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SESSION : VIII DEMOGRAPHIC ASPECTS OF AGRICULTURAL
DEVELOPMENT & FOOD SUPPLY

MODERATOR'S STATEMENT

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MODERATOR'S PAPER FOR SESSION ON "DEMOGRAPHIC ASPECTS OF
AGRICULTURAL DEVELOPMENT AND FOOD SUPPLY"
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The most dramatic aspect of the "population problem" is the race between population growth and the food supply. The classic expression of this problem is that of Malthus, who pictured population as always pressing on the food supply, with the dour conclusion that it is the natural destiny of man to live in this state of hunger and want. The Malthusian view is very much alive today, and publicists around the world often point to India as an example of the Malthusian predicament.

The food problem has two sides: first, the number and needs of consumers and, second, the available land and other means of production to meet the needs of those consumers. I would like to speak first about the extent to which consumption needs are being met and second how population growth affects agricultural production, in each case drawing on the papers that were presented for this session.

Sometimes, reading the newspapers, one might think that hunger is a new problem. Hunger is of course nothing new and throughout history it has been an ever-present threat or reality. To quote one authority, Roger Revelle, "Throughout the last six thousand years most human beings everywhere have lived in deprivation, ignorance, and misery. The present situation of the peoples of the West and the so-called developed areas is a highly anomalous departure from the normal human condition. It remains to be

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seen whether this will prove to be an ephemeral perturbation or a transition to a new level of human fulfillment, a true Age of Man."

Hunger has stalked man since his beginnings. But there are three new elements. First, through modern technology we have a reasonable expectation that we can do something about eliminating hunger--not just for a privileged few but for all of mankind.

Second, we are concerned--our conscience is stirred. This is newer than one might think. It is not so long ago that famine relief was not thought of as an obligation or responsibility of government. I am not just talking about China and India. To cite a single case, at the time of the Irish famine in the middle of the 19th century the British government really did not regard this as its problem--it was an Act of God.

Third, our very success in reducing famines, hunger, and disease has led to huge increases in population and at present rates of growth the prospects for future increases are utterly staggering.

So what we have is a vastly larger problem, a much more effective technology for meeting it, and a new conscience that we must do something about it, with the goal of providing a decent diet for all the peoples of the earth. Internationally the UN Food and Agriculture Organization is dedicated to achieve a new human freedom--"Freedom from Hunger."

In few countries are the lines more clearly drawn than in India. As we all know, India is engaged in a vital race between population and the food supply. As we all know, the amount of population growth in India during the last decade has been enormous. The rate of growth, though high, is not spectacular. But because of the large base the prospective growth in the future, barring catastrophe, will be huge. Even the "low" projections

for India indicate a population of a billion people by the end of this century.

Abstractly one can view the saving of lives to this result as a good thing or a bad thing; but if you are the people concerned you obviously view this as a good thing. Most people prefer to live rather than to die.

The alarmists about the situation sometimes deal in paradoxes; for example they say "The countries of the underdeveloped world are overpopulated by the simple criterion that they are not able to produce enough food to feed their populations." In a strict sense this is obviously not true. They do feed their population and the increase in their populations or these would not exist. There is no hard evidence that taken as a group the countries of the less developed world have experienced a deterioration in their diet or that people are simply being saved from disease to die later from starvation. There are of course conspicuous exceptions such as Bangladesh and Biafra associated with war and natural disasters. But aside from these there is almost universal evidence that death rates have declined, and at all ages. Not only are lives being prolonged but the threats to life, whatever their causes, are being reduced.

I do not say this to justify the poverty and hunger that still exist in the world. Obviously there are tens of millions, indeed hundreds of millions of people who are undernourished and malnourished today, but I mention some optimism to point out that the situation is far from hopeless and that progress is being made. The very fact of population growth itself shows that progress is being made. But in a finite world this cannot go on forever.

Where does India stand in the race between food and population? One paper prepared for this session, by Dr. A. K. Garg, reviews the picture for India as a whole. His paper deals with the "Demographic Factors Affecting Magnitude and Distribution of Food Requirements and Production," giving a review of the world situation and then a comparison of population change, of production of food grains, and of nutrition in India during the period 1950 to 1970. He determines that in this 20-year period the Indian population had grown 53% while the food grain production had risen 96%. One might quibble about some of the figures but the general conclusion is certainly correct. Far from being static, Indian agriculture has made great strides in the production of food grains during the last twenty years. At the same time population growth has literally eaten up over half the gains in production. There remains some, but not enough, rise in per capita output. Despite this rise, says Dr. Garg, nutrition in India remains deficient. Eighty per cent of the calorie intake still consists of food grains, while in the developed countries this figure is less than 60%, the balance including a much higher content of protein and protective foods. Dr. Garg does not mention another problem, namely that the necessity for concentrating on food production has weakened India's position in the production and export of other crops. Dr. Garg foresees the early possibility of India becoming self-sufficient in food and in the near future achieving a better diet, even with its expanding population.

This is a macroscopic view of the situation. Two of the other papers deal in more detail with the problems of two major states. The first, by Dr. B. B. Sarkar, concerns the "Interrelations of Population Growth, Agricultural Land Use and Food Production in West Bengal." Dr. Sarkar

presents a much gloomier picture of the situation than does Dr. Garg. His study is of the sixteen districts of West Bengal, showing how population growth in the 20 years 1951-1971 has brought changes in the land-man ratio, in utilization of land for agricultural production and in the availability in food grains in each district and in the state as a whole. In the period 1951-1971 the population of West Bengal has risen from 26,3000,000 to an estimated 43,605,000.* Correspondingly the per capita land available for cultivation in all crops has dropped from .67 acres to .39 acres. Because of the desperate need for basic food grains the acreage devoted to rice and wheat has risen from 60% of the cultivable area in 1951 to 80% in 1971. Agricultural productivity has risen owing to more intensive inputs, primarily labor, but the per capita cereal production has grown very modestly and this has been achieved at the expense of not producing pulses and other crops. The physical production of rice and wheat has grown in every district of West Bengal. But in several districts per capita production of wheat and rice has actually declined.

To an outsider a striking feature is the lack of the development of highly-specialized and productive agriculture close to the Calcutta metropolitan area. In most Western cities and indeed in many cities of the underdeveloped areas a more lucrative horticulture has developed around the major cities to provide them with fruits, vegetables, dairy products, etc. In West Bengal there has apparently been no surplus for such luxuries. It has been necessary to focus production almost entirely on basic calorie-producing grains.

*The preliminary 1971 census results give a figure of 44,440,000.

West Bengal was a food-deficit area in 1951 and continues to be so in 1971 by about the same proportion. As Dr. Sarkar points out, this might be regarded as encouraging in a small way in that food production has more or less kept pace with population growth, but this has been achieved by extending rice and wheat acreage at the expense of other crops. In other words, without major changes in technology West Bengal faces a grim future, in which increases in production will be more and more difficult while each year the population grows by larger amounts. The rural areas of West Bengal are already unable to provide an adequate diet for themselves, much less provide any surplus for the huge metropolis of Calcutta. In the last decade West Bengal grew by almost ten million people and it is already the most densely populated state after Kerala. More recently West Bengal has received millions of refugees from Bangladesh. At the rate of growth prevailing in the last decade it will be necessary to feed twelve million more people in West Bengal in the 1970s.

This seems like a hopeless task for traditional agriculture. The easy things have already been done in maximizing the cultivable area and in using the land more intensively by traditional methods. Dr. Sarkar argues for planning at the district level to take account of the rather diverse problems that exist in the different districts. Plans at the state and national level do not get down to the nitty-gritty of district problems. This is perhaps so, but one wonders whether planning alone, no matter how good, can long stave off disaster in West Bengal without a major transformation of agriculture. Dr. Sarkar's statement of the problem seems to be particularly conservative in that he is referring only to rice and wheat. Very disturbing is the increasing proportion of land in these crops,

which means that there is less of other foods. Thus far the green revolution seems to have had little effect in Bengal, except for the relatively small area in wheat.

This is a discouraging picture. What about something more average for India? This is given in a paper presented for this session by Messrs. R.K. Kacker and N.K. Verma on "Growth of Population and Production of Food Grain in Uttar Pradesh." To those of us from abroad, the size of the larger Indian states, with populations larger than most nations, is awe-inspiring. Uttar Pradesh, with some 90,000,000 people has a population roughly comparable to that of Brazil in South America, which has twenty-five times the geographical area. In contrast with West Bengal, Uttar Pradesh has in the last two inter-censal periods grown less rapidly than India as a whole. Nevertheless it has experienced enormous population growth--some 14.5 million between 1961 and 1971. Any reasonable forecast, barring a major catastrophe, sees the population of this state exceeding 100 million by the time of the next census. Uttar Pradesh produces less than its per capita share of cereal production, but makes up for this by the fact that it produces twice its per capita share of pulses. Until very recently the annual increase in the production of food grains in Uttar Pradesh was only about half the percentage increase of that in India as a whole and per capita production of food grains in 1969-70 was only about 10% higher than in 1950-51. The authors of this paper consider in some detail the relationship between reported production and actual human consumption. They point out that if proper allowance is made for seed requirements, cattle feed, and other losses, the per capita deficit in food grains in Uttar Pradesh was some 21 lakh tons, or about 11% of the total requirement and

this increased to 16% in the poorer crop years of 1968-69. Fortunately yields of cereals and especially wheat have made strong advances since 1969 and there is real hope that the targets may in fact be achieved. If the targets of the Fourth Plan are achieved in 1973-74, Uttar Pradesh will have achieved just about the basic requirements of food grains at 214 lakh tons as compared with a total requirement of 216 lakhs. It seems likely, as suggested by the authors, that Uttar Pradesh will indeed reach self-sufficiency as measured by total requirement of food grains within the next few years.

Self-sufficiency and "total requirements" are of course relative terms. Averages for a total population are deceptive in that many are better and many are worse than the average. Hunger will continue to be a major problem in Uttar Pradesh for many years to come, but it is a great source of gratification that this first state of India is making good progress in providing a higher calorie diet for its population.

The picture is not complete without looking at other areas in India, especially those with the most favorable experience. For this one naturally looks to the Punjab. The Punjab is of course now a major surplus area-- it traditionally has been so, but now this volume of surplus has been greatly increased. The very success has created many structural problems. In a country where only a relatively small part of the crop moves into the cash market the sudden increase of productivity such as occurred in the Punjab means a far larger than proportionate increase in the amount of the crop available for the market, which creates all kinds of problems of storage, transport, credit, and marketing. The experience of the Punjab has clearly indicated that for maximum effectiveness the green revolution is going

to have to be something very much more than the introduction of new seeds and the application of more fertilizer. It requires a restructuring of the whole agricultural and marketing economy for the products concerned. But there is now no question of any food shortage in the Punjab if we are talking about calories and average per capita consumption.

I have pointed to three very different regional situations in India. I have done this to emphasize, what is obvious but often overlooked, that India does not have a single "food problem" but a multiplicity of different regional problems. It seems to me that the answer to the question "Can India Feed Its Growing Population?" is too general—it is really a whole set of different problems depending on the region concerned. But if we must look at the country as a whole it seems likely that India will be able to increase her food production faster than her population in the next few years. New agricultural technology, and quite as important, the willingness of the farmer to adopt these technologies, is giving the country a "breathing space"—time to make an adjustment in the rate of population growth, which in the long run simply cannot be maintained in a finite world.

I have been talking about consumption needs and extent to which they have been met and perhaps may be met in the near future. Let us turn to the other side of the coin. What are the interrelations of demographic changes and problems of production and productivity?

Obviously, rural population densities such as those observed in India mean great pressure on land. A paper by V.M. Danekar and S.N. Gadam contributed to this session is entitled "Rural Population Densities in Relation to Agricultural Resource." This study examines the data for the 309 districts, relating rural population density to the production of 14

crops beginning with rice and wheat. As might be expected, the land use pattern and rural densities turn out to be highly related. On the average, an acre of rice supports about two persons, an acre of wheat and other cereals about one person, and an acre of pulses about .4 persons. An acre of sugarcane supports about 3 persons and an acre of vegetables about 8 persons. The paper asks the question whether rural population density determines land use or whether land use determines density. It seems to me this is the traditional hen and egg problem: Which comes first the hen or the egg? The author speculates as to whether these densities derive from migration or from "natural" forces, that is, the natural increase of the population from birth and death rates. He speculates that migration over the years may be more important than is commonly thought in India, which is usually regarded as a country of great residential stability. I think this is a question on which it is not necessary to speculate. The decennial censuses provide presumptive evidence and I think we would find, upon close inspection, that there has indeed been cumulatively a very great amount of migration to new lands or to newly-irrigated land and to other more attractive and less densely populated regions.

As noted earlier, the growth of population has important effects on farm size and the size of the farm unit. In a quite sophisticated article P.S. Sharma writes on "The Impact of Farm Size on Agricultural Productivity in India--A Cross-Sectional Analysis on the Basis of 1961 Census Data." Sharma starts his analysis by pointing out that what is relevant is output rather than acreage. He measures the influence of holding size, rainfall and irrigation on output per acre. Sharma's study is valuable as a straightforward analysis of the situation in traditional agriculture, as shown by the 1961 census data. The picture is the familiar one of

increasing pressure of population on the land, of decreasing size of holdings, of increasing tenancy, and of wide differences in productivity between small and larger holdings. The greater intensity of labor input on the smaller holdings was necessary to gain the increases in output necessary to feed the population. This may in part explain the relatively slow growth of the non-agricultural population in India as compared with some other less developed countries. The productivity of agricultural labor in India has traditionally been low, but greater and greater intensity of labor input has been required to provide the increases necessary to feed the expanding population.

We have been concerned up to now with relatively simple relationships between the population size and the food supply, farm size, and the intensity of cultivation in the traditional agriculture, now happily modified in some areas by the progress of the green revolution. In India one understandably finds a rather obsessive concern with "self-sufficiency" in food whether for the different states or for India as a whole. In a literal sense and in relation to food grains it seems that the country is nearing that goal. This does not mean that self-sufficiency is within reach for some areas such as West Bengal nor even for large sections of the population in states that are doing better. Hunger has not been fully conquered, but it is in retreat.

Often the solution of old problems creates new ones. There is much discussion of the effects of the green revolution on agricultural employment and rural welfare. In the long run this may prove to be a more stubborn and more disruptive effect on population growth than the food problem. The latter, after all, is not new.

Understandably many Indians are concerned about this problem of how

to usefully employ the rapidly-growing working force in rural areas and I shall make some observations on it though no papers on this subject were offered for this seminar. Much has been said about the first and second and even third generation effects of the green revolution. A first observation is that only a rather small proportion of farmers in India and in other less developed areas have thus far profited from the new varieties.¹ In any case what is occurring and must occur is much broader, an agricultural revolution involving complex effects in many directions. Even a bare listing of suggested measures for bringing about a better balance between population and food supplies in India takes more than a printed page.² Beyond these are major problems of storage, credit, marketing, and pricing. But these are economic problems with relatively short run effects that will hopefully be straightened out by the price mechanism and by government policies.

What I would like to discuss briefly here are the possible social consequences. In India and several other Asian countries the green revolution is developing in the following context: there is rapid population growth in areas already very densely populated; there are very low incomes but with wide regional and class disparities in income, wealth, and power; at present there are limited opportunities for useful non-farm employment despite rapid growth in manufacturing and service sectors; and finally there are major possibilities of labor-displacing technology in the new agriculture.

The population of labor-force age in the rural areas of India was about 195 million in 1961 and grew to perhaps 245 million, or about 50 million, in the decade. In the next decade it will grow 50-60 million

more and the total rural labor force may approximate 300 million. Finding useful employment for such massive increments obviously poses enormous problems. No foreseeable increase in industrial development seems likely to absorb this increment or indeed any substantial share of it. Places for the majority of these workers must be found where they are, in the rural areas and in agricultural activities.

The outstanding feature of the green revolution is its productivity, achieved by a technology in which capital-intensive inputs may replace labor-intensive inputs. The most dramatic of these is the possibility of replacing human power by tractor power. This of course greatly increases labor productivity of those employed but, even more important from the point of view of gains in production, tractor cultivation often provides the opportunity for double or triple cropping, which means getting more total yield per acre than is possible with human labor. In India tractors may be an essential ingredient in increasing the yield per acre though in other places this kind of extensive cultivation is often associated with lower productivity per acre. Will the new agricultural technology displace labor or absorb it? Apparently there is no simple solution or answer that is equally good for India or the less developed countries as a whole.

Perhaps the best test to date is what has happened in the Punjab. In a recent issue of Agricultural Situation in India,³ there are presented the results of a detailed field survey of the impact of the new developments on the demand for agricultural labor. The initial results are clearly favorable if measured by the fact that the real wages for agricultural labor have risen. The labor-displacing qualities of mechanization have been more than compensated for by the increased demands for labor in

double-cropping and in handling a larger crop in servicing, transport, and processing. Also the demand for labor has been spread out with less of a peak demand at one time. Reports of this nature are reassuring.⁴ The extent to which small cultivators as well as large holders have adopted the new varieties is also a favorable sign.

Nevertheless there are ominous tendencies. For obvious reasons the larger and wealthier landowners are the first to adopt the new technologies, if for no other reason than that they have the capital to adopt them, that is, they have the funds to buy adequate supplies of fertilizer and to mechanize. Already there has appeared a tendency for the larger holders to displace tenants and thereby reduce them to the status of agricultural laborers. Price of land has risen, and again the larger holder has major advantage in expanding his holdings to progressively more economic sizes. He is of course in a more advantageous position to acquire more land. In West Pakistan, where conditions are similar to the Indian Punjab, there has been a transformation of the landlord-tenant relationship into one of capitalist-wage labor.⁵

But perhaps most disturbing is the impact on the farmers who are not in a position to benefit from the new technology. These are producing crops like wheat and rice that are in competition with producers of the new varieties. The results can be shattering. If, as seems very likely, the price of staple grains is reduced as the new varieties make progress, the traditional farmer on dry lands, for example, may actually be worse off than he was before because he is getting a lower price for the same output. In other words, class and personal differentials of income and wealth between regions may well be accentuated by the new agricultural

revolution.⁶

Underlying the whole problem, of course, is demographic pressure. If there were not already very high densities of population on the land, much of the potential third-generation effects of the green revolution would not be likely to occur. But while the green revolution can mean much more food and better diets for the majority, it could indeed spell disaster for marginal traditional farmers who are not in position to benefit from the new technology.

These problems have given rise to major differences regarding the best agricultural strategy. Some of my colleagues argue persuasively that India and other countries in a similar situation would be well advised to attempt to follow the model of Japan and Taiwan, where agricultural advances were widely shared by the rural population, perhaps at the expense of maximum increase in production. There are also demographic reasons for this that I shall mention below.

As demographers and students of population we might ask if there is a demographic solution or a contribution of population limitation to the solution of the massive problem of rural poverty and underemployment. In the long run it is an essential element. But if we are talking about the labor force and the impact of population growth on the economy we would have to admit that even a rapid reduction of the birth rate will not be an important substitute for economic development in the 1970s. Babies and small children are not large consumers. A rapid reduction in their number will not have a large immediate effect in damping the expanding needs for food, shelter, education, and other services. Children and young people who will cause these demands in the 1970s are mostly already born. And

of course the effects of demographic changes on the labor force will be longer delayed. Reduction of birth rates now will only begin to affect the number of persons entering the labor force some 12 to 15 years hence. Thus investment in family planning programs and in the reduction of the birth rate, no matter how advantageous in benefit-cost terms, is in fact a long-term investment and not, unhappily, a major solution to the economic problems of the 1970s. It is much more for those of the 1980s and still more for the 1990s and beyond. It does not follow that family planning programs are not important now. Because of the enormous inertia of population growth there is a long "braking" distance to bring it to a halt, and action taken now will be more effective than if taken later.

I have been discussing how population growth and population pressure affect the food supply and agricultural development. We may turn this around and ask how does agricultural development affect population?

No strategy aimed at checking population growth can ignore the rural masses. These are three-fourths of the population in the developing countries today, that is, close to two billion people, and, according to the United Nations estimates, their numbers should increase about one billion to a total of about three billion rural people in the developing countries by the year 2000. This is despite the assumption of enormous rural-urban migration and the expectation that urban areas will absorb an increase of no less than one and a half billion people in that period. But even with this assumption the majority of the people in the developing countries will still be rural in the year 2000.

India is, of course, no exception. On the contrary, a larger proportion of the population in India is rural (about 80%) than in the rest of the

underdeveloped world. It is a safe assumption that the urban population will grow faster than the rural population but even if it grows at a very much faster pace India will still remain predominantly rural in the foreseeable future.

Urban people are more receptive to the idea of family planning than rural people. There are many reasons for this: the lesser economic value of children in the city; the greater space constraints in living arrangements; higher aspirations for children; the greater accessibility of methods of birth control, and so on. In India as in many other countries there apparently are fertility differentials, with lower fertility in the urban populations and especially the urban upper classes.

Happily, perversely, and entirely contrary to Malthus we see that throughout the world when people become prosperous they have fewer children. In all of the developed world, and I mean in every single country, birth rates are now quite low. Birth rates are also falling in those countries of the less developed world that are making rapid socio-economic progress. In Asia this has happened first in Japan and more recently is occurring in Korea, Taiwan, Hong Kong, Singapore, Malaysia, and Ceylon. In all of these countries the birth rate has been falling with the attainment of higher levels of socio-economic development. This is not just true of East and Southern Asia. It is also true of widely scattered countries with widely differing cultures, such as Turkey, Tunisia, Albania, and the Central Asian Soviet Republics--all countries of Muslim tradition; among the black populations of the West Indies; among the more developed and developing countries of Latin America such as Chile, Costa Rica, and Brazil. The populations of Indian background in Malaysia, in the Fiji Islands, in

Mauritius, and in Trinidad all are experiencing reductions in birth rates. Universally family limitation has made greatest progress among urban populations but then among the more prosperous rural populations. It seems reasonable to expect that an agricultural development strategy that improves the lot of the agricultural masses rather than just the larger and perhaps more efficient producers would accelerate the demographic transition from high to low birth rates. A landed peasantry with rising income and rising aspirations has very tangible reasons for family limitation--a landed peasant does not wish to divide his land among too many sons or to jeopardize the advancement of his children by having too many. Landless laborers on the other hand have no such motivation. Often more children are simply more hands. Japan, Taiwan, and now Korea are conspicuous examples where progress in agriculture has been widely diffused to the benefit of smallholders as well as largeholders. It is probably not accidental that in these countries rural birth rates are now quite low, as they are in Japan, or are falling very rapidly, as they are in Korea and Taiwan. I think these are realistic models for what may happen elsewhere.

To return to India, the data are not readily available to tell us what has been happening to the birth rate, as you know. In the absence of complete vital statistics the Registrar-General has developed an improving sample registration system. But the 1971 census will provide the best source for assessing trends. It will be the people in this room who have the data and the skills to make this kind of analysis. I hope they will do so.

FOOTNOTES

1. It had actually been applied to only 10-15% of Asian farm acreage up through 1969. Cf. Walter P. Falcon, "The Green Revolution: Generations of Problems," American Journal of Agricultural Economics, 52, 5: 698-710, December 1970.
2. Cf. Roger Revelle, "Population and Food Supplies" in Prospects of World Food Supply, U.S. National Academy of Sciences, 1966.
3. S. S. Kahlon, J.R. Gupta, and R.K. Sondhi, "Impact of New Farm Technology on Farm Labour Use in Punjab, 1966-67 to 1969-70," Agricultural Situation in India, XXVI, 9:629-636, December 1971.
4. S. S. Johl, "Mechanization, Labor-Use, and Productivity in Indian Agriculture," Economics and Sociology Occasional Paper No. 23, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1971 (mimeographed).
5. Carl H. Gotsch, "Tractor Mechanization and Rural Development in Pakistan," Development Advisory Service, Harvard University, June 15, 1972 (mimeographed).
6. Cf. B. S. Minhas, "Mass Poverty and Strategy of Rural Development in India," March 1971 (mimeographed) and "Rural Poverty, Land Redistribution and Development Strategy: Facts and Policy," Indian Economic Review, 97-128, April 1970.

Summary

In this session we have been asked to consider population growth in relation to food supplies and agricultural development. The contributors to this session and this author conclude that India is gaining in the race to feed its rapidly-growing population. National self-sufficiency in food grains is within sight. The average Indian is probably eating better and has the prospect of further improvements in the next few years. Hunger has not been fully conquered but it is in retreat. The Cassandras have been confounded. Progress in food production is giving India the "breathing space" it must have to slow its massive population growth.

This does not mean that all Indians or all Indian states have shared in this progress. As one paper forcefully brings out, West Bengal has not shared in the gains made in other states. And in each state large sectors of the population have not benefitted by recent national progress.

Other contributors to this session have also pointed out the continuing pressure of population on the land in the traditional sector, causing smaller holdings, high prices for land, tenancy, landlessness, concentration on cereal production, and labor-intensive, inefficient production.

The green revolution is changing this in some areas, but not without real dangers. Studies in the Punjab suggest that mechanization and capital-intensive methods may even increase the demand for labor and increase real wages in the short run. But in Pakistan and some parts of India landlord-tenant relationships are being replaced by capital-labor relationships with all their social implications. It is not yet clear what the long-range effects of the agricultural revolution may be in relation to the enormous increases in the agricultural labor force that must be

absorbed in the next few years.

Reductions in population growth will not resolve these problems in the next few years but are a sine qua non for long range and definitive solutions. It is suggested that an agricultural strategy that favors the wellbeing of the rural masses rather than simply maximizing production will contribute to an earlier and more rapid reduction of birth rates and hence an earlier solution of the problems of food and agricultural underemployment. The 1971 census should provide some data to test this hypothesis.

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SESSION : VIII DEMOGRAPHIC ASPECTS OF AGRICULTURAL
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VIII. 01

Rural Population Densities in Relation to Agricultural Resource

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Rural Population Densities in Relation to Agricultural Resource

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1. It is well known that the density of population in relation to geographical area varies greatly in different regions of the country. The purpose of this paper is to examine to what extent the variation in the density of rural population may be attributed to the differences in the agricultural resources of different regions. Though agricultural resources include several things, besides land and water, such as livestock, implements, etc., we shall confine attention to only the resources in land and water. Resources in land and water are ultimately reflected in land use namely area devoted to agriculture, pasture and forest and, within the arable area, land devoted to different crops. The hypothesis underlying the study is that, land under different uses has different capacity to carry human population and that this will be reflected in different densities of rural population in relation to rural area.

2. For purposes of this analysis, we propose to choose the district as the unit. This is the smallest unit for which data relating to both population and land utilization are available readily and on a uniform basis. The data relating

to population relate to the year 1961 and are of course taken from the Census of India 1961 (Vol. I, India, Part II-A(1), General Population Tables). The Census also gives, side by side with estimates of population, the relevant geographical area. The rural area relevant to the rural population is derived from the geographical area of the district as reported by the Survey Departments of the respective States minus the urban area as reported by the local authorities of towns in that district. All the districts as they were in 1961 are included in the study. However, there are a few exceptions. Three districts namely Calcutta, Greater Bombay and Madras are omitted because they are entirely urban districts. We are also omitting Howrah because it is a predominantly urban district. Among the Union Territories, only Himachal Pradesh is included as the land use data were not readily available for the remaining territories. Further, the land use data for the districts used in the following are for the districts with 1951 boundaries. Hence a few adjustments became necessary. A few districts in Uttar Pradesh, Punjab and Himachal Pradesh were split up into two districts each between 1951 and 1961. They are the following:

<u>State</u>	<u>1951 districts</u>	<u>1961 districts</u>
Uttar Pradesh	Tehri Garhwal	Tehri Garhwal Uttar Kashi
	Garhwal	Garhwal Chamoli
	Almora	Almora Pithoragarh
Punjab	Kangra	Kangra Lahaul and Spiti
Himachal Pradesh	Mahasu	Mahasu Kinnaur

In the following, we refer to the districts with their 1951 boundaries. Any changes in the boundaries of the other districts between 1951 and 1961 are neglected. We presume that this will not affect the general findings of this study. Thus, the study includes in all 309 districts.

3. The land use data are taken from 'Indian Agricultural Statistics' - Detailed Tables and refers to the year 1956-57. This was the latest year for which districtwise data on land use was available when the study was undertaken. Since then, the data for the year 1958-59 have become available. However, we have not reworked our results. We presume that such a reworking will not materially change our results. There is only one exception. For Kerala, the data for 1956-57 were not available. Hence, we have used the data for the year

1958-59 for this state. Thus the land use data refer to the year 1956-57 for all states except Kerala for which the data refer to the year 1958-59.

4. In Table 1, we give the distribution of the districts according to the rural density expressed as number of persons per 100 acres of rural area. It will be seen that the density varies from less than 10 persons per 100 acres to more than 200 persons per 100 acres. But in the case of 247 districts, that is 80 per cent of the total, the density does not exceed 100 persons per 100 acres or one person per acre. There are 19 districts with densities in excess of 150 persons per 100 acres. They are: Hooghly (221), Murshidabad (160), and Burdwan (150) in West Bengal; Muzaffarpur (205), Saran (202), Darbhanga (197), and Patna (179) in Bihar; Deoria (174), Jaunpur (166), Ballia (162), Azamgarh (162), Ghazipur (154) and Gorakhpur (152) in Uttar Pradesh; Alleppey (358), Trivandrum (261), Trichur (206), Ernakulam (185) and Quilon (166) in Kerala; and Kanyakumari (210) in Madras. At the other extreme, there are 9 districts with rural densities less than 10 persons per 100 acres. These are: Ladakh (0.4), and Doda (9) in Jammu-Kashmir; Mizo Hills (5), United Nikir and North Cachar Hills (7) and United Khasi and Jaintia Hills (1) in Assam; Jaisalmer (1), Bikaner (4), and Barmer (9) in Rajasthan; and Kutch (5) in Gujarat. All these are either hilly or desert districts.

Table 1 : Distribution of the Districts According to the Rural Population Density

Density Class Person/100 Acree	Frequency
0	2
10	20
20	40
30	35
40	38
50	21
60	20
70	18
80	15
90	12
100	16
110	9
120	11
130	3
140	5
150	4
160	4
170	2
180	1
190	1
200 & above	7
Total	309

5. This large variation in the rural density from district to district might be presented in another way. Average rural density for the 309 districts included in this study is about 48 persons per 100 aerea. This density is referred to as the all-India rural density. We might express the rural density in each district as a percentage of the all-India rural density and classify the districts according to this percentage. The distribution of the

districts on this basis is shown in Table 2. It will be noticed that in 8 districts the rural density is more than 4 times as high as the all-India density and that, at the other extreme, the density in 8 district is less than 20 per cent or one-fifth of that of the All-India density.

Table 2 : Distribution of the Districts by Rural Population Density as a Percentage of All-India Rural Population Density

Percentage Class Interval	Frequency
0 -	3
10 -	3
20 -	6
30 -	12
40 -	25
50 -	20
60 -	30
70 -	29
80 -	16
90 -	15
100 -	17
110 -	9
120 -	10
130 -	9
140 -	6
150 -	6
160 -	3
170 -	11
180 -	2
190 -	8
200 -	30
250 -	16
300 -	10
350 -	3
400 & above	8
Total	309

6. Let us now examine to what extent these differences in the rural densities in different districts may be explained as due to differences in the agricultural resources of the districts. As we have earlier explained, by agricultural resources of a district we mean its land and water resources as are evident in the pattern of its land use. In particular, we shall distinguish areas under the following fourteen crops or groups of crops: (1) Rice, (2) Wheat, (3) Other cereals, (4) Pulses, (5) Sugar, (6) Fruits and Vegetables, (7) Condiments and Spices, (8) Miscellaneous Food-crops, (9) Fibres, (10) Oilseeds, (11) Plantation Crops, Drugs, Narcotics etc., (12) Fodder, (13) Miscellaneous Non-food crops, (14) Area not under crops. As we have expressed the rural population densities in terms of persons per 100 acres of rural area of the district, we shall consider the acreages under the above categories of crops per 100 acres of the rural area of the district. We propose to examine the relationship between rural population density with land use pattern by finding the multiple regression of the rural density on the above-mentioned fourteen categories of land use. We should note that by reducing all the district data, both for rural population and crop acreages, on the basis of per 100 acres of rural area we have eliminated the effect of the differences in the size of the different districts; the latter would have affected the regression if we had worked with total rural population and total acreages under different crops in each district.

7. In Table 3, we give the results of the regression analysis.

Table 3 : Multiple Regression of Rural Density on Crop Acreages

	Explanatory Variable	Regression Coefficient
0.	Constant term	1.427367
1.	Rice	2.038899*
2.	Wheat	0.865340*
3.	Other cereals	0.990131*
4.	Pulses	0.437146*
5.	Sugar	3.172341*
6.	Fruits & vegetables	8.202946*
7.	Condiments & spices	-0.510084
8.	Misc. food crops	-1.787168
9.	Fibres	0.199198
10.	Oil seeds	-0.320629
11.	Plantation crops, drugs, etc.	0.770566
12.	Fodder	0.009514
13.	Misc. non-food crops	2.818899
14.	Area not under crops	-0.037984

The regression coefficients for rice, wheat, other cereals, pulses, sugar and for fruits and vegetables are significant at 5 per cent level of significance. In the above Table, they are marked with an asterisk. The remaining regression coefficients are not statistically significant. The value of the multiple correlation coefficient is 0.922491 which means that as much as 85.10 per cent of the total variation in the rural densities is explained by the differences in the pattern of land use in different districts.

8. To see the meaning of this, we should work out for the several districts, the rural densities that we should expect taking into account the land use pattern in them and the regression relation between the rural density and the land use pattern we have obtained above and then check how the actual rural densities compare with the expected densities thus estimated. This is done in Table 4. In this Table we give a distribution of the districts according to their actual rural densities expressed as percentages of the rural densities expected in them on the basis of the regression relation obtained above. It will be noticed that in 8 districts the actual densities are less than 50 per cent that is less than half of the expected densities, and that in 17 districts the actual densities are more than 150 per cent that is more than one-and-half times the expected densities. Barring these 25 districts, in the remaining 28 districts the actual densities are within 50 per cent and 150 per cent of the expected densities.

9. This Table should be compared with Table 2 in which is given a distribution of the districts according to the actual rural densities expressed as percentages of the all-India average rural density. There, it will be noticed, in as many as 51 districts the actual densities are less than 50 per cent of the all-India average density and that in as many as 97 districts the densities are more than 150 per cent of the

Table 4 : Distribution of the Districts According to Their Actual Rural Densities Expressed as Percentages of the Rural Densities Expected in Them on the Basis of the Regression

Percentage Class Interval	Frequency
Negative	1
0 -	-
10 -	-
20 -	1
30 -	2
40 -	4
50 -	15
60 -	21
70 -	29
80 -	47
90 -	42
100 -	44
110 -	30
120 -	23
130 -	22
140 -	11
150 -	4
160 -	6
170 -	1
180 -	2
190 -	1
200 & above	3
Total	309

all-India average density. Consequently, in only 161 out of the 309 districts the rural densities are within 50 per cent and 150 per cent of the all-India average density. In contrast, when we take into account the land use pattern in the districts and the regression relation between the land use pattern and the rural densities, in as many as 284 out of the 309 districts the actual densities appear to lie between 50

per cent and 150 per cent of the expected densities. This is the meaning when we say that a large part of the variation, in fact more than 80 per cent, in the rural densities is explained by the differences in the land use pattern in different districts.

10. Let us for a moment return to Table 4. As already noted, in 8 districts the actual densities are less than 50 per cent of the expected densities and in 17 other districts the actual densities are more than 150 per cent of the expected densities. Clearly, in these 25 districts, the regression relation between rural densities and the land use pattern does not explain quite satisfactorily the actual densities. We should therefore see which these districts are. The 8 districts in which the actual densities are less than 50 per cent of the estimated densities are the following: Ladakh (0.4) in Jammu & Kashmir; Jaisalmer (1.3), Barmer (9), Churu (11) and Jodhpur (11) in Rajasthan; Baudh-Khondmal (19) in Orissa; and Raipur (34) and Durg (35) in Madhya Pradesh. The figures in brackets show the actual rural densities in these districts. It will be noticed that these are all low-density districts having densities much below the all-India average. The densities to be expected in these districts on the basis of the regression relation are much higher. Consequently, the actual densities in these districts turn out to be less than

half of the expected densities. In other words, the rural densities in these districts are not only below the all-India average density but are much below, less than half, the densities to be expected in them taking into account their land use pattern.

11. At the other end, there are 17 districts where the actual densities are more than 150 per cent of the expected densities. A majority of these districts, in fact 12 out of the 17, are again low-density districts with rural densities below the all-India average density. These districts are: Sirohi (24), Udaipur (30) and Bhilwara (31) in Rajasthan; Dangs (16) and Amreli (34) in Gujarat; Tehri Garhwal (15) in Uttar Pradesh and Palamau (36) in Bihar; Doda (9) and Poonch (29) in Jammu & Kashmir; Siala (43) in Punjab; and Mizo Hills (5) and U.Mikir & North Cachar Hills (7) in Assam. As mentioned above, these are all low-density districts. Some of them are desert districts and others are hilly districts. Nevertheless, they seem to support populations much in excess of what would be expected of them taking into account the pattern of their land use.

12. The remaining 5 districts with actual densities more than 150 per cent of the expected densities are: Ratnagiri (53) in Maharashtra; Coimbatore (70) and Salem (72) in Madras; and Monghyr (122) and Bhanbad (150) in Bihar. From the figures in brackets, it will be seen that their actual

densities are above the all-India average density. Moreover, these densities are between 50 and 60 per cent above the densities to be expected in them on the basis of their land use patterns.

13. To sum up, among the 25 districts where the regression relation between the land use pattern and rural density cannot be considered quite satisfactory because the actual densities are either less than 50 per cent or more than 150 per cent of the densities to be expected on the basis of the land use pattern, 20 districts are low-density districts with densities below the all-India average density. It seems therefore that though the regression relation between land use pattern and rural densities is on the whole satisfactory explaining more than 80 per cent of the variation in rural densities in different districts, the relation is not quite so satisfactory in the case of low-density districts.

14. We might note the particular values of the several regression coefficients. These are shown in Table 3. The value of the coefficient for rice is 2.04 which means that an acre of rice supports approximately 2 persons. In the same manner, an acre of wheat and other cereals supports about 1 person; an acre of pulses about 0.4 persons; an acre of sugar about 3 persons and an acre of fruits and vegetables about 8 persons. These coefficients appear plausible. The remaining coefficients are not statistically significant. Nevertheless,

the very low coefficient for fibres which include cotton and jute and also the negative coefficients for oil-seeds, condiments and spices and miscellaneous food crops are puzzling. It seems that, because of the correlations between different crop acreages, most of the regression coefficients are affected by the manner in which the crops are grouped and the number of crops or crop-groups allowed in the regression relation. Interpretation and use of the particular regression coefficients outside the given regression must therefore be done with care.

15. Finally, we should ask the meaning of the entire regression relation. The regression shows that the rural population density is highly correlated with the pattern of land use. The question might be asked as to how the population comes to be distributed in some relationship with the carrying capacity of the land. In particular, is it the result mainly of natural forces of births and deaths, or is it the consequence of inter-district and inter-region migration over the years? If it is the result of natural forces, fertility and/or mortality conditions must differ greatly in different districts with different patterns of land use. On the other hand, if it is the consequence of migration over the years, migration between rural areas must have taken place and might be taking place on a scale not normally suspected.

SUMMARY

The hypothesis underlying the study is that land under different uses, particularly under different crops, has different capacity to carry or support human population and that this will be reflected in different densities of rural population. A simple multiple regression of rural densities in 309 districts (1961 Census) on crop acreages in the districts (14 variables) is worked out. The value of the coefficient of multiple correlation turns out to be 0.9225.

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VIII. 02

Demographic Factors Affecting Magnitude & Distribution
of Food Requirements and Production

By

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DEMOGRAPHIC FACTORS AFFECTING MAGNITUDE AND
DISTRIBUTION OF FOOD REQUIREMENTS
AND PRODUCTION

by

Dr. D.K.Garg*

INTRODUCTION

Food is one of the most important basic needs of mankind. An American writer tells us that "history is the record of man in quest of his daily bread." The relation between food supply and civilization is an ancient one. Man's advances from the most primitive societies to the present have always been based on availability of sufficient food to him. Deficiency in food supply is devastating in its effect on the people and society where the shortages occur.

There have been three major revolutions in the twentieth century. The revolution in communications has broken down the barriers of distance and language and the dynamism of ideas are no longer confined to any particular nation. The political revolution has given sovereignty to nearly a third of the world's population. The third revolution is the population explosion which is a great challenge to the whole world and particularly to the developing countries having high aspirations for a better life after getting independence from the foreign rule.

Today the need to increase food resources is a large and more pressing problem than ever. It is necessary to increase food production at an accelerating rate in order to feed a population which is growing in the world as a whole, at a more rapid rate than even before.

The present dietary level in developing countries, particularly in India is lower than the actual needs. Of the present world population, "10 per cent to 15 percent is under-nourished and upto half suffer from some degree of

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hunger or malnutrition or both." To meet the shortage of foodgrains India has to depend on imports from privileged countries to feed its less fortunate people.

TRENDS IN FOOD PRODUCTION:

There are vast differences in diets throughout the world. The common pattern in most countries is a basic reliance on staple cereals and starchy foods. These are supplemented, when consumers can afford them, with the more expensive nutritionally protective foods. As incomes rise above subsistence level, the more expensive foods are first added to diets and then begin to replace the staple foods.

As mentioned above the level of nutrition in the developing countries is very low as compared to the developed countries. The large disparity is reflected in the calorie supply per capita as shown in the following table:-

TABLE I
LEVELS OF DAILY PER CAPITA CONSUMPTION OF
FOOD BY REGIONS AND GROUPS OF COUN-
TRIES.

Region	Calories	Total protein (grams)
Far East	2070	56
Near East	2470	76
Africa	2360	61
Latin America	2470	67
Europe	3040	88
Northern America	3120	93
Oceania	3250	94
Group I*	2150	58
Group II*	3060	90
World	2420	68

Source: Sukhatme, P.W.(1961). "The World's Hunger and Future Needs in Food Supplies." The Journal of the Royal Statistical Society, Series A (General); Vol.124, Page 477. *The Group I countries include the Far East, Near East, Africa and Latin America (Except River Plate countries). The group II countries include Europe, Northern America, River plate countries and Oceania. These groups correspond fairly closely to the under-developed and developed countries of the world.

The table reveals that diets are poorest in the Far East region which contains over half the world's population and India is a part of it. Throughout most of this region, the people have a daily average per capita calorie intake considerably below the standard estimated by FAO as adequate, taking into account the climate and physical size of the inhabitants. In studies conducted in FAO certain targets have been set for daily per capita consumption of calories and animal proteins and the comparison of these targets with estimated actual levels of consumption affords at least an approximate indication of the extent of present deficiencies. A comparison is shown in the following table for the four "under-nourished" regions:-

TABLE II
PRESENT LEVELS AND MINIMUM TARGETS FOR
DAILY PER CAPITA CONSUMPTION OF
TYPES OF FOODS IN UNDER
NOURISHED AREAS OF THE
WORLD.

	Far East		Near East		Africa		Latin America		Total Under-nourished areas	
	Pre-sent	Target	Pre-sent	Target	Pre-sent	Target	Pre-sent	Target	Pre-sent	Target
Calories Animal	2070	2300	2470	2470	2360	2460	2370	2410	2150	2340
Protein (Grammes)	.8	15	14	20	11	20	19	20	9	16
Index....	100	141	100	117	100	128	100	105	100	133

Source: Sukhatme P.V. (op.cit.), pp.498 and 504
*Excluding River Plate countries.

The above table reveals that while the average of consumption of calories in the Latin America, Africa and Near East are almost near the target figures, there is a deficiency of about 10 per cent in the Far East region which again reflects the great deficiency in India. Deficiency of animal protein consumption are serious in all the under-nourished regions except Latin America. The table in brief indicates that the present level of diet in the Far East region particularly has to be raised the greatest.

Food deficiency in India originated mainly from 1935 when Burma, being a food surplus zone was separated from the rest of India. India attained freedom in 1947 from foreign rule but not freedom from foreign food. At the time of partition, India lost to Pakistan the food-surplus areas of the Punjab and Sind alongwith vast canal-irrigated lands. Just after independence, a committee was constituted which made a series of recommendations for increasing food production such as improved irrigation, more fertilizer, improved seed, cooperatives etc. which have since become quite familiar to this country. In 1948, there was an outcry in Parliament about the increasing import of food grains. It increased from 2.84 million tons in 1948 to 3.71 million tons in 1949. Fortunately in 1950, the production went up and only 2.12 million tons were imported. Then came the Five year Plans of India. It was planned that the country should become self-sufficient in few years. The plans provided huge sums for agriculture development but the country could not become self-sufficient even after twenty years of our planning, still there was considerable improvement in production as is evident from the following table:-

TABLE III
PRODUCTION OF FOODGRAINS IN INDIA
(1950-51 to 1965-66)

Year	Total Foodgrains (in million tons)
1950-51	50.625
I PLAN	
1951-52	51.996
1952-53	59.201
1953-54	69.821
1954-55	69.035
1955-56	66.350
II PLAN	
1956-57	68.855
1957-58	64.311
1958-59	77.141
1959-60	76.672
1960-61	83.018
III PLAN	
1961-62	82.706
1962-63	78.448
1963-64	80.243
1964-65	86.996
1965-66	72.264

Source: Commerce Annual Number 1967 pp.174

The above table shows that the production has increased in all the three Five Year Plans except in the years of drought or any other natural calamity. It continued to increase in the subsequent years also except in 1969 when the monsoons failed in some parts of the country. It is expected that we would have the record production of more than 100 million tons in the year 1970-71.

From the trend of food production in the country, it can be easily concluded that in a span of twenty years i.e. from 1950 to 1970, our food production has doubled. It has increased from about 50 million tons in 1950 to about 100

million tons in 1970. This has been due to particularly more area brought under cultivation in the First Five Year Plan and intensive cultivation in the subsequent years. Recently, the high yielding varieties have brought a revolution in agriculture and it is hoped that in the near future we would become self-sufficient in food.

TRENDS IN INDIAN POPULATION:

The world population is growing very fast and every year a 'New Nation' of about 65 million people is born which is much larger than France. Unfortunately, those 65 million mouths every year, may be more in the coming years, will not be able to feed themselves as France does because the major portion comes in developing countries which are hardly capable of feeding even their existing population. The following table gives an estimated population for the last five decades of this century:-

TABLE IV
POPULATION PROJECTIONS TO THE YEAR 2000,
FOR THE WORLD, CONTINENTS, AND
REGIONS

(United Nations "High" projections; in millions)

Area	1950	1960	1970	2000
World Total	2,500	2,920	3,500	6,280
Africa	199	237	294	517
Northern America	168	197	225	312
Latin America	163	206	265	592
Asia (excluding the Asian part of the Soviet Union and Japan)	1,296	1,524	1,870	3,717
Japan and Kyukyu Islands	34	96	110	153
Europe (excluding the European part of the Soviet Union)	393	424	457	568
Oceania	13.2	16.3	19.4	29.3
Soviet Union (Asian and European Parts combined)	181	215	254	379

Source: The Future Growth of World Population (United Nations Publication, Sales No.1958 XIII 2).

The above data show that out of a total world population of about 3000 million in 1960, two-third i.e. about 2000 million is in the developing countries and only one-third in the developed countries. The table further indicates that by the end of this century, the world population will rise to more than 6200 million and again the growth rate will be higher in the developing countries. It is also clear that Asia, of which India is a part, is the most thickly populated area in the world.

India is a vast country with a high density of population. The population is growing at more than 2.3 per cent per year. Every year, a nation bigger than Australia is born producing more than 10 million mouths to feed. This is a tremendous and challenging task to a nation who is already facing deficit in food.

At the time of partition of the country in 1947, as mentioned earlier, the food-surplus areas went to Pakistan and India with a population of about 340 million at that time had to face the food problem immediately.

The population in the year 1950-51, i.e. just before the beginning of the Five Year Plans was 361 million and according to the estimates prepared by the Registrar General of India, the country should have about 551 million in 1970. The calculations made for the 1971-81 decade are even more startling. The country will have a population of about 700 million in 1981.

FOOD NEEDS IN RELATION TO POPULATION GROWTH:

A number of factors have an important bearing on the trends in demand for food stuffs. Probably the most important factor influencing the need for food is that of population growth.

In developing countries particularly in India which is economically poor, vegetarian food (foodgrains, starchy roots and sugar) constitutes 80 per cent of the calorie intake per head while in the developed countries it is less than 60 per cent.

The distribution of food supplies is not in proportion to the density of population. This imbalance has been aggravated by the higher rate of growth of population in developing countries with denser population and lower growth rate in food production. The following table shows the distribution of population alongwith the respective share in the world food supplies:-

TABLE V
DISTRIBUTION OF WORLD POPULATION AND
FOOD SUPPLIES.

Regions	Percentage Population	Food 'supplies'	Crop Food	Animal Food
Far East	52.9	27.8	44.2	18.5
Near East	4.4	4.2	5.5	2.8
Africa	7.1	4.3	6.3	2.8
Latin America	6.9	6.4	6.5	16.7
Europe	21.6	34.2	26.2	38.4
North America	6.6	21.8	10.4	29.2
Oceania	0.5	1.3	0.9	1.6
	100.0	100.0	100.0	100.0

Source: Third world Food Survey by F.A.O.

The above table shows that the developed countries of Europe, North America and Oceania with about 57 per cent of the world food supplies have to support only about 30 per cent of world population. On the other hand the developing regions of the Latin America, Far East, Near East, and Africa produce only 43 per cent of the world population. The situation in the Far East particularly is still worse where the food supply is only 28 per cent and 52 per cent of the world population has to be supported. The problem in India is of the same magnitude.

The challenge of deficit and malnutrition has been met very courageously by India and the progress in food production in the last 20 years has been very encouraging inspite of repeated natural calamities like drought, floods, etc. in the country. During this period, the rate of production has been much higher than the rate of population growth. Of course, the self-sufficiency in food has not yet been achieved, yet the deficiency has been met to a great extent inspite of a much higher birth rate than many other countries of the world. The following table will give **an idea** about the rates of population growth and food production in India in the last twenty years:-

TABLE VI
RATES OF POPULATION GROWTH AND FOOD
PRODUCTION FROM 1950 to
1970.

Item	Years		% increase
	'1950	: 1970'	
Population, millions	361	551	53
Foodgrain, millions tons	51	100*	96

* Estimated

From the above data, it is evident that in the last 20 years the population of India has increased from 361 million in 1950 to 551 million in 1970, the per cent increase being 53. On the other hand the foodgrain production has almost doubled. Therefore, with this trend it can be anticipated that in the next few years the country should become self-sufficient in food. It may be emphasized here again that had the population growth rate not been so high in the past, the country would have become self-sufficient by now.

HOW TO ATTAIN SELF-SUFFICIENCY IN FOOD:

India's food problem should be met with two angles. Firstly, the food production must be increased further and secondly, the population growth rate should be reduced to the

minimum. Family Planning programmes need to be taken up on war-footing because increase in production is neutralized by the increase in population. Consciousness should be developed in the rural masses which constitute about two-thirds of the population. Progress in the programmes has been quite satisfactory. Japan has tremendously reduced its birth rate and we hope that India will follow Japan in this direction.

As mentioned earlier, the food production is increasing in the country. Another front on which we can make more intensive efforts is the production of marine fish since the country is surrounded on its three sides by sea. Peru is a good example where fish production rise from 50,000 tons in 1954 to 9 million tons in 1964.

While bringing more land under cultivation is important, greater output per hectare of land is necessary. There are great potentialities for increasing food production by practicing scientific methods of cultivation, namely, use of high yielding variety seeds, building up soil fertility, combating pests and diseases, use of improved implements and machinery, adoption of approved agronomic practices etc. This will lead to a higher annual increase in food production. Finally, higher food production in the country will result in rapid economic development also.

In conclusion, it appears that we can be optimistic about producing enough food in India during the coming years.

SUMMARY

Food is one of the most important basic needs of mankind. Man's advances from the most primitive societies to the present have always been based on availability of sufficient food to him.

The food problem originated mainly due to the rapid population growth in the twentieth century particularly in the developing countries and today the need to increase food resources is a large and more pressing problem than ever.

India is one of the countries which has been facing the food problem for the last more than two decades particularly since partition of the country in 1947. To meet the deficiency, efforts are being made to increase the food production by every possible way. Food production has been increased by about 96% since 1951 when the First Five Plan was started. Unfortunately, at the same time there has been a rapid growth in population also which has naturalized all the increased food production during this period and the deficiency still continues. However, the increase in food production has been very encouraging and thus we can be optimistic that the country will become self-sufficient in food in the near future.

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VIII. 03

Growth of Population and Production of Food-grains in Uttar Pradesh

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GROWTH OF POPULATION AND PRODUCTION OF FOOD-GRAINS IN UTTAR PRADESH

R.K. KACKER*
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INTRODUCTION

It is customary to register births, deaths, and marriages and to hold periodical census in economically developed and developing countries. The information collected is sufficiently accurate and is useful for demographic studies. The data collected through the census are indeed, by and large, the demographers mainstay for statistics needed by planners, administrators and politicians. Relying largely on the census data this paper attempts to study the GROWTH OF POPULATION AND PRODUCTION OF FOOD-GRAINS in relation to the State of Uttar Pradesh.

POPULATION GROWTH

The State of Uttar Pradesh is the most populous State in the Indian Union. It ranks first in population and fourth in area. In 1971 it claimed about 16 percent of country's population with only 9.2 percent of its total land area. According to the census of India, the total population in the State was 63.2 millions in 1951, which increased to 73.7 millions in 1961 and now stands at 88.3 millions according to 1971 census, about 4.1 million short than that projected by the expert committee on population. The shortfall in population recorded in 1971 has made it necessary to give a second look to the population projections made for 1976 by the expert committee. While the question will have to be gone into in details by the experts, subsequently again after final figures of 1971 Census are made available, it has become necessary to make

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workable population estimates for purposes of this paper. The following table gives decennial population according to censuses, since 1921 along with the projection for 1976.

Table - 1

GROWTH OF POPULATION IN UTTAR PRADESH AND INDIA

Year	:Population		:Increase over		:Density	
	:(in lakhs)		:previous decade:		:(Per sq. K.M)	
	:U.P.	INDIA	:U.P.	INDIA	:U.P.	INDIA
			:(%)	(%)		
1.	2.	3.	4.	5.	6.	7.
1921	467	2514	-	-	159	77
1931	498	2790	6.6	11.0	169	85
1941	565	3187	13.5	14.2	192	93
1951	632	3611	11.9	13.3	215	111
1961	737	4392	16.6	21.6	251	134
1971	883	5473	19.7	24.6	300	182
1976	966	6105*	9.4	11.6	328	203

*N. B. Computed on the basis of Annual growth rate between 1961 - 1971.

Source: Statistical Diary 1970 - Economic & Statistics Directorate Page 21.

In Uttar Pradesh, as well as the entire country, the year 1931 marked the beginning of the era of expansion in population, when a rise of 6.6 per cent over 1921 population

was recorded. This rate was more than doubled in the decade 1931-1941 as this period was to a large extent free from epidemics and famine conditions. The next decade 1941-51, though relatively free from epidemics and famine conditions, was marked by conditions of war, political unrest, communal disturbances and migration of population in the wake of independence and partition of the country. This period, therefore, witnessed a slight fall in the rate of population growth. The next decade (1951-60) was comparatively peaceful. The growth of population during this period was 16.6 percent which was higher than the rate observed in any previous decade. The latest population count has given a still higher rate of growth viz. 19.7 percent in Uttar Pradesh and that of 24.6 percent in India. It is significant to note that the State of Uttar Pradesh has throughout been recording a lower rate of growth than India as a whole.

Population growth has a significant impact on economic development. While on the one hand additional population, contributing additional labour force, is an asset to the nation for the production of goods and services, but on other hand, if the additional population consumes more than what is produced by the additional labour force, it becomes liability. The growth in numbers is, therefore, conducive to economic development only if additional production exceeds additional consumption, resulting in savings which could form the basis of capital formation for further economic development. If this does not happen, population growth is detrimental to economic progress. In India, particularly in Uttar Pradesh, the experience has been that the rate of growth in population has almost been of the same order as that of the growth in economy with the result that trends in per capita income have been encouraging. Examination of the impact of population on the economy will, therefore, be an interesting and useful exercise. The scope of the Paper is, limited as it examines the availability of food grains in relation to the needs of growing population.

GROWTH IN FOOD PRODUCTION

Food comes first in priority among consumer goods and it will be useful to examine trends in food production

in the State. Uttar Pradesh is the largest producer of food crops (cereals and pulses) in the country. It accounts for roughly 17 per cent of all the food grains produced in the country which is incidentally of the same order as proportion of the State population to the total population of the country. Among individual food crops, it accounts roughly for one third of wheat, half of barley and Arhar, one fifth of Maize and one third of Gram, as seen from the following table.

Table No. 2

PRODUCTION OF FOOD GRAINS IN INDIA AND U.P. DURING 1968-69

COMMODITIES	: PRODUCTION ('000 TONES)		: PROPORTION OF U.P. (Per Cent)
	: INDIA	U.P.	
1.	2.	3.	4.
A. CEREALS.	<u>83595</u>	<u>12854</u>	<u>15.4</u>
1. Rice	39761	2746	6.9
2. Wheat	18651	6087	32.6
3. Barley	2424	1150	47.4
4. Maize	5701	1277	22.4
5. Other cereals	17058	1594	9.3
B. PULSES	<u>10418</u>	<u>3395</u>	<u>32.6</u>
1. Gram	4310	1545	35.8
2. Arhar	1816	691	38.1
3. Other pulses	4292	1159	27.0
Total Food Grains	<u>94013</u>	<u>16249</u>	<u>17.3</u>
Total Population in Lakhs(1971)	<u>5473</u>	<u>883</u>	<u>16.1</u>

Source: Directorate of Agriculture, U.P.

Unfortunately the State has lagged behind in the growth of food-grain products and the rate of growth in food production in Uttar Pradesh has not been as much as in the rest of the country, as will be evident from the following Table which gives the rate of growth in production of food-grains in Uttar Pradesh and other States since 1950-51.

TABLE No. 3

STATE WISE COMPOUND RATES OF GROWTH IN PRODUCTION OF
FOOD GRAINS 1950-51 TO 1968-69

Sl. No. :	States	:(Percent per annum)
1.	2.	3.
1.	Andhra Pradesh	2.77
2.	Assam (including Nagaland & N. E. F. A.)	2.81
3.	Bihar	4.60
4.	Jammu & Kashmir	4.94
5.	Kerala	3.63
6.	Madhya Pradesh	3.79
7.	Maharashtra (including Gujarat)	5.02
8.	Mysore	3.80
9.	Orissa	5.20
10.	Punjab (including Haryana)	5.87
11.	Rajasthan	5.27
12.	Uttar Pradesh	1.77
13.	West Bengal	2.26
	INDIA	3.38

Source: Worked out from Production figures from Estimates of Area & Production in Principal Crops in India

It will be seen from the above table that the rate of growth in the production of food grains in the State of Uttar Pradesh was only 1.77 percent as against 3.38 percent in the country as a whole. The higher rate of growth in the country was mainly due to the contribution of Punjab (including Haryana), Rajasthan, Orissa, Maharashtra

(including Gujarat), Jammu and Kashmir and Bihar.

In order to study the trend in production of food grains in Uttar Pradesh as compared to the growth of population, the Table 4, gives population and production of food grains alongwith the per capita per day food grain production in the State since 1950-51. It will be seen that while the population of the State increase steadily, food production looked upwards, in favourable years but in some bad years like 1963-64 and 1966-67 the production slumped on account of extreme unfavourable weather conditions.

Table 4

PER CAPITA PER DAY FOODGRAINS PRODUCTION IN UTTAR PRADESH

<u>Year</u>	<u>Population</u>	<u>Production of foodgrain (in lakh tonnes)</u>	<u>Per capita per day production (In grams)</u>
50-51	632	117.8	511
55-56	685	120.6	482
60-61	737	144.9	539
61-62	750	140.6	514
62-63	764	134.9	484
63-64	778	117.9	415
64-65	792	152.5	528
65-66	806	132.9	452
66-67	821	117.8	393
67-68	836	166.3	545
68-69	851	162.5	523
69-70	867	175.5	555

*Source: Economic Development of Uttar Pradesh by Shri Kripa Shankar Page 29. Popn. Projected on basis of growth between 61 & 71 census.

It will be seen that per capita per day production of food grain which was 511 grams rose to 539 grams in 1960-61 which was the best achievement till it was exceeded in the year 1967-68. During 1967-68 which marked the

beginning of current period of recovery in agricultural production, per capita production was 545 grams which rose further to 555 grams during 1969-70. The lean year of 1966-67 saw the worst period when per capita production had dwindled to meagre 393 grams.

REQUIREMENT OF FOOD GRAINS FOR HUMAN CONSUMPTION

According to the recommendation of Nutritional Advisory Committee, the daily requirements of foodgrains for an adult have been placed at 485 grams alongwith 284 grams of milk, 125 grams of meat or fish, 85 grams of fruits besides 57 grams each of fats and sugar.

Dr. Aykroyd has suggested that an adult should have an intake of 25000 calories a day. As consumption of milk, meat, fruits etc. in Uttar Pradesh is very low, foodgrains consumption per head should, according to him, be near about 596 grams (21 ozs) so as to ensure 21000 calories through it, while the remaining 5000 calories may be derived from nonfoodgrains ingredients. As the per capita production has all along been less than the minimum requirements of 596 grams, it means that after making allowance for seed, animal feed and wastage, per capita production has been much below the required standards, as laid down by Dr. Aykroyd.

The above mentioned consumption norms are based on minimum nutritional requirements. It would be worthwhile to examine available estimates of actual consumption. According to consumption survey conducted in Rural and Urban areas of Uttar Pradesh during 1967-68 by the Economics and Statistics Directorate, Uttar Pradesh, per capita consumption of foodgrains was found to be 619 grams.(22oz.) per day as detailed below:

Table No. 5

PER CAPITA PER DAY CONSUMPTION OF FOODGRAINS IN UTTAR.
PRADESH DURING 1967 - 68

COMMODITIES	CONSUMPTION (Gms.)		
	RURAL	URBAN	U.P.
1.	2.	3.	4.
A. <u>CEREALS</u>	590	408	566(20oz)
1. Wheat	189	272	200
2. Rice	117	56	109
3. Gram	5	2	5
4. Other Cereals	279	78	252
B. <u>PULSES</u>	56	32	53(2 oz)
1. Arhar	29	22	28
2. Urd	13	5	12
3. Other Pulses	14	5	13
C. TOTAL FOOD-GRAINS	646	440	619 (22oz)

Source: Quarterly Bulletin of Statistics
(Octo - Dece. 68) Page (83 & 91)

The corresponding estimates given by the States sample of the N.S.S. are 608 grms. for rural areas and 429 grams for urban areas, which would work out to 585 grams for the State as a whole.

The consumption data collected through household surveys, however, suffer from over estimation. It was estimated in a study made by the Reserve Bank of India

that consumption of food-grains in rural areas was over estimated to the tune of 26.2 percent. The urban families however, depend mostly on market purchases for their consumption of food-grains and the estimates of consumption obtained for them may not, therefore, be much out of the mark. Even if there is some what over estimation in household consumption, it may be expected to be counter balanced by the non-household consumption in urban areas, such as consumption in hotels, restuarants and confectioneries, which is not reflected quantitatively in domestic budgets. Therefore making allowance for over estimation in rural areas only the daily per capita consumption there may be taken as 512 grams. This taken along with per capita consumption of 440 grams, in urban areas, gives over all per capita daily consumption of food grains in the State as 502 grams. But if it is considered that with the rise in agricultural incomes after 1967-68, the consumption of food-grains in rural areas should be rising, it will not be unreasonable to base projections of requirement at the end of IVth plan on the basis of some what higher per capita consumption, say 530 grams. For the intervening period, consumption may be presumed to rise from 512 grams in 1967-68 to 530 grams. in 1973-74 by equated intervals.

Besides human consumption, foodgrains are required for seed also. Some food grains are also used for cattle feed and some are stored in storage etc.

SEED REQUIREMENTS

The quantities of seeds used in respect of each crop have been studied in the N.S.S. report No. 32 'Some Aspects of cost of cultivation' and the marketing reports issued by the Agricultural Marketing adviser to the Government of India, Nagpur. Working on the seed rates given by these reports the seed requirement is estimated to be about 7.4 percent of total production of food-grains in 1968-69 as shown in the table given below:

Table No. 6

FOOD-GRAINS AND THEIR DISPOSAL

Commodity	Production : tones : '000	Seed : rate : per : hectare : (kg.)	Requ- : ire- : ment : '000 : Tonnes	Cattle : feed : per : centage : of : total : produc- : tion	Total : requi- : rement : ('000 : Tonnes)
1.	2.	3.	4.	5.	6.
A. CEREALS	<u>12854</u>	-	<u>988</u>	-	<u>179</u>
1. Paddy (Rice)	2746	56	239	1	27
2. Wheat	6087	115	585	1	61
3. Jowar	455	9	8	2	9
4. Bajra	573	7	6	2	11
5. Barley	1150	70	104	2	23
6. Maize	1277	19	27	2	26
7. Madua	141	26	6	2	3
8. Small Millets	358	16	9	2	18
9. Other cereals	67	5.97% of out put	4	2	1
B. PULSES	<u>3395</u>	-	<u>222</u>	-	<u>541</u>
1. Gram	1545	65	141	35	541
2. Moong	5	11	0.15	-	-
3. Arhar	691	43	27	-	-
4. Urd	56	13	2	-	-
5. Masur	112	11.3% of out put	13	-	-
6. Other pulses	986	3.95% of out put	39	-	-
Total Food-Grains	16249	-	1210	-	720
Percentage	100.0	-	7.4	-	4.4

* Estimated on the basis of value of seed per hectare.

Source: Production Figures taken from Directorate of
Agriculture.

CATTLE FEED

Usually following food-grains are consumed for cattle feed.

(i) Rice and Wheat	1 percent
(ii) Jowar, Bajra, Barley, Maize, Ragi and other cereals	2 percent
(iii) Small Millets	5 percent
(iv) Gra	35 percent

The consumption shown against each has been estimated as the percentage of total production. The percentages of cereals fed to cattle have been obtained from the 'Population and Food Planning in India, 1947' by Dr. Baljit Singh. In case of gram the percentage has been culled out from the N.S.S. report No.65 'Tables with Notes on Animal Husbandry' on this basis food-grains used as cattlefeed are worked out to be about 4.4 percent of the total produce in 1968-69 as shown in Table 6.

Apart from these utilization, sizeable proportion of produce is wasted at various stages i.e. at threshing ground, storage, etc. There are no reliable data on the quantum of wastage of food-grains. However wastages were assumed to be around 5 percent of the produce in 'Report of Joint Study Team Uttar Pradesh (Eastern Districts)' by the Patel Committee, as also in the studies made by the N.C.A.E.R. as well as by various other authors.

TOTAL REQUIREMENTS

On the consideration discussed above total requirement of food-grains for various years from 1967-68 onwards are given below:

TABLE NO. 7

STATEMENT, SHOWING REQUIREMENT OF FOOD-GRAINS IN UTTAR PRADESH

Years	Population :(Lakhs)	Per capita :per day :consumption :(Grams)	REQUIREMENT OF FOOD-GRAINS (LAKH TONNES)				Total
			Human :consumption :of total :produce	Seed :@ 7.4 :percent :of total :produce	Live :stock :feed :@4.4 :percent :of total :produce	Wastage :@ 5% :total :produce	
1.	2.	3.	4.	5.	6.	7.	8.
1967-68	836	512	156	14	8	9	187
1968-69	851	515	160	14	8	10	192
1969-70	867	518	164	14	9	10	197
1970-71	883	521	168	15	9	10	202
1971-72	899	524	172	16	9	10	207
1972-73	915	527	176	16	9	11	212
1973-74	932	530	180	16	9	11	216
1974-75	949	533	185	16	10	11	222
1975-76	966	536	190	17	10	11	228

Source: Figures taken from earlier tables.

According to the above table, total requirement of food-grains in 1973-74, the end of IVth plan, is expected to be 216 lakh tonnes as against the State target of production of 214 lakh tonnes.

It will also be interesting to compare in the following table the estimated requirements with the actual or targetted

production in the State.

TABLE NO. 8

STATEMENT SHOWING DEFICIT : OF FOOD-GRAINS IN UTTAR PRADESH

Year	Total requirement	Production	DEFICIT	
	of food-grains (Lakh Tonnes)	of food-grains (Lakh Tonnes)	Actual (Lakh Tonnes)	Per-centage
1.	2.	3.	4.	5.
1967-68	187	166	21	11.2
1968-69	192	162	30	15.6
1969-70	197	176	21	10.7
1970-71	202	180	22	10.9
1971-72	207	190	17	8.2
1972-73	216	214	2	0.9

It is evident from the above table that even in agriculturally prosperous years like 67-68 the deficit of food-grains in Uttar Pradesh was nearly 21 lakhs tonnes i.e. about 11 percent of total requirement. The deficit sharply increased in the year 1968-69 to about 16 percent. If, however, the targets of food production fixed for the Fourth Plan are achieved the deficit is expected to be reduced to about 1 percent taking the State to near self-sufficiency.

As discussed above the self sufficiency in food-grains is expected to be achieved in U.P. by 1973-74. This would require that the rate of growth in food-grains production during 1968-69 to 1973-74 should ultimately be about 5.73 per cent per annum.

GROWTH OF POPULATION AND PRODUCTION OF FOOD-GRAINS IN UTTAR PRADESH

SUMMARY

INTRODUCTION

It is customary to register births, deaths and marriages and to hold periodical/which are useful for demographic studies. Relying largely on the census data this paper attempts to study the "Growth of Population and Production of Food-Grains" for Uttar Pradesh.

POPULATION GROWTH

The State of Uttar Pradesh ranks first in population and fourth in area. In 1971 it claimed about 16 percent of country's population with only 9.2 percent of its total land area. According to the census of India, the total population in the State was 63.2 million in 1951, which increased to 73.7 millions in 1961 and now stands at 88.3 millions according to 1971 census, about 4.1 million short than that projected by the Expert Committee on population. The paper gives revised workable population estimates for Uttar Pradesh on the basis of compound Annual growth rate between 1961-1971; the projected population for 1976 on that basis has been estimated as 96.6 millions.

It has been brought out that the State of Uttar Pradesh has throughout been recording a lower rate of growth than India as a whole. Population growth has a significant impact on economic development. The growth in population is conducive to economic development only if additional production exceeds additional consumption, resulting in savings which could form the basis of capital formation for further economic development. In Uttar Pradesh, the experience has been that the rate of growth in population has almost been of the same order as that of the growth in economy, with the result that trends in per capita income have not been encouraging.

GROWTH IN FOOD PRODUCTION

Food comes first in priority among consumer goods. U.P. is the largest producer of food crops (cereals and pulses) in the country. It accounts for roughly 17 percent

of all the same order as proportion of the State population to the total population of the country.

Even so, unfortunately, the State has lagged behind in the growth of food-grains products and the rate of growth in food production has not been even as much as in the rest of the country. The rate of growth in the production of food-grains in U.P. was only 1.77 percent as against 3.38 percent in the country as a whole. The per capita per day production of food-grains which was 511 grams in 1950-51 rose to 539 grams in 1960-61 which was the best achievement till it was exceeded in the year 1967-68. During 1967-68 which marked the beginning of current period of recovery in agricultural production, per capita production was 545 grams which rose further to 555 grams during 1969-70. The worst period was 1966-67 when per capita production had dwindled to meagre 393 grams.

REQUIREMENT OF FOOD-GRAINS FOR HUMAN CONSUMPTION

According to the recommendation of Nutritional Advisory Committee, the daily requirement of foodgrains for an adult should be placed at 485 grams along with 284 grams of milk, 125 grams of meat or fish, 85 grams of fruits besides 57 grams each of fats and sugar.

Dr. Aykroyd suggested that an adult should have an intake of 26,000 calories a day. As consumption of milk, meat, fruits etc., in U.P. is very low-foodgrains consumption per head according to him, should be near about 596 grams (21000 calories) while the remaining may be derived from non-foodgrains ingredients. Per Capita production has all along been less than the minimum requirement of 596 grams. It means that after making allowance for seed, animal feed and waste, per capita production has been much below the required nutritional standard.

The paper examines available estimates of actual consumption. According to consumption surveys conducted in

would have been counter-balanced by the non-household consumption

rural and urban areas of U.P. during 1967-68 by the Economic and Statistics Directorate, U.P. per capita consumption of food-grains was found to be 619 grams (566 grams of cereals and 53 grams of pulses) per day. Between rural and urban per capita consumption of foodgrains was 646 grams per day in rural areas and in urban areas it was 440 grams. The consumption estimates are generally over estimated. The extent of over estimation for rural areas was assessed in a study made by the Reserve Bank of India. Based on that study, the paper gives adjusted estimate of consumption in rural areas. No adjustment has been made for urban areas as it is felt that over estimation in household consumption in urban areas, such as consumption in hotels, restaurants and confectioneries which is not reflected quantitatively in domestic budgets. Therefore, making allowance for over estimation in rural areas only, the daily per capita consumption has been taken as 512 grams. This taken along with per capita consumption of 440 grams in urban areas, the paper estimates over all per capita daily consumption of food grains in the State as 502 grams. Considering that with the rise in agricultural incomes after 1967-68, the consumption of food-grains in rural areas should be rising, the paper bases projections of requirement, at the end of IVth Plan on the basis of 530 grams as per capita consumption for the intervening period, consumption has been presumed to rise from 512 grams in 1967-68 to 530 grams in 1973-74 by equated intervals.

Besides human consumption, foodgrains are required for seed, cattle feed and wasted in storage etc. and the paper has provided estimates for requirements of seed and cattle feed and also allows for wastage. The seed requirement has been estimated to be about 7.4 percent of total production of food-grains, while foodgrains used as cattle feed have been worked out to be about 4.4 percent of the total produce. Wastage has been assumed to be around 5 percent of the produce.

study, in rural areas. TOTAL REQUIREMENT

The paper estimates the total requirement of food-grains in 1973-74, at the end of Fourth Plan, as 216 lakh tonnes, as

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against the State target of production of 214 lakhs tonnes.

Even in agriculturally prosperous years like 1967-68, the production of food-grains in Uttar Pradesh was deficit by nearly 21 lakh tonnes, i.e. about 11 percent of total requirement. The deficit sharply increased in the year 1968-69 to about 16 percent. It is observed that if the targets of food production fixed for the Fourth Plan are achieved the deficit is expected to be reduced to about one percent, taking the State to near self-sufficiency. This would require that the rate of growth in foodgrains production during 1968-69 to 1973-74 should ultimately turn out to be about 5.73 percent per annum.

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VIII. 04

“Inter Relation of Population Growth—Agricultural
Land Use and Food Production in West Bengal”.
—A Regional Approach (1951-1971)

By

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"Interrelation Of Population Growth, Agricultural Land
Use and Food Production in West Bengal" - A Regional
Approach (1951 - 1971)

Dr. B. B. Sarkar

Calcutta Metropolitan Planning Organisation
Calcutta, December, 1970

For time immemorial man and land are very intimately connected with each other. One reason for this is that food, a primary necessity of life, is an agricultural product. Another reason is that agriculture is the only industry which requires extensive use of land as a major factor of production. Man therefore depends on land for existence and the economic and functional concept of land change by man's efforts to secure means of living from the use of land. History depicts that man has always clustered around the places where lands are fertile and the areas of high density are identified with the areas with agricultural promise. Therefore land and agriculture have existed as way of living for people and have entered into life and tradition of society rather than remaining as a profession only. The growing population over years and their increased dependence on land have resulted in rapid changes in land use and agricultural growth as a consequent of dire economic necessity of the population. Growth of population has directly affected the use and availability of land. Trends in land utilisation, cropping pattern and production of food and other crops are directly influenced and moulded by the growing and varied needs of man. West Bengal with high density of rural population and with about 70 p.c. people depending on agricultural pursuits is no exception to the general trends.

The objective of the paper is limited but it attempts to point out some basic issues which are affected by dissimilar and rapid population growth particularly after 1951. The paper indicates how population growth between 1951 - 1971 (projected for 1971) - the major economic force, has brought in changes in land - man ratio, utilisation of land for agricultural (mainly food production) production and availability of foodgrains in the districts of West Bengal and in the state as a whole. It has been also shown that dissimilar growth in population has affected the agricultural development in districts and resulting in regional and sub-regional imbalances in land-man ratio and food supply. Finally the paper suggests broad development strategy for the districts to reduce imbalance in agricultural growth in different districts of West Bengal.

It may be observed that (Tables 1 & 4) population has recorded a rise by 72.03 p.c. in West Bengal excluding Calcutta and 35.73 p.c. including Calcutta between 1951-1971. The districts recorded higher percentage of population growth. The size, distribution and growth of population have a decisive

role in influencing the development of agriculture at the national, regional and sub-regional levels. Development potentials of agriculture and consumption requirements of growing population, rural and urban, to be taken into consideration. In this study main emphasis is given on how growth of population has affected land use and production of cereals (rice and wheat) in districts in the period in question. Production of other cereal crops is negligible in West Bengal and pulses have been excluded from the present study.

There are sixteen districts in West Bengal including Calcutta. Out of these districts seven districts recorded a rise in population by more than the percentage rise in total cereal production in West Bengal as a whole (Table 4). The rise in population is due to higher birth and lower death rate coupled with higher rate of migration from East Bengal and from other provinces in India during the period between 1951 - 1971. The increased population pressure on agriculture has been reflected in continuously high man-land ratio in agriculture. The ratio becomes still higher when land includes only cultivable land (Table - 3). (Cultivable land includes area under cultivation, cultivable waste and current fallow). In eleven districts out of fifteen total culturable land has declined and in all the districts per capita culturable land has declined by more than 40 p.c. during the said period leading to excessive pressure on culturable land and food crop cultivation. Of the total culturable area in each district 60 to 80 p.c. of the area is used for the cultivation of rice and wheat alone (Tables 2 & 4). Rice again occupies more than 95 p.c. of the area under cereal cultivation. The trend in favour of maximum land used for rice cultivation is common to all districts and percentage of land under rice and wheat cultivation to the total culturable land has increased appreciably in all districts. The extent of land used for cereal cultivation, (mainly rice) however, is not similar in all the districts. This is influenced by population pressure, occupational structure, demand for agricultural products and possibility of growing other crops in the districts. But increased population pressure remains the decisive factor in putting maximum land for rice cultivation to meet the growing food requirement of the population.

With dissimilar and higher rate of population growth not followed by commensurate development in agriculture, the districts recorded lower per capita production of cereals below the minimum requirement per man (Tables 3 & 5). All the districts except Howrah recorded higher total production of cereals and in all the districts except Purulia declining per capita land per man is observed. But the increased production could not make the districts and the state of West Bengal self-sufficient or surplus in food supply. Only six districts of Burdwan, Bankura, Birbhum, Midnapore, West Dinajpur and Coochbehar have recorded surplus production of cereals over their consumption needs (Table 6) while all other 9 districts recorded shortage of cereals in relation to their consumption needs. The districts which recorded increased per capita production in the period are not necessarily the districts with surplus cereal production.

Dissimilar growth of population is observed in districts of West Bengal between 1951 - 1971 (Table 4). Districts can be divided in three groups. Group - A includes Nadia, Jalpaiguri and Coochbehar which witnessed more than 80 p.c. rise in population. Group - B includes districts of Burdwan, Birbhum, Hooghly, 24-Parganas, Murshidabad, West Dinajpur and Darjeeling where the rise in population is between 60 - 70 pc. Group - C includes five districts of Bankura, Midnapore, Howrah, Maldah and Purulia having increased population by 48 - 69 per cent.

This pattern of increase in population has affected the relationship between man and culturable land in the one hand and man and food supply on the other. That population has exerted increased pressure on existing available culturable land has been reflected in declining land - man ratio. Per capita land available for cultivation has gone down steadily in all districts (Table-3).

Districts in Group - A recorded highest percentage increase in population and two districts of this group i.e., Jalpaiguri and Nadia have also witnessed maximum decline in land-man ratio by 51 p.c. in the period (Table-4). Coochbehar district recorded about 94 p.c. rise in population and 41 p.c. decline in per capita available land. Jalpaiguri and Coochbehar recorded little fall in per capita production of cereal but maintained a tilting balance in favour of surplus in cereal production; But Nadia experienced substantial rise in per capita cereal production and remained chronically a deficit district in food supply.

In Group - B, 70 - 80 p.c. rise in population has been followed by 33 - 50 p.c. fall in per capita culturable land. Here also changes in population and per capita land have followed a uniform direction through actual change differed in degree.

Group - C includes the five districts of Bankura, Midnapur, Howrah, Maldah and Purulia where population increased by 43 - 69 p.c. and decline in per capita land has been between 40 - 44 p.c. excepting in Purulia. In Purulia district 43 p.c. rise in population has been followed by 4.92 p.c. rise in per capita land during the period. (Purulia district was included in West Bengal in 1956 from Bihar with large area without cultivation. Population increase is also lower in the district; all these resulted in little increase in per capita land for cultivation).

In the period under consideration increased population and decreased per capita land have been followed by rise in total production of cereals in all districts excepting Howrah where a decline in total cereal output has been recorded. Rise in total production has not been followed by a rise in per capita production in all districts. A 46 p.c. rise in total cereal production in Bankura is followed by about 9 p.c. decline in per capita production. In Jalpaiguri and Coochbehar districts 83 and 79 p.c. rise in total cereal production was followed by 8 and 9 p.c. decline in per capita production respectively. Similar differences in the change of total production and per capita production of cereals are noticed in other districts.

Some apparently contradictory but interesting and indicative findings can be seen in the front of production and consumption needs of cereals in different districts and in West Bengal as a whole during the period under consideration. In districts of Burdwan, Birbhum and West Dinajpur in Group - B rise in population has been followed by increased total and per capita production of cereals while land-man ratio declined by 40 p.c. This shows real growth of cereal production through high degree of intensive land utilisation and higher productivity. Here increased population and consequent reduced land-man ratio is compensated by commensurate development of cereal production. While in districts Bankura and Midnapore in Group - C, and Coochbehar

in Group - A, increased population is followed by increased total production and overall surplus cereal production with decreased land-man ratio and per capita production (Tables 4 and 6). Overall surplus with decreased per capita production is not possible. These three districts show surplus cereal production over the consumption need of cereals because the cereal consumption need for all the districts has been calculated on a separate basis. (100 people of all age-group is assumed to be equal to 85 people of age between 10 and above. This assumption has been made to calculate the total cereal consumption need. People of age 10 and above have been assumed to be adult for consumption purposes. Average requirement of people of the age group is 16.5 Oz. of cereals per day per man).

In Jalpaiguri, Darjeeling and Howrah districts increased population is followed by increased total production, decreased per capita land and per capita production. This implies excessive pressure of population on available cultivable land is not compensated with higher productivity indicating relative backwardness of agriculture in general and production of cereals in particular. Similar backward agriculture is noticed in Furulia district.

The districts of Hooghly, 24-Parganas, Nadia, Murshidabad and Maldah have recorded increased per capita production but overall cereal shortage in the period. Pressure of population is felt in these districts and this is reflected in poor yield and overall deficit in cereal production. Similar trend is reflected in West Bengal as a whole where per capita production has increased but the state is in deficit in cereal production (See the Chart Table-7).

It can be concluded from the above analysis that rapid increase in population in the absence of increased employment opportunities elsewhere the growing number of people depended more on agriculture for food and living. Some improvements in agriculture have raised total production and yield rates in several districts but population pressure has been felt strongly in intense land use in every district, differences in agricultural development leading to development gaps in districts and overall deficit in cereal production in the state of West Bengal. The situation also indicates unfavourable impact of increased population on agricultural development and agricultural productivity via reduced land-man ratio

in the state. The situation highlights the importance of commensurate development of agriculture within shortest possible time to provide food for more men. As the pattern of land utilisation and the proportion of cultivable land put to actual agricultural operations differ from district to district the declining per capita land available for cultivation in the districts highlights the urgent need of producing maximum foodgrains and other crops per unit of land. This means higher productivity is the only answer to the problem of food-gap in West Bengal.

As the district economic activities are still very much agricultural oriented, rapid rise in population has not only caused imbalance in districts in respect of cereal production, it is also responsible partially for disparities in district development. Since cereal production occupied 60 - 90 p.c. of total cultivable land and still higher p.c. of actually cultivated land in different districts any adverse impact on cereal production due to population pressure is bound to influence unfavourably the agriculture and the district economy in general (Table-2). Along with other ways advanced agriculture contributes towards economic development in two important ways (i) by reducing pressure on land and thereby releasing excess men from agriculture for other sectors; (ii) supplying sufficient food and other products for growing rural and urban population. Increased supply of raw materials for growing industries comes at a little later stage. Failure to achieve development in agriculture and the consequent inability of agricultural sector to contribute its due share in economic development will affect adversely the district, state and national economy. From the experience in other countries it appears that the solution to the problem of imbalance in district economy lies in, along with other measures (i) preparation of integrated district or regional development plans for the development of districts and (ii) planning for population management at regional or district level.

The necessity of integrated district or regional plans has not received so far adequate attention in India. Development plans for districts with special emphasis on agricultural and allied development planning at lower levels with sectoral and spatial consistency seem to be the logical necessity for removing imbalance in district economies. Difficulties related to the definition of district, region or sub-region and difficulties with regard to resources for investment are there.

But these difficulties all the more emphasise the necessity of district plans. Planning decisions relating to agriculture and allied developments in districts should be taken at district or regional level and not always from state or national level. District plans or regional plans need not conflict with the general development policy framework laid down by the national or state plans. Ultimately the results of district or regional plans might be used as inputs for preparing state plans. In fact this process will bring more reality and consistency in state plans. Initially the development of agriculture and allied fields may be the objective of district plan. This will ensure adequate supply of food for growing rural and urban population, supply raw materials for industries and will achieve better utilisation and management of scarce resources like land, water, fertilizer and other inputs for agricultural and allied development. Differences in local problems of development and difficulties in resolving the problem require attention at local levels.

Increased population in the districts has been held partially responsible for dissimilar growth of food production and agricultural development in West Bengal. In fact differences in economic conditions of the districts have been widened in the absence of proper planning and population management at district, region and state level. Population is relatively immobile factor and therefore economically desired re-adjustments of population do not take place between districts without induced measures particularly in a resource scarce economy like ours. Failure of our national and state plans in increasing employment opportunities for growing men and relative absence of any plan for managing distribution and growth of population in districts or between districts have created problems. Planned attention to population and resource management can achieve better results in terms of higher per capita food production, production of raw materials for industry and hence per capita income. District development planning should take into recognition the importance of spatial distribution and size and composition of population. District or regional development plan is bound to be heavily influenced by the quantity, quality and composition of population.

Notes and References

1. Demand for foodgrains include rice, wheat, jowar, bazra etc. and pulses of different varieties. West Bengal produces rice and in recent years wheat cultivation has caught the attention of farmers as a second crop. Other cereal crops have no importance in West Bengal. Some amount of pulses i.e., 2.5. Oz. per day per adult is recommended with food. But due to lack of data, pulses production has been omitted. Only cereal production has been considered. Cereal requirement per man per day is 16.5 oz. and this is excluding pulses. Study has been kept confined to cereal demand only.
2. Population figures for 1971 have been taken from a projection of population in West Bengal made by Calcutta Metropolitan Planning Organisation, Govt. of West Bengal. Projection is made under the assumption of declining birth rate and slightly declining fertility.
3. Figures for 1971 relating to area under cultivation, production of crops etc. have been calculated taking three years average (1956, 1961, 1966) in case of area increase or decrease and two year's average (1967-68, 1968-69) in case of production.

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TABLE - 1

(Total Population In '000)

	<u>1951</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
Burdwan	2192	2638	3083	3450	3913
Birbhum	1067	1257	1446	1617	1835
Bankura	1320	1493	1665	1860	2110
Midnapur	3359	3851	4342	4856	5509
Howrah	1611	1825	2039	2281	2588
Hooghly	1604	1918	2231	2496	2832
24 Pargs.	4460	5371	6281	7024	7968
Nadia	1145	1429	1713	1913	2176
Murshidabad	1716	2003	2290	2563	2907
W.Dinajpur	977	1151	1324	1481	1680
Malda	938	1080	1222	1363	1545
Jalpaiguri	917	1139	1360	1520	1724
Darjeeling	460	543	625	699	793
Coochbihar	669	845	1020	1141	1294
Purulia	1169	1265	1360	1520	1724
W.B. (In.Cal)	26303	30615	34928	38896	43605
W.B. (Ex.Cal)	23604	27303	32001	35789	40606

TABLE - 1 (Contd.)

Area Available for Cultivation
(In. '000 Acres)

	<u>1951</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
Burdwan	1385	1362	1344	1341	1339
Birbhum	919	935	930	930	930
Bankura	1394	1349	1253	1253	1250
Midnapur	2689	2669	2657	2656	2655
Howrah	280	272	268	268	268
Hooghly	636	627	620	621	621
24 Pargs.	1964	1942	1932	1933	1933
Nadia	878	823	822	822	822
Murshidabad	1250	1142	1135	1134	1133
W. Dinajpur	1143	741	1210	1210	1210
Malda	805	802	801	801	801
Jalpaiguri	945	839	863	865	863
Darjeeling	301	293	295	295	295
Coochbihar	625	712	663	716	716
Purulia	713	-	1102	1103	1103
W. B. (In. Cal)	-	-	-	-	-
W. B. (Ex. Cal)	15927	14563	15905	15948	15941

TABLE - 1 (Contd.)

*Total Production of Cereals (Rice + Wheat)
(In '000 mds.)

	1951	1956	1961	1966	1971
Burdwan	11553.0	13631.8	16441.4	16219.4	22254.0
Birbhum	8304.1	10312.3	10919.0	13031.4	15613.2
Bankura	10009.5	10267.4	11257.2	7397.9	14609.2
Midnapur	22673.5	24873.6	26133.2	25002.4	27633.5
Howrah	2242.3	2188.5	2567.0	1911.9	2221.8
Hooghly	3302.0	6091.9	5669.8	4550.6	10953.3
24 Pargs.	11629.3	20216.2	16311.2	16987.4	21041.6
Nadia	2761.1	3661.1	3939.8	3697.6	6662.7
Murshidabad	5383.6	6269.7	7617.3	9754.1	10733.8
W. Dinajpur	4093.6	6147.9	8727.1	10190.2	14306.7
Malda	3403.0	4232.7	4094.3	3604.3	6720.4
Jalpaiguri	4199.4	534.5	6168.2	6698.4	7875.2
Darjeeling	905.9	716.0	1112.0	1179.5	1429.1
Coochbihar	3319.1	4793.4	4539.1	5979.7	6827.3
Purulia	-	-	6133.4	5214.4	3366.2
W.B. (In. Cal)	-	-	-	-	-
W.B. (Ex. Cal)	95794.9	118732.9	156239.9	131469.2	177763.0

N.B. Cleaned Rice figures have been given in all the tables.

TABLE - 2

A. Total Area Under Rice & Wheat In ('000) Acres					
	1951	1956	1961	1966	1971
Burdwan	1006.1	1036.1	1116.9	1090.2	1237.5
Birbhum	727.9	797.4	778.6	819.8	803.3
Bankura	776.4	820.7	823.0	760.2	903.3
Midnapur	2051.3	2050.6	2089.3	2057.9	2093.6
Howrah	223.9	206.7	217.9	216.6	251.5
Hooghly	424.5	465.2	457.2	461.2	585.3
24-Parganas	1404.9	1525.1	1454.1	1493.2	1550.3
Nadia	361.0	430.7	482.4	516.3	666.1
Murshidabad	687.9	705.1	725.2	787.0	916.1
West Dinajpur	551.2	619.0	863.4	1054.4	1154.1
Maldah	428.4	451.3	424.4	476.4	487.7
Jalpaiguri	443.6	472.9	480.7	569.5	700.3
Darjeeling	69.3	70.6	86.4	93.4	101.1
Cooch-Bihar	462.0	517.3	460.7	629.0	651.3
Purulia	-	-	570.6	579.1	646.5
West Bengal	9618.4	10264.3	11035.8	11624.2	12748.5

TABLE - 2 (Contd.)

	<u>'A' as percentage of Total cultivable Area.</u>				
	1951	1956	1961	1966	1971
Burdwan	72.64	79.74	83.11	81.28	92.46
Birbhum	79.22	85.24	83.76	83.17	86.34
Bankura	55.67	60.86	65.42	60.65	72.24
Midnapur	76.27	76.85	78.62	77.43	78.87
Howrah	80.00	76.10	81.34	80.97	94.03
Hooghly	66.82	74.16	73.71	74.24	94.20
24-Parganas	71.54	73.53	75.26	77.24	80.19
Nadia	41.12	52.05	58.64	62.77	62.77
Murshidabad	55.04	61.73	63.88	69.40	80.35
West Dinajpur	48.21	83.54	71.74	87.11	95.37
Maldah	53.17	56.36	52.93	59.43	60.92
Jalpaiguri	46.98	53.21	55.74	65.90	81.04
Darjeeling	22.92	24.23	29.15	31.53	34.24
Cooch-Bihar	73.92	72.61	69.01	87.85	90.92
Purulia	-	-	51.81	54.31	53.66
West Bengal	60.39	70.48	69.39	72.89	79.98

TABLE - 3.

	Per Capita Land Available for Cultivation All Crops (In Acres)				
	1951	1956	1961	1966	1971
Burdwan	0.63	0.52	0.44	0.39	0.34
Birbhum	0.86	0.74	0.64	0.53	0.51
Bankura	1.06	0.90	0.76	0.76	0.59
Midnapur	0.80	0.69	0.61	0.55	0.48
Howrah	0.17	0.15	0.13	0.12	0.10
Hooghly	0.40	0.33	0.23	0.25	0.22
24-Parganas	0.44	0.36	0.31	0.28	0.24
Nadia	0.77	0.53	0.43	0.43	0.38
Murshidabad	0.77	0.57	0.50	0.44	0.39
West Dinajpur	1.17	0.64	0.91	0.82	0.72
Maldah	0.86	0.74	0.66	0.59	0.52
Jalpaiguri	1.03	0.73	0.63	0.57	0.50
Darjeeling	0.65	0.54	0.47	0.42	0.37
Cooch-Bihar	0.93	0.65	0.49	0.63	0.55
Purulia	0.61	-	0.81	0.72	0.64
West Bengal Excluding Calcutta.	0.67	0.52	0.50	0.45	0.39
West Bengal Including Calcutta.	-	-	-	-	-

TABLE - 3 (Contd.)

	Per Capita Land Available for Rice & Wheat Cultivation (In Acres)				
	1951	1956	1961	1966	1971
Burdwan	0.46	0.41	0.36	0.32	0.32
Birbhum	0.63	0.63	0.54	0.51	0.44
Bankura	0.59	0.55	0.49	0.41	0.43
Midnapur	0.61	0.53	0.48	0.42	0.38
Howrah	0.14	0.11	0.11	0.09	0.10
Hooghly	0.26	0.24	0.20	0.18	0.21
24-Parganas	0.23	0.23	0.23	0.21	0.19
Nadia	0.32	0.30	0.28	0.27	0.31
Murshidabad	0.40	0.35	0.32	0.31	0.31
West Dinajpur	0.56	0.54	0.66	0.71	0.69
Maldah	0.46	0.42	0.35	0.35	0.32
Jalpaiguri	0.43	0.42	0.35	0.37	0.41
Darjeeling	0.15	0.13	0.14	0.13	0.13
Cooch-Behar	0.69	0.61	0.45	0.55	0.50
Purulia	-	-	0.42	0.39	0.37
West Bengal Excluding Calcutta.	0.41	0.37	0.34	0.32	0.31
West Bengal Including Calcutta.	0.37	0.34	0.32	0.30	0.29

TABLE - 3 (Contd.)

	Per Capita Cereal Production (Gross) In md. (Wheat & Rice)				
	1951	1956	1961	1966	1971
Burdwan	5.27	5.17	5.33	4.70	5.69
Birbhum	8.25	8.20	7.53	8.09	8.51
Bankura	7.58	6.83	6.75	3.93	6.92
Midnapur	6.75	6.46	5.41	5.15	5.02
Howrah	1.39	1.20	1.26	0.84	0.86
Hooghly	2.37	3.13	2.41	1.82	3.37
24-Parganas	2.61	3.76	2.41	2.42	2.64
Nadia	2.41	2.56	2.41	1.93	3.06
Murshidabad	3.43	3.13	3.22	3.81	3.69
West Dinajpur	4.19	5.34	7.70	6.83	8.81
Maldah	3.63	3.91	2.94	2.64	4.35
Jalpaiguri	4.58	0.47	4.54	4.41	4.57
Darjeeling	1.97	1.32	1.78	1.69	1.80
Cooch-Bihar	5.71	5.67	4.45	5.24	5.23
Purulia	-	-	4.56	3.43	4.85
West Bengal Excluding Calcutta.	4.06	4.27	4.88	3.67	4.38
West Bengal Including Calcutta.	3.64	3.88	4.47	3.38	4.08

TABLE - 4.

Percentage change between 1951 - 1971

	<u>Population</u>	<u>Production of cereals (Rice & Wheat)</u>	<u>Per capita cultivable land (All crops).</u>	<u>Per capita Cereals (Rice & Wheat Production).</u>
Burdwan	78.51	92.54	-46.03	8.03
Birbhum	71.98	77.74	-40.70	3.18
Bankura	59.85	45.95	-44.34	-8.73
Midnapur	64.01	21.90	-40.00	-25.24
Howrah	60.65	-0.94	-41.13	-37.83
Hooghly	76.56	188.22	-45.00	63.16
24-Parganas	78.65	80.94	-45.45	0.96
Nadia	90.04	141.31	-50.65	26.94
Murshidabad	69.41	82.37	-49.35	7.64
West Dinajpur	71.95	261.70	-38.46	110.45
Malda	64.71	97.19	-39.53	19.59
Jalpaiguri	88.00	87.53	-51.46	-0.27
Darjeeling	72.39	57.75	-43.03	-8.36
Coochbehar	93.42	78.77	-40.86	-7.66
Purulia	47.43	36.40	4.92	2.77
West Bengal (Excl. Cal.)	72.03	85.57	-41.79	7.69
West Bengal (Incl. Cal.)	65.73			

TABLE - 5

Total Need of Rice + Wheat (In '000 mds).
(16.5 oz. per Adult per Day)

	<u>1951</u>	<u>1961</u>	<u>1971</u>
Burdwan	8495.28	11951.76	15166.56
Bankura	5116.32	6452.40	8176.08
Birbhum	4135.92	5604.24	7113.60
Midnapur	13018.80	16830.96	21354.48
Howrah	6242.64	7902.48	10032.00
Hooghly	6215.28	8645.76	10975.92
24 Parganas	17286.96	24345.84	30384.88
Nadia	4436.88	6639.36	8436.00
Murshidabad	6653.04	8878.32	11267.76
W. Dinajpur	3784.80	5130.00	6511.68
Malda	3634.32	4737.84	5987.28
Jalpaiguri	3552.24	5271.36	6680.40
Darjeeling	1782.96	2421.36	3073.44
Coochbihar	2594.64	3953.52	5016.00
Purulia	4532.64	5271.36	6680.40
W.B. (i)	91487.28	124036.56	157333.40
W.B. (ii)	101952.48	135331.84	169011.84

N.B.:— W.B. (i) Excluding Calcutta.

W.B.(ii) Including Calcutta.

TABLE - 5 (Contd.)

	Per Capita Cereal Need Per Year (16.5 oz. per adult per day) In Mds.	Per Capita Cereals (Rice + Wheat) Available Per Years. In md.(Gross)				
		1951	1956	1961	1966	1971
Burdwan	4.56 md.	5.27	5.17	5.33	4.70	5.69
Bankura	"	7.58	6.83	6.75	3.98	6.92
Birbhum	" "	3.25	3.20	7.53	3.09	3.51
Midnapur	" "	6.75	6.46	5.41	5.15	5.02
Howrah	" "	1.39	1.20	1.26	0.84	0.36
Hooghly	" "	2.37	3.18	2.41	1.32	3.37
24 Parganas	" "	2.61	3.76	2.41	2.42	2.64
Nadia	" "	2.41	2.56	2.41	1.93	3.06
Murshidabad	" "	3.43	3.13	3.22	3.81	3.69
W. Dinajpur	" "	4.19	5.34	7.70	6.88	3.31
Malda	" "	3.63	3.91	2.94	2.64	4.35
Jalpaiguri	" "	4.53	0.47	4.54	4.41	4.57
Darjeeling	" "	1.97	1.32	1.73	1.69	1.80
Coochbihar	" "	5.71	5.67	4.45	5.24	5.28
Purulia	" "	-	-	4.56	3.43	4.35
W.B. (i)	" "	4.06	4.27	4.43	3.67	4.33
W.B. (ii)	" "	3.64	3.33	4.47	3.38	4.03

N.B.:- W.B. (i) Excluding Calcutta

W.B.(ii) Including Calcutta..

N.B.:- Cleaned Rice.

TABLE - 6

Production (Net Rice and Wheat)
In '000 mds.

	<u>1951</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
Burdwan	9246.4	10905.4	13153.1	12975.5	17803.2
Birbhum	7043.3	8249.8	8735.2	10465.1	12490.6
Bankura	8007.6	8213.9	9005.8	5918.3	11687.4
Midnapur	18138.8	189898.9	20906.6	20001.9	22110.8
Howrah	1794.2	1750.8	2053.6	1529.5	1777.4
Hooghly	3041.6	4873.5	4535.8	3640.5	8766.6
24-Parganas	9303.4	16173.0	13449.0	13589.9	16333.3
Nadia	2208.9	2923.9	3191.8	2953.1	5330.2
Murshidabad	4710.9	5015.8	6094.2	7803.3	8591.0
West Dinajpur	3274.9	4913.3	6981.7	8152.2	11345.4
Malda	2726.4	3336.2	3275.4	2883.4	5376.3
Jalpaiguri	3359.9	7276.5	4934.6	5358.7	6300.2
Darjeeling	724.7	572.8	839.6	943.6	1143.3
Coochbehar	3055.3	3334.7	3613.3	4783.8	5461.8
Purulia	-	-	4906.7	4171.5	6693.0
West Bengal Excl. Calcutta	76635.9	94936.3	125031.9	105175.4	142210.4
West Bengal Incl. Calcutta.					

N.B.: Net Production of Cereals = Gross Production - 20% of Gross for seeds and wastage.

TABLE - 6 (Contd.)

Total Consumption Need of Cereals(Rice & Wheat)

In '000 mds.
(16.5 oz. per day)

	<u>1951</u>	<u>1961</u>	<u>1971</u>
Burdwan	3495.3	11951.76	15166.56
Birbhum	4135.92	5604.24	7113.60
Bankura	5116.32	6452.40	8176.08
Midnapur	13018.80	16330.96	21354.48
Howrah	6242.64	7902.48	10032.00
Hooghly	6215.28	8645.76	10975.92
24-Parganas	17286.96	24345.84	30884.88
Nadia	4436.88	6639.36	8436.00
Murshidabad	6653.04	8878.32	11267.76
West Dinajpur	3734.80	5130.0	6511.68
Malda	3634.32	4737.84	5937.28
Jalpaiguri	3552.24	5271.36	6680.40
Darjeeling	1782.96	2421.36	3073.44
Coochbehar	2594.64	3953.52	5016.00
Purulia	4532.64	5271.36	6680.40
West Bengal Excl. Calcutta	91487.28	124036.56	157388.40
West Bengal Incl. Calcutta	101952.48	135331.84	169011.84

Chart - Table 7

District	Group	Population	P.C. Change between		District overall Surplus or Deficit in Cereal production
			1951 - 1971		
			Per capita land	Per Capita cereal production.	
1	2	3	4	5	6
Burdwan	B	+	-	+	+
Birbhum	B	+	-	+	+
Bankura	C	+	-	-	+
Midnapur	C	+	-	-	+
Howrah	C	+	-	-	-
Hoochly	B	+	-	+	-
24-Parganas	B	+	-	+	-
Nadia	A	+	-	+	-
Murshidabad	B	+	-	+	-
West Dinajpur	B	+	-	+	-
Maldah	C	+	-	+	-
Jalpaiguri	A	+	-	-	-
Darjeeling	B	+	-	-	-
Coochbehar	A	+	-	-	+
Purulia	C	+	+	+	-
West Bengal		+	-	+	-

N.B.: + means increase

- means decrease

For Cal.(6) + means surplus

and - means deficit.

SUMMARY

The paper has sought to study the impact of rapid rise in population in West Bengal and in its districts on the development of agriculture and the district economies during the period between 1951 - 1971.

It is observed that the rise in population has worsened the situation of increased population pressure on land available for cultivation in West Bengal, though West Bengal is relatively advanced in industrialisation.

During the period 72 p.c. rise in population has been followed by 86 p.c. rise in total cereal production (rice and wheat) and 42 p.c. decline in per capita land available for cultivation in the State of West Bengal. The district figures vary widely in respect of each item.

Increased pressure on land is again followed by dissimilar pattern of growth in agriculture in districts and the consequent disparities in district economies. Food shortage in most of the districts and in the State of West Bengal as a whole has remained chronic.

Wide disparities in district economies, it is expected, could be reduced appreciably by adopting detailed planning at regional or district level. Adoption of population management policy at regional or district level is also highly desirable.

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VIII DEMOGRAPHIC ASPECTS OF AGRICULTURAL
DEVELOPMENT & FOOD SUPPLY

VIII. 05

Impact of Farm Size on Agricultural Productivity in
India—A Cross-Sectional Analysis on the Basis of
1961—Census Data

By

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IMPACT OF FARM SIZE ON AGRICULTURAL PRODUCTIVITY IN
INDIA - A CROSS-SECTIONAL ANALYSIS ON THE BASIS OF
1961 CENSUS DATA

P.S. SHARMA*

Farm size can be defined either in terms of a single input, say, acreage or in terms of output. Efficiency can be measured in terms of output per unit of single input, say acreage or as output per unit of cost of all inputs. There are serious limitations in these sets of definitions, though at the same time, these definitions have their own merits. In the field of industrial sector, output is considered a more reliable index of size. However, in the agricultural sector, output as a measure of size suffers from certain limitations. As is known, a part of agriculture output is retained by farmers for self-consumption and any amount of imputation of value to retained output could be an under-estimate or an over-estimate and this estimation could be different for small, medium and large sized holdings. There is also the problem of increase in the proportion of marketed output to total output with the increase in the size of farms. The comparison of output itself at different points of time/at different points of supplies is difficult owing to year to year price changes - a difficulty which gets enlarged out of all proportion when farmers of different sizes grow a different variety of crops. If to avoid this difficulty, output is measured in terms of weight or volume, there arises the problem of high income yielding or low income yielding crops being clubbed together and no account being taken of their different values. On the top of all these difficulties, there is the problem of concealment of output by the farmers. In view of these difficulties on the size of output, preference sometime is given to the use of acreage as an index of size in studies on agricultural productivity.

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On the acreage side, there is the problem of standardisation. Further acreage is only a single input and often not even the predominant input. There is thus no single satisfactory measure of farm size. In the present exercise, farm size has been indicated by the unstandardised acreage calculated on the basis of the data contained in the Reports of Census, 1961. Farm size expressed in terms of acreage has, however, been studied together with water supply variables like rainfall, per cent irrigation, the assumption being that, by and large, it is the availability of water supply that largely accounts for the differences in the quality of land.

2. The concept of per acre productivity used here is the concept of composite value productivity¹ based on the valuation of selected 20 crops which correspond to the cultivated area covered under farm size figures of 1961 Census. These selected crops are rice, wheat, jowar, bajra, maize, ragi, barley, gram, tur, cotton, jute, mesta, sann hemp, sugarcane, groundnut, sesamum, linseed, rape seed and mustard, castor and tobacco. Per acre composite productivity² for each of various districts has been worked out by averaging crop by crop physical productivity during the triennium 1959-60 through 1961-62, and thereafter, these have been valued by weighted all-india harvest price for 1960-61 for various districts of 15 States, the weights used being the State-wise physical production for a crop.³

3. In the present exercise, we have tried to study the relationship between farm size and productivity, taking into account certain other relevant variables like average annual rainfall⁴, irrigation, etc.

The mean holding size and their coefficients of variation for the States as in 1960-61 is given below:-

Table - 1

State	Mean (acres)	Coefficients of variation	No. of districts considered (N)
Andhra Pradesh	8.21	50.0	20
Assam	4.61	14.1	11
Bihar	4.96	25.9	17
Gujrat	15.16	46.8	17
Jammu & Kashmir	3.95	33.1	9
Kerala	2.13	42.9	9
Madhya Pradesh	11.80	30.6	43
Madras	3.39	36.4	12
Maharashtra	13.89	45.0	25
Mysore	10.10	55.0	18
Orissa	5.55	32.2	13
Punjab (before reorganisation)	12.45	38.6	19
Rajasthan	18.46	67.2	26
U.P.	5.89	37.5	48
West Bengal	4.29	26.5	15
All-India	9.42	75.3	303

It will be seen from above that the holding size is relatively higher in Western and Central India, viz., Rajasthan (18.46 acres), Gujarat (15.16 acres), Maharashtra (13.89 acres),

Madhya Pradesh (11.80 acres). These are generally the states which grow low valued crops like Jowar, Bajra etc. In the rice growing States like Assam, Bihar, West Bengal, Madras, Kerala, the holding size is relatively smaller ranging from 2 to 5 acres. States like Andhra Pradesh, Mysore fall in the medium category having holding size between 8 to 10 acres. Another point to be noticed is that the coefficient of variation in holding size is greater in the States with larger holding size. At all-India level, the coefficient of variation works out to 75 per cent which indicates the great variation observed in the holding size in the districts of various States in India.

Holding size and its association with productivity rainfall and irrigation:.....

4. Table No.2 indicates the correlation coefficients between holding size and productivity: holding size and rainfall: and holding size and percent gross irrigation.

Table 2.

State	Correlation Coefficients between			
	Holding size and productivity	Holding size and rainfall	Holding size and % irrigation	No. of districts (N)
1.	2.	3.	4.	5.
Andhra Pradesh	-.3696	-.0183	-.5177*	20
Assam	-.0006	-.4110	.4073	11
Bihar	-.2474	.2563	.3227	17
Gujarat	-.7038**	-.4831*	-.0128	17
Jammu & Kashmir	-.4828	.8380**	-.7061*	09
Kerala	-.2372	.5219	-.1805	09
Madhya Pradesh	-.5154**	-.0773	-.3924**	43

1.	2.	3.	4.	5.
Madras	-.4592	-.2201	-.1758	12
Maharashtra	-.7714**	-.7111**	-.3197	26
Mysore	-.7658**	-.5369**	-.6576**	19
Orissa	-.4388	-.0277	-.1228	13
Punjab	-.3860	-.7527**	-.5504**	19
Rajasthan	-.8446**	-.7975**	-.5206**	26
U.P.	-.0532	-.0085	-.2070	48
West Bengal	-.2335	-.1191	-.2130	15
All India	-.6185**	-.4764**	-.3311**	303

** Significant at 1 per cent level of probability.
 * Significant at 5 per cent level of probability.

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At all-India level, correlation between holding size and productivity is negative and significant (-.62) alongwith a/ and significant correlation between holding size and rainfall (-.48) and holding size and irrigation (-.33). It may be noted that in States where holding size shows/significant correlation with productivity, it is observed to be negative. The examples are Gujrat (-.70), Maharashtra (-.77), Madhya Pradesh (-.52), Rajasthan (-.84), Mysore (-.77). These are generally dry States where the pattern of agricultural production is oriented towards low-valued crops. Further, it is to be noticed that out of 16 correlation coefficients worked out between per acre productivity and holding size, as many as 13 turn out to be negative, of which 6 are significant at 1 per cent level.⁵ On this basis, one could state that holding size and productivity are related negatively. At all-India level and in the States of Rajasthan and Mysore a significant negative correlation between holding size and productivity seems to be the result of a significant negative correlation between holding size on the one hand and rainfall and irrigation on the other. In Gujrat and

Maharashtra, it is the negative relationship between rainfall and holding size that may explain the negative correlation between holding size and productivity. In Madhya Pradesh, this may be due to a negative correlation between holding size and irrigation. This one could broadly explain the negative relationship between holding size and productivity on the basis of negative relationships observed between holding size and water supply variables as reflected by rainfall and irrigation.

Various

Holding size and per acre productivity:

5. If we fit a double log function taking productivity per acre as the dependent variable and holding size as the independent variable, we find from annexure Table 1 that elasticity coefficients which are significant are negative implying that a unit increase in holding size leads to a decrease in productivity. It may be of interest to note that the negative elasticity coefficients are high in Rajasthan (-.73), Mysore (-.83), Andhra Pradesh (-.65), Maharashtra (-.63). These elasticity coefficients are -.55 at all-India level, -.43 in Madhya Pradesh, -.31 in Madras and -.48 in Gujrat. Holding size alone explains 80 and 83 per cent of the variations in productivity in Maharashtra and Rajasthan respectively. The variations explained by this variable in other States are: Mysore .72, Andhra Pradesh .63, Gujrat .50 and Madras .33, Madhya Pradesh .32. At all-India level, holding size explains 55 per cent of the variation in productivity. It is, thus, observed that in quite a few States, holding size alone explains more than 50 per cent of the variations in per acre productivity. The fact that holding size is significantly correlated with irrigation and agriculture labor. Per acre implies that holding size is subsuming the effects of other variables.

Rainfall and Productivity:

6. The impact of rainfall on productivity has been studied by fitting double log function taking productivity as the dependent variable and rainfall as the independent variable and the results are contained in annexure table 2.

Annexure table 2 shows that rainfall has a significant impact on productivity in the States of Andhra Pradesh, Gujrat, Maharashtra, Mysore, Rajasthan, U.P. and at all-India level. The significant elasticity coefficients with respect to rainfall and R^2 (coefficient of determination) are as under:-

State	Elasticity coefficients observed to be significant	R^2
Andhra Pradesh	.99	.24
Gujrat	.56	.41
Maharashtra	.64	.53
Mysore	.75	.48
Rajasthan	.90	.50
U.P.	.40	.11
All-India	.21	.15

It will be seen from above that rainfall has a significant impact on productivity in Andhra Pradesh, Gujrat, Maharashtra, Mysore, Rajasthan, U.P. and at all-India level. However, it explains about 50 per cent of the variations in per acre productivity in the States of Maharashtra, Mysore and Rajasthan. In other States its explanatory power is relatively less. At all-India level, rainfall explains 15 per cent of the variation in productivity.

Irrigation and Productivity:

7. The impact of irrigation on per acre productivity has also been studied by fitting double log function, taking productivity as the dependent variable and irrigation as the independent variable and the results are contained in the annexure table 3. Annexure table 3 shows that irrigation

has a significant impact on productivity in the States of Andhra Pradesh, Kerala, Jammu and Kashmir, Mysore, Punjab, Rajasthan, U.P., West Bengal as also at all-India level. The significant elasticity coefficients along with R^2 (coefficient of determination) are as under:-

<u>State</u>	<u>Elasticity co-efficients observed to be significant</u>	<u>R^2</u>
Andhra Pradesh	.51	.73
Kerala	.07	.39
Jammu & Kashmir	.86	.39
Mysore	.44	.66
Punjab	.11	.55
Rajasthan	.14	.55
U.P.	.12	.09
West Bengal	.10	.46
All-India	.16	.20

8. It will be seen from above that elasticity co-efficients with respect to % irrigation are generally of lower magnitudes ranging from .07 to .16. In the case of Andhra Pradesh (.51), Mysore (.44) and Jammu & Kashmir (.86), however, irrigation has a greater impact on productivity. If we consider the explanatory power of the variable, 'irrigation', in relation to productivity, we find that irrigation alone explains 73 per cent of the variations in productivity in Andhra Pradesh, 66 per cent in Mysore, 55 per cent each in Rajasthan and Punjab, 46 per cent in West Bengal, 39 per cent each in Kerala and Jammu and Kashmir. In U.P. irrigation explains a relatively negligible proportion of variation in

productivity. At all-India level, irrigation alone explains 30 per cent of the variation in productivity. Here two points require explanation. In Madras, where $\frac{1}{2}$ significant per cent of gross area is irrigated, irrigation does not have a significant impact on productivity. This could be due to the fact that there are very good irrigation facilities in various districts of Madras; so that differences in irrigation between districts have ceased to be significant in influencing productivity. In Rajasthan, where proportion of cultivated area irrigated is negligible, irrigation has a significant impact on productivity. This is because in dry areas, even meagre irrigation facilities influence significantly per acre productivity of dry crops like bajra, jowar, gram, etc.

Rainfall and Irrigation and Productivity:

9. Annexure table 4 shows that when we consider both the water supply variables, viz., rainfall and % gross irrigation and study their impact on productivity, the following points emerge:-

(i) When rainfall alone was considered, it was found to have a significant impact on productivity in Andhra Pradesh. Similarly, when irrigation alone was considered, it was found to have a significant impact on productivity in this state. However, when we consider both these variables, we find that irrigation alone has a significant impact on productivity. This may be an indication of the greater importance of irrigation in Andhra Pradesh in influencing productivity. This is also evident from the fact, that irrigation alone explains in Andhra Pradesh 73 per cent of the variations in productivity whereas rainfall and irrigation together explain 74 per cent of the variations in productivity. This shows that in Andhra Pradesh, irrigation is relatively more important compared to rainfall in explaining productivity.

(ii) In Gujrat, and Maharashtra, rainfall alone has a significant impact on productivity, irrigation being unimportant.

(iii) In Punjab, when we consider both the water supply variables, it is found that irrigation alone has a significant impact on productivity.

(iv) In States of Madras, Mysore, Rajasthan, U.P. and at all-India level, both rainfall and irrigation have a significant impact on productivity, though the impact of rainfall in these states is greater than that of irrigation, as

reflected by the higher elasticity coefficients.

10. This situation holds good at all-India level also. It is also observed that the explanatory power of the two water variables, viz., rainfall and irrigation considerably increases if we consider them together in those States where both are significant as is evident from the improvements in R^2 .

R^2 for water supply variables

State	Rainfall alone	Irrigation alone	Rainfall and irrigation together
Mysore	.48	.66	.76
Rajasthan	.50	.55	.66
U.P.	.11	.09	.26
All-India	.15	.30	.41

R^2 has also shown improvement in some of those States where either rainfall or irrigation is significant as will be seen from the table below:-

State	Rainfall alone	Irrigation alone	Rainfall and Irrigation together
Maharashtra	.53	N.S.	.58
Punjab	N.S.	.55	.61

N.S. : Not significant.

Madras seems to stand as a class by itself. In this state, either rainfall or irrigation alone is not found to be significant. However, when we consider these water supply variables together, both of them turn out to be significant and explain about 50 per cent of the variation in productivity.

Rainfall Irrigation and holding-size in relation to productivity:

11. So far, we have considered rainfall, irrigation and holding size individually. Now, we propose to study their effect on productivity when they are considered together. The results of this exercise are contained in annexure Table 5. This table shows that:-

(i) Among the three independent variables, only holding size has a significantly negative impact on productivity in Gujrat, Madhya Pradesh and Maharashtra. Earlier, we had seen that in Gujrat and Maharashtra, rainfall had a significant impact on productivity but now when it is considered along-with irrigation and holding size, it ceases to be significant. This might be because rainfall and holding size are themselves significantly correlated so that holding-size variable subsumes the effect of rainfall also.

(ii) In Andhra Pradesh, Madras and Punjab, among the three variables, irrigation alone has a significant positive impact on productivity.

(iii) In Mysore, U.P. and West Bengal, rainfall and irrigation have a positive impact on productivity. The impact of holding size on productivity is not significant. In Rajasthan, irrigation and holding-size are significant variables, the former having a positive impact on productivity and the latter negative impact.

(iv) At all-India level, all the three variables, viz. rainfall, irrigation and holding size are found to be significant. The water supply variables have a positive impact on productivity, whereas the holding-size has a negative impact.

12. It is also observed that holding-size, wherever it is significant, it is found to have a negative impact on productivity. Earlier, we had seen that the impact of holding size alone on productivity was negative. When holding size is

considered with rainfall and irrigation, its negative impact on productivity does not change. However, when holding-size is considered with water supply variables, the impact of holding-size on productivity becomes non-significant in Andhra Pradesh, Madras, Mysore. The effects of holding size may have been subsumed in water supply variables in these states. It is observed further that the explanatory power of the three variables considered together is greater than the combined power of water-supply variables, as will be seen from below:--

State	<u>R² for Selected States</u>	
	<u>Rainfall and irrigation together</u>	<u>Rainfall, irrigation and holding-size together</u>
Gujrat	.42	.59
Maharashtra	.58	.80
Rajasthan	.66	.87
Punjab	.61	.68
Mysore	.79	.82
All-India	.41	.82

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13. From the above discussion based on annexure table 5, it is observed that elasticity coefficients with respect to holding size are significantly negative in the States of Gujrat (-.3586), Madhya Pradesh (-.4043), Maharashtra (-.6371), Rajasthan (-.7256) and at all-India level (-.4018). The point to be noted is that when we hold rainfall and irrigation constant, a unit increase in holding size decreases productivity significantly in Gujrat, Maharashtra, Madhya Pradesh, Rajasthan as also at all-India level. This elasticity coefficient is the highest in Rajasthan (-.73), followed

by Maharashtra with a coefficient of $-.64$, Madhya Pradesh with $-.40$ and Gujrat with $-.36$. Thus, broadly speaking, the elasticity coefficients for size seem to increase with a decline in the coefficients of water supply variables.

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14. Another fact to be noted is that when we consider the impact of holding size variable on productivity along with rainfall and irrigation, we find that the elasticity coefficients are significant in Gujrat, Madhya Pradesh, Rajasthan and at all-India level, and are lower than the coefficients for holding size considered above. In the case of Maharashtra, the elasticity coefficients with respect to holding size remain more or less unchanged under both the situation. The position is given below:-

States	Significant productivity elasticity coefficients with respect to holding size	
	Holding size alone	Holding size together with rainfall & irrigation
Gujrat	$-.4770$	$-.3566$
Maharashtra	$-.6330$	$-.6371$
Madhya Pradesh	$-.4260$	$-.4043$
Rajasthan	$-.7769$	$-.7256$
All-India	$-.5488$	$-.4018$

While considering the impact of holding size on productivity individually and in conjunction with rainfall and irrigation, it has been observed that wherever it has significant impact on productivity, it has turned out to be negative.⁶ Various reasons have been advanced to explain this phenomenon.⁷ Broadly these explanations could be summarised as (1) labour-based, (2) capital-based, (3) fertility-based, (4) tenancy-based, (5) management-based. In this exercise, attempt has been made to check labour-based and tenancy based explanations against some empirical evidence.

Labour-based explanations:-

15. The decrease in productivity per acre could be due to a decrease in the number of agricultural workers per acre with the increase in holding size. Assuming a positive marginal productivity of agricultural labourers, any decline in the number of workers will have a negative impact on per acre productivity. It may be pointed out that if we utilise 1961 census data on agricultural workers and find the correlation between holding size and per acre agricultural workers on the basis of district-wise observations for various States, it is observed that the two are highly negatively correlated. The significant negative correlations center around .80 in various States as will be seen from table below:-

TABLE 3.

Correlation coefficients between holding size and per acre agricultural workers

State	No. of districts observations (N)	r
Andhra Pradesh	20	-.4626*
Assam	11	-.6502*
Bihar	17	-.8174*
Gujrat	17	-.8359**
Jammu & Kashmir	09	-.8348**
Kerala	09	-.3334
Madhya Pradesh	43	-.8795**
Madras	12	-.8445**
Maharashtra	25	-.8658**
Mysore	19	-.7877**
Orissa	13	-.8321**

(contd.....)

State	No. of districts observations (N)	'r'
Punjab	19	-.8184**
Rajasthan	26	-.2858
U.P.	48	-.8055**
West Bengal	15	-.7885**
All-India	303	-.6025**

** Significant at 1 per cent level

* Significant at 5 per cent level

Due to high correlation between holding size and per acre agricultural workers, the two could be considered as proxy for each other. While considering labour-based explanation, assumption of a positive marginal labour productivity has been made. In this context, we would be interested to test the hypothesis that the marginal productivity of agricultural workers is positive. This was tested by fitting a function of this type:-

$$Y = a + b_1 x_1 + b_2 x_2 + b_3 x_3$$

Where Y= Per acre gross value productivity. (1959-62)

x1= average annual rainfall. (1959-62)

x2= gross irrigated area as per cent of gross area sown. (1959-62)

x3= agricultural workers per acre. (1961 Census)

16. The results of this exercise given in annexure table 6 show that the productivity elasticity with respect to per acre agricultural workers is positive⁸ wherever it is significant. U.P., however, is an exception. The implication of such a conclusion is that given the traditional technology and

organisation, agricultural workers cannot be withdrawn from agricultural production without decreasing the total agricultural output. This seems to be the situation in Bihar, Gujrat, Madhya Pradesh, Maharashtra and Rajasthan. Barring Bihar, the rest of the States are associated with relatively larger holding size. This lends support to the conclusion that labour productivity is greater in large holdings. The case of negative elasticity observed in U.P. is to be studied in details by considering Eastern U.P., Western U.P. and Central U.P. separately.

17. The decline in per acre productivity could also be explained by the increase in the proportion of hired agricultural workers in relation to total agricultural workers with the increase in holding size. This situation has been confirmed by the **results** of 1961 Census.⁹ The logic behind this argument is that the family labour is more efficient than hired labour. In order to ascertain the impact of hired workers on productivity, double-log function of the following type was fitted in those States where the proportion of hired workers to total agricultural workers is significant.

$$Y = a \cdot x_1^{b_1} \cdot x_2^{b_2} \cdot x_3^{b_3} \cdot x_4^{b_4}$$

Where Y = Per acre composite crop productivity (1959-62).

x1 = Average annual rainfall (1959-62)

x2 = Gross irrigated area as % of gross cropped area (1959-62)

x3 = Total agricultural workers per acre (1961 Census)

x4 = Hired workers as % of total agricultural workers (1961 Census)

The results of this equation are as under:-

State	No. of dis- tricts	X1	X2	X3	X4
Bihar	17	.6063 (.5300)	.0345 .0356	.3578* (.1681)	.0205 .0959
West Bengal	15	.3491** (.0716)	.1062** .0232	.2805** .0771	.0384 .0548
Mysore	19	.3917* (.1600)	.2572* (.1125)	.1234 (.2146)	.0990 (.1497)
Madras	12	.3688 (.2196)	.2205 (.1017)	.1485 (-) (.2034)	.2183 (.2588)
Kerala	09	(-).1359 (.2286)	.0387 (.0405)	-.2085 (-) (.3079)	.0986 (.0907)
Bihar, West Bengal, Mysore, Madras, Kerala, together	72	.3491** (.0716)	.1062** (.0232)	.2805** (.0771)	.0384 (.0548)
Madhya Pradesh	43	.3129* (.1406)	.0539* (.0215)	.3012* (.0816)	.1584** (.0522)
All Eastern and Southern States (Assam, West Bengal, Bihar, Orissa, Andhra Pradesh, Madras, Mysore and Kerala)	156	.3458** (.0487)	.0878 (.0130)	.3305** (.0397)	.0739* (.0256)

* Significant at 5 per cent level.

** Significant at 1 per cent level.

(Figures in brackets are the standard errors of the estimates).

It will be observed that productivity elasticity coefficient with respect to hired workers is positive wherever it is significant. This is as expected, as nobody will employ a hired worker if its contribution is negative.

Tenancy-based explanation:

18. One could argue that the returns per acre might be lower for tenanted lands compared to self-owned and operated lands due to the fact that the owner-farmers may apply more inputs as also qualitatively better inputs than the tenants. Due to insecurity of tenure and the payment of rent amounting to 40 to 50 per cent of the gross produce, the tenants may not be enthusiastic about the application of quality inputs like fertilisers as also about undertaking of capital-intensive improvements on tenanted lands. Sometimes, the tenants may not even be in a position to use modern inputs like fertilisers and high-yielding seeds due to constraint of resources and lack of requisite knowledge. The constraint of resource results from a nominal surplus generating tenant farm after payment of rent due to lower retaining capacity of output and his resulting inability to get higher output prices. The credit worthiness of tenant farmer in getting institutional finance is also limited compared to over-cultivator with large holding and social influence.¹⁰ Due to limited financial/assets position, the ability of tenant-cultivator to bear uncertainty resulting from output variation caused by weather conditions and is limited. Under conditions of uncertainty, he would be reluctant to apply high cost inputs. In view of this situation, he would like to operate in areas associated with relatively greater stability in production or relatively less variation in output.

19. If we study the district-wise observations of 1961 Census relating to per cent area under pure tenancy to total cultivated area in rural areas, we find that tenancy-infested districts are, by and large, concentrated in coastal areas and in assured rainfall and/or high irrigation areas.¹¹ On a study of correlation between % area under pure tenancy and per acre productivity, it is found that tenancy is positively correlated with productivity in Madras, Punjab, West Bengal, Gujrat, Maharashtra and Mysore and negatively in Kerala, Bihar, Jammu & Kashmir and Rajasthan. At all-India

level, considering about 300 district observations, it is found that tenancy and productivity are positively correlated. In both these sets of States, coefficient of variation of productivity is relatively less in States having irrigation as the main source of water supply and this is relatively greater in States having rainfall as the main source of water supply, as will be seen from below:

A. States showing positive correlation between pure tenancy and productivity.

1.	2.	3.	4.	5.	6.	7.	8.
State	No. of Districts	Correlation between productivity and % area under pure tenancy	Means levels of Rainfall (annual) (inches)	% Gross Irrigation	per acre productivity (Rs.)	% coefficient of variation of productivity	Size of tenant holding (acres)
Uttar Pradesh	12	.62	48	31.4	260	20.10	2.77
Bihar	15	.40	71	23.2	254	15.56	3.13
Madhya Pradesh	19	.28	25	34.5	163	29.62	9.78
West Bengal	17	.34	32	6.0	113	33.46	8.06
Maharashtra	25	.65	45	5.7	123	54.34	6.78
Andhra Pradesh	19	.38	45	13.5	168	56.75	5.02
India	303	.36	45	13.7	160	44.79	4.28

B. States showing negative correlation between pure tenancy and productivity.

Madhya Pradesh	09	(-).75	108	25.6	296	14.15	1.96
Uttar Pradesh	17	(-).18	51	16.9	172	19.23	2.21
Kerala	09	(-).59	39	44.4	141	36.99	3.43
West Bengal	26	(-).26	21	12.5	80	46.85	10.60

20. It will be observed that States with better irrigation facilities show relatively lower coefficient of variation. High variability is observed in States dependent mostly on rainfall. Another point to be noted is that the size of pure tenant holding is increasing with the increase in the coefficient variation/productivity. The implication of such a result would be that the tenant tries to face greater uncertainty through increasing his land resources in fact through substituting land for water supply.

21. We have studied the impact of pure tenancy on productivity in selected States by holding rainfall and irrigation constant through fitting of double-log function.

$$Y = a \cdot x_1^{b_1} \cdot x_2^{b_2} \cdot x_3^{b_3}$$

where Y = per acre gross value productivity (1959-62).

x1= Average annual rainfall (1959-62).

x2= Gross irrigated area as % of gross area sown (1959-62).

x3= Area under pure tenancy as per cent of total cultivated area (1961 Census).

The results are under: Productivity elasticity coefficient with respect to

States	No. of Districts.	Rainfall (x1)	% gross irrigation (x2)	% area under pure tenancy (x3)	R ²
Kerala	09	.06 (.21)	.04 (.03)	(-).08* (.04)	.63
Mysore	19	.76** (.27)	.31** (.07)	(-).19 (.14)	.82
Bihar	17	.44 (.54)	.01 (.04)	(-).04 (.05)	.12
Madhya Pradesh	43	.09 (.06)	.03 (.03)	(-).09 (.07)	.13
Uttar Pradesh	48	.54** (.16)	.13* (.06)	(-).05 (.05)	.28
J & K. Punjab	09	.58 (.58)	.24 (.19)	(-).22 (.13)	.62
Rajasthan	26	.58** (.18)	.25** (.06)	(-).04 (.11)	.72

** Significant at 1% level. * Significant at 5% level.

22. It will be seen that the elasticity coefficients for the tenancy variable are generally low and are associated with a negative sign. In fact, among the seven States for which results are presented above, tenancy has a significant and negative impact on productivity only in Kerala, where in 5 out of 9 districts, more than 50 per cent of the total cultivated area under seasonal crops (excluding plantation crops) falls under pure tenancy. Another point to be noted for Kerala is

is that though the elasticity coefficients for all the three variables studied here are low, the coefficient for pure tenancy is the highest among them and this underlines the importance of pure tenancy in explaining productivity in Kerala. In Mysore, U.P. and Rajasthan, the co-efficients for rainfall and irrigation are significant, but are not significant for pure tenancy. In these States, it is found that tenancy variable is significantly correlated with rainfall and/or irrigation, and, therefore, the water supply variables may be subsuming the effects of pure tenancy. It is not inconceivable that the areas of high productivity associated with more and regular rainfall and/or better irrigation facilities are also areas of rapid population growth caused partly by natural growth and partly by immigration. Increasing population pressure would lead to rising demand for land and in this process would contribute to a higher proportion of cultivated area under tenancy, as the rents would, more or less, be equated to the surplus that the landlords would alternatively get by cultivating lands themselves through hired labour. Since labour is abundant with hardly any opportunity cost, its application will add to the income of the tenant so long as marginal productivity of labour is positive.¹²

Conclusion:

The study shows that on the basis of district observations relating to holding-size and per acre productivity there is a tendency for per acre productivity to decrease with the increase in holding-size, other things remaining the same. This broad conclusion holds good where we consider the impact of holding-size alone on productivity or together with rainfall and irrigation. Looking to the various factors explaining this phenomenon, we find that the decrease in the number of agricultural workers per acre with the increase in holding size, seem to be associated with the decrease in productivity for agricultural workers. An obvious conclusion from such a result would be that given the traditional technology and organisation, agricultural workers cannot be withdrawn from agricultural operations without effecting agricultural output.

This seems to result from positive marginal productivity

It is also observed that the productivity elasticity co-efficients in respect of hired workers is positive wherever it is significant. While considering the tenancy-based explanation, it is observed that broadly speaking size of pure-tenant holding is tending to increase with the increase in the coefficient of variation of productivity. One of the implications of such a result would be that the tenant tries to face greater uncertainty through increasing his land resources, in fact, through substituting land for water supply. The tenancy equations examined here show that the elasticity coefficients for tenancy variable are generally low and are associated with ~~the~~ negative sign. Among the seven States for which results are presented, tenancy has a significant and negative effect on productivity in Kerala only where a sizeable proportion of the total cultivated area is under tenancy condition. In Mysore, U.P. and Rajasthan, the coefficients for rainfall and irrigation are significant but are not significant for pure tenancy. In these States, it is found that tenancy variable is significantly correlated with rainfall and/or with irrigation and, therefore, it appears that the water supply variables might be subsuming the effects of pure tenancy. This is understandable because the areas of high productivity associated with more and regular rainfall and/or better irrigation facilities are also areas of rapid population growth. Increasing population pressure would lead to rise in demand for land and in this process would contribute to a higher proportion of cultivated area under tenancy.

ing The study also shows that as between rainfall, irrigation and holding size accounts for the largest variation (55 per cent), in productivity at all-India level, followed by irrigation and rainfall which account for 30 per cent and 15 per cent respectively.

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ACKNOWLEDGEMENT

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FOOT NOTES

1. While working out per acre productivity, we have utilised the figure of gross cropped area and not that of holding size. This is because it is not the land that is the input but the service or use of land, a proper measure of which must count twice every piece of land that is used twice and leave out such portion that are not used at all - see Asok Rudra The Economic and Political Weekly, October 26, 1968 (P.A-38-Agriculture Supplement).
2. Value of by-products has not been taken into account due to non-availability of district by district estimates for each of 20 crops.
3. For details of methodology, SHARMA, P.S. "Quantitative delimitation of Agricultural Regions in India" Indian Journal of Agriculture Economics July-September, 1968.
4. It is realised that for understanding the impact of variations in rainfall on productivity, it is the month to month variation in rainfall that should be important for specific crops. However, since we propose to examine the productivity of 20 crops together, some of which are important as kharif crops, others as rabi crops, average annual rainfall data have been used.
5. It will be seen that there is a preponderance of negative signs attached to the correlation co-efficients between holding size and productivity as also between holding size and rainfall and between holding size and irrigation. Here we could ask as was done by A-Rudra (The Economic and Political Weekly October 26, 1970) "Can the preponderance of the negative signs be without some significance in their totality". The graphical representation of districtwise data lends weight to the negative relationship between holding size and productivity; (Scatter diagram I).

6. The relationship between farm size and productivity has been studied by many authors. Professor A.K. Sen (1962) while listing certain results found to be broadly valid in Indian Agriculture, pointed out that "By and large, productivity per acre decreases with the size of holding" (The Economic Weekly, February, 1962 - An Aspect of Indian Agriculture) Dipak Mazumdar (1963) stated that the data presented by the Farm Management Surveys in India have added another example to a phenomenon observed in many parts of the under-developed world viz., that in present agriculture, as the size of farm decreases, the output per acre increases" (on the Economics of relative efficiency of Small farmers - The Economic Weekly - Special Number (1963) Prof. A.M. Khusro (1964) wrote "Of particular interest are some generalisations about relations between farm size and farm efficiency which are based upon a remarkable repetitiveness of some phenomena, almost everywhere among the areas studied". Later on he mentions as one of the generalisations "As farm size (acreage) expands, gross output per acre declines". He further states "It is clear that all the regression lines fitted to the data of gross output per acre and acreage are downward sloping, the sign for the regression coefficients being invariably negative. It is this consistently recurring phenomenon of declining slopes in all the seven States that lends itself to the generalisation that in Indian farming of the 1950's gross output per acre declines with the increase in farm size". (Khusro A.M. Returns to scale in Indian Agriculture, Indian Journal of Agriculture Economics July-December, 1964). In 1966, Directorate of Economics and Statistics, Ministry of Food and Agriculture brought out a publication "Farm Management in India". The position taken in this publication about gross output per acre and farm size is as follows.

"In some of the regions like Punjab, U.P., Maharashtra, Madras, Andhra Pradesh and Orissa, output per hectare decreases with increase in farm size". Talking of individual crops, the report has this to say "..... yield per hectare and therefore gross income per hectare

of productivity generally decreases as Farm size increases in all the regions (except West Bengal and Andhra Pradesh where no definite trend is discernible). It has something very similar to say about wheat. The acceptance of the idea of negative relationship between farm size and yield per acre has been criticised by A. Rudra (The Economic and Political Weekly October, 26, 1968). He has questioned all-India generalisation of Prof. Khusro by stating that out of 21 linear regression coefficients, only 3 coefficients turn out to be significant and that the regression coefficients in all the remaining 18 cases may be treated as zero. (-Rudra states "One wonders why the tests were undertaken at all if non-significant results were going to be made the basis of significant generalisation". Rudra has suggested that since it has been claimed that the aggregated Farm Management data, reveal an inverse relationship between farm size and yield, it should be examined whether there was something in the aggregation process that had given rise to a spurious statistical relationship. On studying the disaggregated data do not permit of the generalised conclusions that have been drawn. In the context of this controversy, the results of present exercise would be interesting, though the data utilised here is an aggregate data at the district level and therefore one wonders whether these would be subject to the limitations pointed out by A Rudra viz., whether there was something in the aggregation process that had given rise to a spurious statistical relationship between farm size and productivity.

Farm
management
reports, Rudra
includes that
type of data

7. See Sen A.K. "An aspect of Indian Agriculture". The Economic Weekly Annual Number, Feb., 1962; Mazumdar Dipak "On the economics of relative efficiency of small farmers". The Economic Weekly, Special Number July 1963, Sen A.K. "Size of Holding and Productivity". The Economic Weekly Annual Number, Feb., 1964, Khusro A.M. "Returns to Scale in Indian Agriculture". The Indian Journal of Agricultural Economics, October-December, 1964, Rao C.H.H. "Farm size and the economics of scale".

The Economic Weekly December 14, 1963: Rao, C.H.H. "Alternative Explanations of the Inverse relationship between farm size and output per acre". The Indian Economic Review October, 1966. Rudra A "Farm size and yield per acre". The Economic and Political Weekly Special Number July, 1968: Rudra A "More on returns to scale in Indian Agriculture" The Economic and Political Weekly, October, 26, 1968.

8. It will be seen that we have studied the labour productivity, after taking into account agricultural labour as a stock concept rather than as a flow concept. This was largely guided by non-availability of relevant data. However, the point to be emphasised is that if marginal labour productivity has turned out to be positive on the basis of stock concept of labour it is expected that the positive elasticity coefficients would further improve if we take labour as a flow concept. The graphical representation of per acre productivity and agricultural workers per acre also point out to the positive contribution of agricultural workers (Scatter diagram II).
9. See SHARMA, P.S. "A study of the structural and tenurial aspects of Rural Economy in the light of 1961 Census" Indian Journal of Agricultural Economics, October-December, 1965.
10. Ibid.
11. Rao, C.H.H. "Farm Size and Credit" Economic and Political Weekly - Review of Agriculture, December, 1970.
12. Rao, C.H.H. "Agricultural Growth and Stagnation in India" Economic and Political Weekly, February 27, 1965. This situation may not, however, hold good when the owner cultivator has the fear of losing his ownership rights in the land due to the application of the principle of land to the tiller. Under such circumstances the owner cultivator might switch over to self-cultivation of the land which was leased

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out earlier even by mechanising agricultural operations through the introduction of tractorisation and use of ^L irrigation equipments. Such a process will enable the owner cultivator to reap the benefit of increased surplus in the wake of adoption of high-yielding varieties etc. as also remove the uncertainty caused by employment of hired labour (See Raj K.N. "Ownership and Distribution of Land in India, Indian Economic Review, April 1970). The process of mechanisation may also lead to the decrease in the number of tenants as also the extent of area under tenancy, as has been the experience in U.S.A. (Day, Richard H., "The Economics of technological change and the demise of share cropper "American Economic Review" June, 1967.

ANNEXURE TABLE I

PRODUCTIVITY ELASTICITY COEFFICIENTS WITH RESPECT TO OPERATIONAL 'HOLDING SIZE' AND THE COEFFICIENT OF DETERMINATION (R²)

State	Elasticity coefficient with respect to operational holding size	R ²	No. of district considered (N)
Andhra Pradesh	-.7597** (.1375)	.6289	20
Assam	-.0616 (.3620)	.0032	11
Bihar	-.1536 (.1817)	.0483	17
Gujrat	-.4770** (.1230)	.5005	17
Jammu & Kashnir	-.4236 (.3288)	.1916	09
Kerala	-.1376 (.1350)	.1292	09
Madhya Pradesh	-.4260** (.0967)	.3211	43
Madras	-.3054* (.1374)	.3304	12
Maharashtra	-.6330** (.0659)	.8003	25
Mysore	-.8750** (.1330)	.7177	19
Orissa	-.1490 (.1004)	.1667	13
Punjab(before re-organisation)	.2698 (.1574)	.1472	19
Rajasthan	-.7769** (.0715)	.8307	26
U.P.	.0242 (.1050)	.0011	48
West Bengal	-.1747 (.1612)	.0964	13
All-India	-.5488** (.0289)	.5461	301

ANNEXURE TABLE 2

PRODUCTIVITY ELASTICITY COEFFICIENTS WITH RESPECT TO
RAINFALL AND THE COEFFICIENTS OF DETERMINATION (R²)

State	Elasticity coefficient with reference to rainfall	R ²	No. of districts considered (N)
Andhra Pradesh	.9931* (.4173)	.2389	20
Assam	-.1470 (.2392)	.0279	11
Bihar	.3358 (.3394)	.0472	17
Gujrat	.5659* (.1733)	.4076	17
Jammu & Kashmir	-.5033 (.4568)	.1477	09
Kerala	-.2491 (.2099)	.1674	09
Madhya Pradesh	-.0402 (.0210)	.0822	43
Madras	.0468 (.1402)	.0110	12
Maharashtra	.6445** (.1277)	.5254	25
Mysore	.7502** (.1886)	.4819	19
Orissa	-.2259 (.3325)	.0059	13
Punjab (before re- organisation)	.1415 (.2495)	.0135	19
Rajasthan	.9032** (.1832)	.5030	26
Uttar Pradesh	.4001* (.1631)	.1092	48
West Bengal	.1675 (.1299)	.1312	13
All-India	.2352** (.0329)	.1456	301

*Significant at 5% level.
**Significant at 1% level.

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ANNEXURE TABLE 3

PRODUCTIVITY ELASTICITY COEFFICIENT, WITH RESPECT TO PER CENT GROSS IRRIGATION AND COEFFICIENTS OF DETERMINATION (R²)

State	Elasticity coefficient (with respect to % gross irrigation)	R ²	No. of Districts considered (N)
Andhra Pradesh	.5136** (.0727)	.7343	20
Assam	-.0284 (.0543)	.0295	11
Bihar	.00003 (.02693)	.0000	17
Gujrat	-.1437 (.1025)	.1044	17
Jammu & Kashmir	.2606* (.1241)	.3864	09
Kerala	.0653* (.0311)	.3851	09
Madhya Pradesh	.0482 (.0270)	.0719	43
Madras	.0808 (.0614)	.1475	12
Maharashtra	.0534 (.0744)	.0218	25
Mysore	.4444** (.0775)	.6592	19
Orissa	.0187 (.0286)	.0373	13
Punjab (before re- organisation)	.1078** (.0236)	.5506	19
Rajasthan	.1401** (.0256)	.5537	26
Uttar Pradesh	.1189* (.0561)	.0889	48
West Bengal	.1009* (.0327)	.4629	13
All-India	.1570** (.0138)	.3020	301

* Significant at 5 per cent level.
** Significant at 1 per cent level.

ANNEXURE TABLE 4

PRODUCTIVITY ELASTICITY COEFFICIENTS WITH RESPECT TO RAINFALL AND PER CENT GROSS IRRIGATION AND THEIR COEFFICIENTS OF DETERMINATION (R²).

State	Rainfall	% Gross irrigation	R ²	No. of districts considered(N)
Andhra Pradesh	.1079 (.2971)	.4969** (.0876)	.7368	20
Assam	-.1920 (.3075)	-.0367 (.0573)	.0746	11
Bihar	.5525 (.5035)	.0234 (.0343)	.0777	17
Gujrat	.6305* (.2294)	.0594 (.1169)	.4183	17
Jammu & Kashnir	.2903 (.6401)	.3318 (.2050)	.4067	09
Kerala	-.1241 (.2042)	.0572 (.0353)	.4208	09
Madhya Pradesh	-.0590 (.0204)	.0466 (.0262)	.1493	43
Madras	.3791* (.1539)	.2128* (.0750)	.4777	12
Maharashtra	.6704** (.1234)	.0865 (.0501)	.5820	25
Mysore	.4426** (.1382)	.3424** (.0700)	.7923	19
Orissa	.0678 (.0440)	.0198 (.0343)	.0377	13
Punjab (before re-organisation)	.2625 (.1633)	.1133** (.0228)	.6130	19
Rajasthan	.5226* (.1932)	.0937** (.0285)	.6614	26
U.P.	.5157** (.1598)	.1595** (.0526)	.2600	48
West Bengal	.2300* (.0809)	.1139** (.0259)	.7023	13
All-India	.1997** (.0276)	.1466** (.0128)	.4058	301

* Significant at 5 per cent level.
** Significant at 1 per cent level.

ANNEXURE TABLE 6

PRODUCTIVITY ELASTICITY COEFFICIENTS WITH RESPECT TO RAINFALL, % GROSS IRRIGATION AND HOLDING SIZE AND THE COEFFICIENTS OF DETERMINATION

State	Rainfall (X1)	Irrigation (X2)	Holding size (X3)	R2	No. of districts
(1)	(2)	(3)	(4)	(5)	(6)
1. Andhra Pradesh	.0096 (.3400)	.4154* (.1565)	-.1772 (.2795)	.7432	20
2. Assam	-.1859 (.3528)	-.0396 (.0358)	.0286 (.6028)	.0749	11
3. Bihar	.6895 (.5167)	.0277 (.0341)	-.2170 (.1884)	.1630	17
4. Gujrat	.2649 (.2556)	-.0265 (.1088)	-.3566* (.1545)	.5873	17
5. Jammu & Kashmir	1.0552 (1.1045)	.3543 (.2113)	-.5900 (.6862)	.4831	09
6. Kerala	-.0526 (.2635)	.0577 (.0378)	-.0762 (.1533)	.4469	09
7. Madhya Pradesh	-.0477* (.0219)	.0238 (.0227)	-.4043** (.0948)	.4132	43
8. Madras	.2555 (.1905)	.1650*** (.0850)	-.1748 (.1538)	.5503	12
9. Maharashtra	-.0022 (.1650)	-.0071 (.0404)	-.6371 (.1326)	.8008	25
10. Mysore	.3224* (.1540)	.2281* (.1002)	-.3353 (.2181)	.8205	19
11. Orissa	-.0134 (1.0190)	.0100 (.0344)	-.1403 (.1136)	.1772	13
12. Punjab	.3753 (.2606)	.1345** (.0438)	.0848 (.2381)	.6757	19
13. Rajasthan	-.1754 (.1740)	.0600** (.0263)	-.7256** (.1314)	.8672	26
14. Uttar Pradesh	.5273** (.1601)	.1729** (.0542)	.0978 (.0940)	.2778	43
15. West Bengal	.2379** (.0908)	.0988** (.0306)	-.0104 (.0306)	.5941	15
All-India	.1048 (.0286)**	.0931 (.0123)**	-.1018 (.0332)**	.6297	303

* = Significant at 5 percent level.
 ** = Significant at 1 percent level.
 *** = Significant at 10 percent level.

ANNEXURE TABLE 6

PRODUCTIVITY ELASTICITY COEFFICIENTS WITH RESPECT
TO WORKERS PER ACRE (IN THE PRESENCE OF RAINFALL
AND % GROSS IRRIGATION)

State (1)	Elasticity coefficient (2)	No. of districts considered (N) (3)
Andhra Pradesh	-.0577 (.2304)	20
Assam	-.3573 (.3881)	11
Bihar	.3475** (.1549)	17
Gujrat	.3442*** (.1893)	17
Jammu & Kashnir	.5483 (.4669)	09
Kerala	-.2532 (.3106)	09
Madhya Pradesh	.3558** (.0866)	43
Madras	.0757 (.1808)	12
Maharashtra	.7452** (.1440)	25
Mysore	.1711 (.1950)	19
Orissa	.1127 (.1443)	12
Punjab (before re- organisation)	-.1528 (.1201)	18
Rajasthan	.4453** (.0649)	26
Uttar Pradesh	-.2101* (.0842)	48
West Bengal	-.0304 (.1064)	15
All-India	.2437** (.0349)	301

Note: Figures in parenthesis are the standard errors.

** Significant at 1 per cent level.

* Significant at 5 per cent level.

*** Significant at 20 per cent level.

INDIAN CENSUS CENTENARY SEMINAR
October 23-29, 1972

SESSION : IX DEMOGRAPHIC ASPECTS OF ECONOMIC GROWTH

MODERATOR'S STATEMENT

By

Paul Demeny

OFFICE OF THE REGISTRAR GENERAL, INDIA
Ministry of Home Affairs
New Delhi

DEMOGRAPHIC ASPECTS OF ECONOMIC GROWTH:
MODERATOR'S STATEMENT

by

Paul Demeny
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Center, Professor of Economics, University of Hawaii

I

The subject of the present session--demographic aspects of economic growth as reflected in the unique record of the Indian censuses that span a hundred years and cover a subcontinent - is nothing short of monumental. Extreme selectivity of treatment within the confines of the six papers that were addressed to this subject is then hardly surprising, although, inevitably, the papers leave far more questions open than answered.

Selectivity is immediately obvious with respect to the period covered. While some papers, such as notably V.K. Ramabhadran's, do attempt an historical overview, (even if limited only to the 20th century and exclusively to population developments) most of the discussion is oriented to questions posed by the demographic-economic relationships observed in the recent past. Such a focus is of course quite natural in view of the strong policy-orientation that is manifest in the papers. It is however, also a consequence of the paucity of economic data in the Indian censuses prior to independence -- a topic discussed by B. Das Gupta's brief paper. Beginning with the 1881 census and up to 1941 queries on economic characteristics in the census schedules were limited to occupational status, and even within that narrow focus comparability of successive enumerations is rendered difficult by the shifts in the classifications applied and the detail of information gathered. Such ^{difficulties} comparison over

time of course are the rule, rather than the exception, in the experience of all statistical systems, but in the case of India the problems are compounded by the application of economic categories that were often ill-suited to local conditions.

After independence the scope of economic data collected by the census increased substantially in response to needs of planning and research although utilization and interpretation of census economic data, notably on employment and unemployment, is still beset by conceptual problems.

Focussed as the rest of the papers are on the contemporary period their frame ^{of} reference is still discouragingly broad. To demonstrate this it is perhaps sufficient to reflect upon the fact that during the last inter-censal period along the accretion to the population of India was larger than the total population of Indonesia or Japan; or larger than the combined population of the United Kingdom and France. To begin to unravel the economic implications of demographic growth of this magnitude would require the concentrated efforts of many scholars and could be the proper single object of an entire conference. The treatment of the papers is by an large macroeconomic and even within that limit affording little scope for surveying the variety of experience on the subnational level. It is remarkable, nevertheless, that in a nearly balanced manner the papers together do cover the major lines of thinking that have dominated the literature of economic development during the past quarter century.

With rather drastic simplification even in labelling these three strands of thought may be referred to as emphasizing the crucial role of accumulating physical capital (as epitomized in the models worked out by Harrod and Domar); as emphasizing the shifts in sectoral balance as the central process in development (stemming primarily from the work of Arthur Lewis) and as emphasizing the role of investment in human capital (associated with the name of T.W. Schultz and others). To be sure, in each of these schools demographic factors have been given only peripheral attention. Not that the crucial significance of population growth went unrecognized: the impact, say of a potential doubling of population size within the short time span of a few decades on capital per head, on sectoral balance, or on human investment is too manifest to be ignored. However, in the dominant 20th century tradition of economic thinking demographic change was taken to be an autonomous variable-one outside the scope of conscious manipulation through public policy. It was first of all the magnitude of the developmental task faced by Indian planners that forced a reexamination of this schizophrenic definition of the admissible scope of the dependent variables in economic models and led to an explicit recognition of population as a policy variable in developmental planning.

The fundamental rationale of such a radical change in attitude is lucidly brought out by V.K. Ramabhadran's paper on the population factor in India's economic development. Accelerating demographic expansion, culminating in the peak 25 per cent growth observed during the last decade has been paralleled by impressive developmental efforts and a consequent massive expansion of national income. However, in terms of per capita indices the performance of the Indian economy was distinctly disappointing. A few illustrations should suffice. From the mid 1950's to the late 1960's national income per head increased by less than 15 per cent, i.e. less than Rs.40 per person in constant 1960-1961 prices leaving as a result half of the population with a per capita consumption still below Rs.240. Despite the addition of some 80 million person to the urban population during the last 40 years more than 80 per cent of the 1971 population was still rural. An impressive expansion of literacy since independence still leaves an illiteracy rate exceeding 70 per cent and an absolute number of illiterates that keeps expanding. Developments that on the basis of past demographic behavior can be forecast with a great degree of certainty - notably the growth of the labor ^{force} during the coming two decades -- indicate a further intensification of demographic pressures. Ramabhadran concludes that if economic growth is not to be swamped by such pressures the growth of the population must be curtailed. He points out that the optimistic assumption of reducing the birth rate to 25 per 1000 by 1981 is likely to result in a rate of population growth of

some 1.6 per cent - still excessive from the point of view of economic development.

In a paper analysing the relationship between population pressure and economic change in the Indian context S.R. Mehrotra emphasizes the varying degree of interdependence between population growth and economic growth as conditioned by the special circumstances of an economy, notably by population/resource ratios and the speed of demographic growth. He detects a substantial difference between the western experience and the experience of the less developed countries. The chief factor responsible for this difference appears to be the excessive rapidity of demographic expansion that absorbs most investments and retards the structural transformation of the economy. Slow absorption of the agricultural population by other sectors is illustrated by the continuing fall of cultivated land per capita and the increase of agricultural holdings: processes that are likely to continue under present demographic trends. Mehrotra concludes with the advocacy of two lines of policy apart from continuing efforts for economic development: a reduction of fertility that would save resources for per capita growth, and a change in the attitude of the rich countries that would lead to a "more rational and just distribution of the world population over the land surface of the globe". The specifics of such a solution, and in particular the political mechanisms by which such a solution might become feasible are however not examined by the paper.

The contribution of P.V. Rama Raju ("Demographic Factors in Investment, Savings, and Capital Formation in India") examines the recent growth of national income by its main components in conjunction with the Indian Planning Commission's projections of the net domestic product and expenditure in the 1970's. He concludes that an anticipated reduction of aggregate population growth to 1.7 per cent per annum by 1980-81 and a further reduction to 1.2 per cent beyond that period will have a favorable influence on the rate of savings, investments and per capita income growth. The behavior as under pinnings of his plausible conclusion are, unfortunately, not spelled out. Using the Registrar General's projections he points out that the stipulated demographic changes would result in a population of 870 million by the year 2000, that is roughly 300 million less than that implicit in a continuation of the present rate of growth. Naturally, in per capita terms the economic effect is bound to be favorable.

Dr. Vasant Pethe's paper, that perhaps should have been allocated to the session dealing with demographic aspects of urban development, is addressed to the question of the economic base of Indian cities. Using data from the 1961 census relating to the classification of workers by industry for some 250 urban units, each having a population of 50,000 or more persons, a series of indices are constructed and subjected to statistical analysis.

The indices show the relative importance of the various industries in a given city and, in comparison with the characteristics of all urban centers taken together show the degree of local specialization. The analysis has two purposes: one to delineate set of urban centers that are of special importance from the point of view of a given industry and, second, to ascertain the differential importance of various industries to given localities. The first sheds light on the pattern of industrial location, the second identifies the economic base of cities. An attempt is also made to achieve a more ambitious objective, namely to identify sets of sectors that form a coherent complex, thus reducing the number of individual sectors and defining the industrial base of cities in terms of more meaningful industrial complexes. However the interpretation of correlations between industry divisions remains inconclusive.

Unlike Dr. Pethe's interesting but limited statistical analysis, Professor Baljit Singh's paper is, once again, addressed to the grand theme of economic demographic interrelationships, set in a normative framework. His argument is centered on the importance of qualitative changes in factor inputs, most of all in labor, for economic growth. The essential elements in such changes are perceived as brought about by education and research that produce high level manpower capable of developing new technologies; the creation of a climate

for innovation, and the training of the general labor force to apply them. These insights are fairly standard in development theories, the particular argument presented by Professor Singh however spotlights the inverse relationship between the degree of achieving such qualitative changes rapidly, and the rate of demographic growth. As he puts it, the needed diversion of resources for the maintenance of larger quantities of labor depletes the resources for qualitative improvement. Thus achievement of the latter has definite implications as to the desirable level of the former; specifically a "quantitative norm" of zero demographic growth is perceived by Professor Singh as a logical desideratum for maximum qualitative improvement.

II

Having summarized some of the main points of the papers submitted for the present session, it may not be out of place to adduce some general comments concerning their treatment of demographic-economic relationships. Given their necessary brevity such comments obviously cannot make justice to the complexity of the issues in question. Hence they are offered here only with some reticence and with due apology for the lack of balance they will exhibit.

A common characteristic of the approach taken by the various authors is the resolutely macroeconomic and macrodemographic nature of their analyses. Variables such as saving, investment, quality of the population, sectoral reallocation of the labor force, etc. are treated on an extremely aggregated level: applied in fact typically to the Indian economy as a whole. In turn, they are related to quantities such as the rate of population growth, age distribution, fertility and mortality that likewise characterize a vast aggregate: indeed one exceeding half a billion souls. While the elusive quality of the procedure requires no demonstration the approach does have its legitimate uses and, therefore, a first set of comments will accept this fundamental characteristic as given. It will be suggested that even within such rules of the game some fundamental objections do have to be raised. With reference to the present discussion three somewhat overlapping points will suffice.

First, the functional relationships implicitly or explicitly assumed in the various analyses is exceedingly mechanical and narrow. The model that makes income growth solely or primarily a function of saving and capital accumulation is perhaps the extreme case in point. A certain percentage of saving out of total income is assumed to translate into an equivalent amount of investment that, via the incremental capital-output ratio leads to a certain percentage change in total output, which, in relation to the rate of population growth defines a certain change in income per head, which, in turn, is accepted as a measure of the success of the developmental effort. By definition, then, manipulation of that success indicator can be achieved by engineering appropriate changes in the percentage of income saved, in the capital output ratio, or in the rate of population growth. The latter variable unequivocally appears as representing a drag on "development" yet the crudeness of the model -- including its more elaborate versions -- offers dangerous temptations for downplaying its significance: both the negative impact of high rates of population growth and the positive influence of a reduction of the population growth rate (via fertility reduction) in the process of development. After all, there exists a wide latitude for achievable rates of saving while population growth has its quasi-biological upper limit. High enough saving rates thus can cope easily even with the highest feasible rates of natural increase. While maintaining a high rate of investment should be expected to cause

discomfort, through the magic of compound interest even an early increase in the absolute level of consumption is also assured. Thus a very temporary policy of austerity appears to offer a guaranteed escape from even the most severe pressure caused by rapid demographic growth. Why any country should ever stay poor for any length of time if such a model is a realistic representation of reality remains a mystery.

By the same token- according to this model, the gains from fertility reduction, while positive, appear to be modest indeed. If such reductions are forthcoming spontaneously they may be welcome but strenuous efforts to induce them could hardly be justified. Closer examination of these propositions would show, however, that they are simply built-in consequences of the structure and assumptions of the models from which they are derived rather than reflections of the actual shape of things.

Similarly strong charges of erroneous interpretation may be levelled against the facile identification of formal education as the source of qualitative changes in labour inputs hence of increases of labor productivity. The error sometimes is as crude as the unsuspecting application of tools of partial analysis to what are problems of general equilibrium. If a dentist earns ten times the average level of wages he is indeed right to attribute that earning differential to the specialized skills he has acquired. It does not follow, however, that a road to national richness is

to train everybody to become a dentist. General pleas for larger educational investments are seldom supported by such crude arguments, and arguments for more education that are valid do exist, yet a careful examination of the intellectual standing of simple recipes for economic development invariably reveals a disconcerting amount of faulty logic. Identification of industrialization or urbanization as the engine of economic modernization, for instance, in recent years has been increasingly recognized as suffering of such a logical flaw.

A second criticism of the analyses presented is that they did not confront the difficulties in interpreting the welfare significance of the accepted developmental index: income per capita. The point appears to be a pedantic one yet it could be shown that its portent in the present context is farreaching. Increasing income, to a large extent, is meaningful only if associated with increasing ranges of choice. As incomes grow, however, options that were formerly open tend to be eroded or entirely lost, thus introducing an ambiguity into the meaning of economic gains, measured by income per head, as an index of welfare. The significance of the point at issue here is that differential rates of population growth are likely to have a strong influence on the magnitude of such a bias, particularly when, as in India, initial population size and density are high. The resulting distortion of conclusions is less obvious in a situation characterized by low general levels of income, hence there is a strong temptation for Indian planners not to be bothered by such effects. Yet development should lead to

higher incomes sooner or later and the income elasticities of demand for goods whose supply, ceteris paribus, is negatively related to population size and density are often particularly high. The demand for living space, unspoiled natural beauty, privacy, and freedom from excessive regulation are a few of the obvious examples. Given equal levels of material consumption per head the differential availability of such amenities is either ignored in conventional welfare measures, or the indices are so constructed as to show a perverse relationship. The point is of obvious relevance in the Indian context.

Finally, a third objection that may be made to the analyses presented is that they are oblivious of certain considerations that, for excellent reasons, occupy an increasingly important role in the contemporary discussions of demographic-economic relationships. I refer to the problems of emerging limitational factors to growth, in particular as manifested in such matters as increasing exhaustion of certain natural resources, vulnerability of certain types of technological solutions to breakdowns or unforeseen side effects, and environmental pollution. Once again, the issues appear to be less urgent, hence tend to be ignored, when general income levels are low. This is understandable but it does not change the fact that such problems must be faced in due course by any country that aspires to high levels of income. More gravely, some of the untoward consequences of modern technology may reveal themselves more vicious in low

income countries with high population/resource ratios than is the case elsewhere if only because in such situations the cost of coping with effects of this type is less easily borne. As before, the point of the argument in the present context is that differentials in population trends have a strong impact on the timing and strength by which economic growth will encounter and generate severe problems of resource limitations, of technological hazards, and of environmental pollution. To devote attention to these questions in an examination of demographic-economic relationships in the Indian setting would be therefore highly desirable.

As was pointed out earlier, the papers presented at this Session take a macro approach in analysing the economic impact of population change. It should be added quickly that in that emphasis they reflect the overwhelming majority of authors who have addressed themselves to similar questions in the contemporary literature. The approach has its undoubted merits but it is equally obvious that it is responsible for a one sided and highly selective treatment of the economics of population, most notably for neglect of distributional issues. What happens to income per head in an economy composed of hundreds of millions of people is of traditional although not necessarily legitimate interest to the planners but it would be certainly safe to propose that from the point of view of individuals or individual households, what counts, above all, is what happens to their own income. Individuals by and large are better informed than anybody else including economists about the impact of their own action upon themselves, but to follow their enlightened self interest in population policy matters would require but they have reliable information about the impact that others demographic behavior has upon them. On this crucial question economists have not been supplying adequate answers, not the least because of their failure even to pose the right questions. Yet the crux of social problems and notably of the population problem lies precisely in the existence of externalities - negative or positive - inherent in individual or group action: i.e. in the possibility that

people acting in their own interest take action that harm or benefit others without giving compensation for the harm inflicted or bearing compensation for the benefit rendered. When externalities are so humerous and diffuse that a proper bearing of the costs and the capturing of the benefits of one's own actions cannot possibly result from bargaining and contracting between private individuals, as is likely to be the case with fertility behavior, the sum of the actions of isolated individuals adds up to a social optimum only by accident. Individuals acting in concert through their government however can take appropriate action to correct for externalities that can be identified and thus improve their welfare.

The lack of sufficient knowledge about the micro-distribution of the effects of demographic behavior certainly supplies at least some of the explanation for the inadequacies of policy instruments in the field of population. Most national programs, for instance, continue to take it for granted that provision of efficient means of contraception to couples at zero or near-zero cost would somehow result in behavior that adds up to a social optimum. Since couples make their decisions with reference to their own best interest and do not normally take into account the influence of their action on others this is not necessarily a realistic assumption. In explicit recognition of this, family planning has been increasingly complemented by population education - a judicious mixture of persuasion and propaganda appealing

to self-interest and to the interest of the public at large. Such a policy has obvious limitations. To illustrate them one may picture analogous measures aimed at controlling internal migration. A government, for instance, might consider attacking what it regards excessive urbanization by the two-pronged policy of providing subsidized or free bus transportation out of the cities (the equivalent to birth control instruments) and for those uninclined to take the bus directing a programme of "migration education" trying to persuade migrants that for their own and everybody else's best interest they should return to their villages. It is doubtful that such a policy would be even seriously proposed as an adequate solution of the problem: it would be taken for granted that migration behavior is determined by objective economic and social parameters as perceived by individuals and that free buses and exhortation are likely to play a relatively small role among those determinants. If the effects of migration are regarded as sufficiently serious to warrant effective government intervention the remedial action would undoubtedly focus on changing the relative economic incentives attached to rural and urban residence.

The analogous proposition with respect to population policy could be easily spelled out. Such a policy may seek to change the signals individuals receive from their environment as to their desirable demographic behavior far beyond manipulation of the prices of contraceptives and the sending of educational messages. It is well known that this yet another aspect of population policy where the Indian experience has broken new ground well ahead of others. The subject matter of this session however is relevant not to what the content of the toolbox of potential policy instruments is but to the elucidation whether, why, when and to what extent the use of such instruments is in the social interest. An adequate performance of this task will require efforts to identify the microeconomic impact of demographic change well beyond what has been achieved thus far in economic research.

END

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Population Pressure & Economic Change (with a Special
Reference to India)

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POPULATION PRESSURE AND ECONOMIC CHANGE

(With Special Reference to India)

by

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INTRODUCTION

1. It is essential for a clear understanding of the relationship between population pressure and economic change that the two terms 'population pressure' and 'economic change' are first of all clearly defined.

2. Population pressure has been defined by E.W.Hofstee as the "social tension originating from an absolute or relative disproportion between population and available resources. An absolute disproportion exists when the proportion is such that it endangers the provision for the minimum needs of the population..... A relative disproportion exists if, without in reality endangering the provision for the minimum needs, the people react upon it with a feeling of dissatisfaction."1.

3. It is evident that population pressure in either sense is simply another word for what used to be called overpopulation. And as soon as we think of overpopulation we have to remind ourselves of another related concept - the concept of 'optimum population' or the most desirable size of population. It is only sensible that this size is defined in a dynamic sense. As Alfred Sauvy puts it: "When one says that the 500 million inhabitants of India would be more at ease if there were only 300 million, one does not mean that 200 million should be shot. The optimum like the maximum, can be more than a useful pointer. Anyone is free to reckon as many optimums as he can conceive of: he will be helping the study of how numbers of men act on various other interesting factors."2

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4. In a technologically dynamic world where the capacity to discover and exploit natural resources is growing at a fantastic rate, no static measure of 'optimum population' would make any sense. The classical test of whether the soil can feed its people must be severely qualified. Nor can we regard density per square mile as an indicator of whether a country is over-populated. Countries like Japan and the Netherlands have a density almost twice that of India but they hardly suffer from population pressure in the sense in which India does. Over-population should now be characterised as under-development of the economy. Population pressure and the concomitant economic distress exist because economic growth has lagged behind population growth. If economic growth can be much faster than population growth, the pressure of population would cease to be a problem. It may therefore be more realistic to talk of the 'optimum rate of growth of population' for a given stage of economic development rather than of 'optimum population'.

5. Change is opposed to status quo. By economic change is meant the movement of the economic process over time. But different thinkers select different aspects of this movement for emphasis. The classical theorists, particularly Adam Smith, were concerned with growth in the national income and wealth. To them economic growth seemed to be an automatic process. Unlike this, to Karl Marx, the significant aspect of economic change was the rising consciousness of the working class, the maturation of class conflict and decay of capitalism due to its inherent contradictions. For Marx, therefore, economic change did not include merely the quantitative increase in output but also the change in its distribution between classes. After Keynes - in the era of planning and employment policies - economists are preoccupied with planned economic growth with full employment and social justice. Even for poor countries it is this concept of economic change which is relevant today.

UNDERLYING THEME

6. It would be naive to hold that the rate of economic growth depends exclusively or mainly on the rate of growth of population. The two variables - population growth and economic growth - although closely related are at the same time independent to a considerable extent. Economic growth does not depend much on population growth as such which merely increases the supply of unskilled labour. It depends much more on the stock of known natural resources, capital supply, the supply of skills,

technological change and the efficiency of economic organisation. Population growth on the other hand is affected not by economic conditions alone but also by changing social attitudes towards family size and medical technology. In any case the relationship between the two growth rates is complicated. We shall focus on one issue which is germane to our theme: the impact of a high rate of population growth on the rate of economic growth of a developing economy like India which already carries a large population.

THE POSITIVE EFFECTS OF POPULATION GROWTH

7. Growth of population has played a significant part in the evolution of civilization and economy if we turn our eye upon the long vista of the past. In the pre-industrial phase a certain numerical strength was a pre-requisite to the progressive specialisation of functions and the growth of cities. A growing population assists industrialisation by supplying a ready labour force to staff new factories and exploit natural resources. It supplies an enlarged market in which to sell the mass produced products. Admittedly, the growing population of the past has facilitated the development of mass production techniques and increase in the net national product. Some studies have been made to find out the correlation between population growth and the national product. "Estimates based on production functions of the Cobb-Douglas type suggest that, during the past 75-100 years in the industrialized Western world, population growth has been responsible for something like 0.3 - 0.5 of the increase in net national product, while the balance attributable to capital growth and technical progress, itself sometimes stimulated or facilitated by population growth."³ Spengler who has summarised the evidence makes it clear that the data are imperfect and the studies do not make adequate allowance for changes in the quality of labour. The figures merely suggest the broad orders of magnitude.

NEGATIVE EFFECTS OF POPULATION GROWTH

8. In the context of under-developed economies, the belief that the growth of population has been conducive to economic growth has been very much shaken by the recent disconcerting growth of population in the under-developed world today. In the demographic transition of the developed economies a happy rhythm could be maintained between population growth and economic growth because of a simultaneous and gradual decline of natality and mortality rates. But in the developing economies because of a break-through in medical science, death rates have declined rapidly while birth rates remain at high levels so that the population

there is increasing at such an unprecedented rate as to cause excessive burden which far exceeds the technological and economic stamina of the people.

THE ROOT CAUSE OF THE PROBLEM - DIMINISHING RETURNS ?

9. Rapid growth of population is supposed to retard economic growth beyond a point mainly due to the operation of the law of diminishing returns. As Coale notes, "Ultimately, high fertility produces a population that overwhelms any finite resources, and diminishing returns must sometimes become more important than economies of scale."⁴ It may be pointed out here that there is nothing inexorable about the law of diminishing returns. If all the available knowledge of modern technology is used, returns to scale need not fall at all. In the twentieth century if returns diminish, the cause does not lie in the law of diminishing returns but in the lack of knowledge and capital. The deficiencies are mainly due to historical reasons. The root cause of population pressure is under-development. If all the countries reached the same technological level, the population pressure in the present form will disappear.

RUNAWAY POPULATION GROWTH AND THE INDIAN ECONOMY

10. India ranks second in the world population next only to China. India has 15 per cent of the world population, only 2.4 per cent of the world's land and hardly 2 per cent of the world's income. According to the estimates prepared by the Registrar General of India, the country's population has crossed 550 million mark in mid-1970. An yearly increase of 13 million people in India is more than the total population of Australia. India's population is increasing at the rate of 2.5 per cent a year and it is simple arithmetic to calculate that growth continuing at 2.5 per cent doubles the size of the population in 28 years. If the present rate of population growth continues, our population should cross the 1000 million mark even before the turn of the century. Since death rate may still decline further any prospective reversal in the present acceleration of the rates of population growth in India can come about only as a result of reductions in birth rates. The rapid growth in population is to be viewed in relation to the economic growth which we are having in our country. As we shall see in the following pages, rapid growth of population in India is proving a hurdle in our economic progress.

DEPENDENCY RATIO

11. First of all, a high fertility rate in India like other under-developed countries increases the dependency ratio. Forty five per cent and more of the population in these countries consists of non-working children under 15 years of age. The support of many dependents absorbs private income that would otherwise be available for investment. It also exerts an upward pressure on government consumption expenditure on elementary education, housing and other social overheads. The growth of government investment is correspondingly retarded.

12. Data show in Table I how a high fertility rate impairs economic growth by generating an economically disadvantageous age structure.

TABLE I

Country	Year	Total Popu- lation (in millions)	Population Below 15 Years of Age (in millions)	Depen- dency Ratio	% Rate of Growth of Populatio During 1963-1968
1	2	3	4	5	6
India	1961 ^(C)	438.77	180.01	41	2.5
Philippines	1967 ^(E)	34.65	16.21	46	3.5
Mexico	1967 ^(E)	45.67	21.12	46	3.5
Japan	1965 ^(C)	98.27	25.16	25	1.1
U.S.A.	1967 ^(E)	195.85	60.04	30	1.2
England and Wales	1966 ^(E)	48.18	11.05	23	0.7

(C) - Census

(E) - Estimated

Source : United Nations, Demographic Year Book,
1968.

In countries with such an age structure "over 65 per cent of the total investments are devoted to maintain the level of per capita income at a constant level whereas the corresponding figure for a sample of developed countries was less than 25 per cent."⁵ Thus, it is clear that a high dependency ratio reduces the capacity of the country to step up domestic investment.

THE INVESTMENT GAP

13. It is useful in this connection to study the quantitative relationship between investment and the growth of population and per capita income. The Table II shows the per capita income growth that is feasible with given population growth rates and investment rates.

TABLE II

National Income Invested	Growth of Population per year			
	2%	2.5%	3%	3.5%
	Feasible Growth Rate Per Capita Income			
1	2	3	4	5
10 per cent	1%	0.6%	0.25%	0.1%
15 per cent	2.25%	1.9%	1.5%	1.1%
20 per cent	3.5%	3.1%	2.75%	2.4%
25 per cent	4.75%	4.4%	4.0%	3.6%

Source: Alfred Sauvy, General Theory of Population. English Translation by C. Compos, Weiden Field and Nicolson, London, 1969, p. 208.

Note: It is assumed here that the capital output ratio is 4 for economic investment and 3 for investment in human capital. Sauvy makes a distinction between economic investment and investment in human capital what he calls demographic investment. See pp. 180-1 of his book.

14. A poor country which can only manage to invest 10% of national income and has a high population growth rate of 2.5% can only achieve less than 1% growth in per capita income. These figures roughly indicate the Indian situation, except that the per capita income has grown a little faster - about 1.5 per cent per year in the last 20 years - because of somewhat higher investment ratio in recent years. This slow growth rate does not promise the eradication of poverty even by the end of this century. And due to demographic pressure India has so far found it difficult to raise the actual domestic investment rate much above 10% although in successive Five Year Plans the intention to raise it to 20% has been repeatedly announced. Thus India provides a striking example of population pressure retarding the growth of investment and income. It may be pointed out here that to achieve a sustained growth in per capita income of 4 to 5 per cent a year would require nearly 25% of the national income to be invested which is an impossible figure unless of course we resort to totalitarian restrictions of consumption or forced direction of labour.

POPULATION PRESSURE AND THE FOOD PROBLEM

15. Another bottleneck to economic growth created by population growth is the inability to generate a food surplus. The chronic food shortages from which India has suffered hardly needs any documentation. The comparative ease on the food front during the last two or three years due to the high-yielding seeds should not make us complacent about the long-run problem of feeding the rapidly growing number of people. The progress of the Green Revolution in India is constrained by the lack of irrigation facilities. Even now only 23 per cent of the cultivable land is irrigated. In order to sustain the momentum of growth in agriculture, it will be necessary to extend irrigation very fast. But this requires massive investments for long periods. Thus for a considerable time agricultural growth will be restricted by irrigation capacity. A slower population growth would have relaxed this restriction much earlier.

PRESSURE ON LAND

16. Population pressure on land is constantly increasing. This can be seen from the following data. Since 1921, the cultivated area per capita has declined by 33 per cent.

TABLE III

Cultivated Land Per Capita, 1891-1961

Year	Acres
1891	1.09
1901	1.03
1911	1.09
1921	1.11
1931	1.04
1941	0.94
1951	0.84
1961	0.75

Source: Census of India, 1951, Vol. I, Part 1-A, p. 141.
The figure for the year 1961 is derived from
India 1964 - A Reference Annual, 1964.

17. The present position in respect of distribution of land holdings and tenancy reflects the pressure of population on land. The total number of holdings has increased by more than 4.5 millions⁶ between the years 1953-54 and 1959-60. Although the increase cannot be wholly attributed to pressure of population on land as it may be partly due to a break-up of relatively large holdings but the pressure on land has increased cannot be denied. It may be mentioned here that productivity in agriculture increased by 1.77 per cent⁷ on an all-India basis during 1952-53 to 1964-65 but still it is much below than that achieved in other agriculturally advanced countries. These facts imply that an agricultural surplus has to be created only through intensive cultivation unlike the developed countries there is little room for extending cultivation.

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EMPLOYMENT AND STRUCTURAL CHANGE OF THE ECONOMY

18. The failure to solve the employment problem is another outcome of population pressure. Despite considerable development in both private and public sectors, the problem of unemployment in general continues to be chronic. Although there is much controversy about the magnitude of unemployment in the country, unemployment to the tune of at least 6 per cent⁸ of the labour force does exist in India. The rate of unemployment among the educated classes is higher still.

19. It is generally recognised that the process of economic growth is accompanied by a decline of the agricultural force ratio. Historical evidence shows that hardly any country can attain a high level of living without this structural transformation. But in India, this structural transformation is yet to take place. The situation is that if the labour force continues to grow as at present, it may not come about significantly for a long time. The following data support this contention.

TABLE IV

	Working Force in 1951 (millions)	Per cent	Working Force in 1961 (millions)	Per cent	Compound Rate of Growth per Annum
	1	2	3	4	5
Agriculture	103.6*	72.4	131.1**	69.5	2.3
Non-Agriculture	39.6	27.6	57.5	30.5	3.8
Total Working Force	143.2	100	188.6	100	2.7

Source: * Figures are obtained from India 1956, Government of India Publication, Table XXXVI, p. 105.
 ** Census of India 1961, Vol. 1, Part II-B(1) - General Economic Tables, p. 86.

20. The total labour force growth rate has been 2.7% per annum which is higher than the population growth rate. But the agricultural labour force ratio has declined minimally only 3% during the decade. It may be pointed out that the rate of change in sector proportions is determined by the difference between the rates of growth of non-farm and total employment. But the coefficient of differential growth (as the difference is called by F. Doring⁹) will be comparatively low in countries where total population and labour force are growing between 2 and 3% per annum. It is obvious the process of structural transformation will be slow in India where still about 70% of the labour force is engaged in agriculture.

POPULATION PRESSURE AND URBANISATION

21. Historical evidence shows that there is a close relationship between urbanisation and industrialisation. Urbanisation must be viewed as an essential element in the process of the modernisation of traditional agricultural economies. In India as in other developing countries, cities are overcrowded with the attendant problems of housing shortages, transport bottlenecks and increasing crimes. The rate of urbanisation of the country as a whole despite the industrialisation of the country has been very slow. The urban population in 1961 was only 17.9 per cent of the total population as compared to 17.4 in 1951. This slowing down of the tempo of urbanisation in spite of the speeding up of industrialisation is clearly a case of population pressure from which the country is suffering. Unlike the urbanisation in the Western world, the developing countries because of their unprecedented growth in population are experiencing the pains of urbanisation without at the same time solving the problem of surplus manpower in the rural areas. "The poor countries thus confront a great dilemma. If they do not substantially step up exodus from rural areas, these areas will be swamped with under-employed farmers. If they do step up the exodus the cities will grow at a disastrous rate."¹⁰ The problem will elude solution so long as there is no balance between the overall rate of population growth and the level of development of the productive forces in the country.

22. Our argument so far shows that population pressure restricts economic growth by raising the dependency ratio, limiting private and public investment. The vicious circle caused by the high population growth seems

to be a closed one. Limited investment permits a low rate of growth of non-agricultural employment and thus prevents the solution of the employment problem through structural transformation and urbanisation.

REDUCED FERTILITY AND ECONOMIC GROWTH

23. Economic growth is a costly and painful process. The growth process can be made less painful and less costly if the fertility rate can be reduced and the resources thus saved are utilised for investment. As an indication of the economic benefits of a slowdown in population growth, it has been calculated that "a 50 per cent linear reduction in fertility in twenty five years provides in three decades an income per consumer some 38 - 50 per cent higher than would occur with sustained fertility."¹¹ In July 1962, the Cairo Conference of Developing Countries adopted a declaration of great significance. The Declaration says that "Countries that suffer from the pressure of population on resources available should accelerate their rate of economic development, and in the meantime take appropriate legitimate measures to deal with their population problems."¹²

POPULATION PRESSURE AND INTERNATIONAL STABILITY

24. Such a policy is necessary not only for accelerating economic growth but also for the sake of international stability. Sixty per cent of the world population now lives in abject poverty and these poverty zones constitute the 'danger spots' for the rich forty per cent of the world's peoples. A noted demographer Warren S. Thompson states that "A world in which large differentials in population growth exist is likely to be an unstable world and one in which the acquisition of the larger resources by the growing peoples would be governed chiefly by their ability to take them forcibly from weaker peoples. This belief rests, in part, on the further assumption that even if unused resources needed by the more rapidly expanding peoples were available they would not be made accessible to them by the peoples that already hold title to them."¹³ How the problem of population is solved will depend very much on the attitude of the rich countries. Perhaps the time may soon come that in their own interest the rich countries will support not only the programmes of population control in poor countries but also a more rational and just distribution of the world population over the land surface of the globe.

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SUMMARY

In a technologically dynamic world, population pressure (tantamount to over-population) must be characterised as under-development of the economy. Although the relationship between population growth and economic change or growth is clouded over by complicating factors, it is nevertheless a close one. In the West, population growth accounted for 30 to 50% of the increase in net national product. But in the poor countries, the negative effects of population growth are more important than the positive effects. In case of India, the phenomenal population growth has caused a burden which far exceeds the stamina of the economy. A rapid population growth via high dependency ratio is creating an investment gap which in turn retards the growth of national income. Limited investment permits a low rate of growth of non-agricultural employment and this prevents the solution of employment problem through a structural transformation of the economy. Reduced fertility can accelerate the rate of economic growth. Demographic upsurge in the under-developed world constitutes a threat to world stability. A more rational and just distribution of the world population should be considered as a necessary policy in the future.

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IX. 03

Use of Census Data for Analysis of Economic Base of Urban Centres
and Location of Economic Activity

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Use of Census Data for Analysis of Economic
Base of Urban Centres and Location of
Economic Activity

: By :

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1 The 1961 Census of India had been more comprehensive than any other previous Census, in the sense that it collected a large mass of data on a variety of social and economic aspects of the population. In particular, the 1961 Census has presented detailed data on the economic activity of the working population for each village, town and city. This information is extremely useful for analysing the economic base of individual village or town, as well as for studying the location of economic activity.¹

2 The present paper concentrates its attention on the study of about 250 urban units, each having a population of 50,000 or more persons. It makes use of the 1961 Census data on the classification of workers according to the various "Industry Divisions". The Census has grouped economic activity into the following nine Industry Divisions:

<u>Industry Division No.</u>	<u>D e s c r i p t i o n</u>
I	Cultivator
II	Agricultural Labour
III	Mining, Quarrying, Forestry, etc.
IV	Household Industry
V	Manufacturing other than Household Industries.
VI	Construction
VII	Trade & Commerce
VIII	Transport, Storage and Communication
IX	Other Services

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It may be noted that from the point of view of urban habitations, Industry Divisions I & II are not substantively as well as quantitatively important.² Hence only Industry Divisions III through IX have been taken into account in the following study.

3 The data concerning the distribution of workers into nine Industry Divisions for 250 cities have been analysed with two main objectives in view : (1) to identify and characterise the economic base of individual cities, and (2) to throw light on the location of "Industrial activity" as between the cities of India under consideration. In the following discussion, the term 'locality' or 'city' is used to denote an urban unit having a population of 50,000+, and "the total urban economy" to indicate the totality of conditions obtaining in 250 cities taken together.

4 The data on the industry-wise distribution of workers in cities as given in the 1961 Census are indeed valuable; but by themselves, they are not interesting. They would be revealing only when the statistics of one city are compared with those of other cities and with the whole urban economy. The distribution of workers of the total urban economy between different industries indicates at the macro level the general pattern of the economic functions performed by the urban population as a whole (i.e. population of cities with 50,000+ persons). This pattern becomes an important norm for comparison. If a given city has a "critically large" percentage of its workers in a certain industry than what can be expected in comparison with the total urban economy, one may say that the city specialises in that industry. Table 1 presents the distribution of workers by Industry Divisions (III to IX), in 250 cities taken together. This may be taken to represent the general pattern of urban economic activity, so far as the 250 cities are concerned:

Table 1 : Distribution of workers by industry in 250 cities taken together

Industry Div.	III	IV	V	VI	VII	VIII	IX	III - IX
% of workers	1.9	6.1	27.1	3.9	17.8	9.9	33.3	Total No. 15,154,620

5. As implied earlier, the data on industry-distribution of workers can be used for two purposes: (i) for the study of the location of industry and (ii) for "regional economic

base" studies. In the first type of study, the purpose is to know how a given industry has concentrated or dispersed as between the different localities. Viewed from a different angle, one can know which localities (cities) are important from the point of view of given industries. The economic-base studies, on the other hand, are meant to ascertain the differential importance of the various industries to a given locality. This knowledge is very important from the point of view of city development and planning at the micro level. In the ultimate analysis, both the locational and economic-base aspects represent two sides of the same coin; they show nothing but different facets of local specialisation.

6 Apart from the location and economic-base studies, the data on industry-distribution of working force can be used for another important purpose. Instead of looking at industries as separate individual sectors, one may take an integrated view and try to find out whether they can be reduced to a fewer number of, what may be termed as, fundamental sets of industries. The basic economic function of a city, in this sense, can be ascertained not in terms of separate industrial sectors as defined in the Census, but in terms of the fundamental sets of industry or, to use a briefer term, as an "industry-complex". An inter-correlation matrix for industries would indicate whether some individual industries have, between them, high correlation so that they may form a close-knit industry set or an industry complex. Once industry complexes are determined, the urban economic-base of cities can be further defined more meaningfully in terms of industry-complexes.

7. To sum up, the Census data concerning the industry-distribution of workers are very important for the study of division of labour and local specialisation and can be used to throw light on three aspects : (1) urban economic-base, (2) location of industries, and (3) the industry complex of cities.

8. The methodology and indices used for analysing the economic-base and locational aspects are given below.³ The various indices have been classified into two groups : (A) Economic-Base or functional indices: Index Nos. E1 to E5: These indices indicate the economic-base or the economic functions of individual cities, (B) Location Indices: L1 & L2: These indicate location of industries as between the cities. The Indices are self-explanatory. However, a few details

concerning the meaning, use and limitations of the various indices are presented in a summary form in the following statement. Some of the indices are not used in the present paper for the following reasons: The Indices E1 & L1 are rather crude; E2 gives absolute numbers and as such is not suitable for comparison; and in E3, the values do not add up to 100%. Hence, the data on cities are analysed with the help of indices E4 & E5 for the study of economic-base, and L2 for the study of location.

9. The results of the application of the Economic-Base Index E5 are presented in Table 2. This index throws light on the extent of specialisation of a city in a field or fields of economic activity. The critical value of the index selected for determining whether the extent of specialisation is noteworthy or not is taken to be 25. It may be noted that the choice of the critical value is purely arbitrary. If a city conforms completely to the total urban pattern, the value of the index would be obviously zero. Generally, the greater the value of the index, the greater is the degree of specialisation (and by implication, greater is the export-orientation of the locality). It will be seen from Table 2 that 49 out of 250 cities revealed local specialisation on the basis of the critical value chosen for this purpose.

10. Some more details concerning the type of local specialisation in cities can be had from Table 3. This table sets out the results of the application of Economic-Base Index E4. The Table shows for each industry, the cities which specialise in that industry. It is quite possible that one city specializes in more than one industry. The critical value chosen for determining specialisation of a city in an industry is 75. The number of cities specialising in various industries on this criterion was found to be as follows : 2 cities in Industry Division III, 29 cities in IV, 30 in V, 2 in VI, 6 in VII, 6 in VIII and 37 in IX. It is interesting to see that some cities have the value of E4 as high as 100, which means that the whole of the surplus labour in that city is engaged in the given industry.

11. An idea regarding the location of each industry as between cities can be had from Table 4, which is compiled by applying the Index L2. The critical value selected for determining notable localisation is 200. The number of cities in which a given industry is largely concentrated is as follows: Industry Division III in 21 cities, IV in 47 cities, V in 10

cities, VI in 9 cities and VIII in 15 cities. Interestingly, Industry Division VII (Trade & Commerce) does not show particular concentration in any city (on the basis of critical value of 200). This is perhaps quite expected, as every urban unit would have workers in trade and commerce to oil the wheels of urban activity. The same is perhaps true of services (Division IX) as well. The findings of this table may be used to formulate, what may be called, a Law of Location of Industry. The Law would state that only some ~~industries like~~ mining, manufacturing, transport etc., thanks to their peculiar features, tend to localise. On the other hand, economic activities like trade, commerce, services etc. seem to exist, more or less, in all urban habitations; and further, seem to absorb such proportions of workers that they do not show any particular concentration from the point of view of the location of economic activity.

12. In order to arrive at fundamental sets of industries, correlation matrix for the nine industry-divisions was prepared. However, no positive results came out. Even then, this negative result is important, Table 5 gives the correlation matrix for what it is worth.

STATEMENT : ECONOMIC BASE AND LOCATION INDICES

Explanation of symbols used in Indices :

- C_i : Number of workers in an industry i in a city
- U_i : Number of workers in an industry i in the whole urban economy (i.e. in 250 cities taken together)
- C_t : Total number of workers in a city
- U_t : Total number of workers in the whole urban economy

<u>Index No.</u>	<u>Formula</u>	<u>Meaning & Purpose</u>	<u>Use & Limitations</u>
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The Economic Base Indices:

E1	$\frac{C_i}{C_t} \cdot 100$	Indicates relative importance of industries to a given city, in giving employment to its workers.	This is rather crude index. It can-not be used for inter-city comparisons.
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Index No.	Formula	Meaning & Purpose	Use & Limitations
E2	$C_i - \frac{(U_i - C_t)}{U_t}$	Shows whether an industry in a city employs more (or less) of workers than its pro-rata share when compared with total urban economy. We have considered only <u>excess labour</u> (i.e. positive values).	This gives absolute nos; not useful for comparison.
E3	$\frac{100}{C_t} \left[C_i - U : \frac{C_t}{U_t} \right]$	This is a 'relative' form of E2. <u>Surplus</u> (or deficit) labour is related to total number of workers in a city.	E3 & E4 can be used for inter-city & inter-industry comparisons. They do not change the rank orders of industries.
E4	$100 \frac{\left[C_i - U : \frac{C_t}{U_t} \right]}{\sum \left[C_i - U : \frac{C_t}{U_t} \right]}$	This is another relative form of E2. Excess (deficit) labour in a given industry in a city is related to total of excess (deficit) labour in the city.	--
E5	$\frac{100}{C_t} \sum \left[C_i - U : \frac{C_t}{U_t} \right]$	An overall & generic index indicating the degree of local specialisation in a city.	Can be used for inter-city comparison.
<u>The Location Indices:</u>			
L1	$\frac{C_i}{U_i} \cdot 100$	Indicates how a given industry is located as between cities.	Only a first approximation.
L2	$\frac{C_i/C_t}{U_i/U_t} - 100$	Shows location, correcting for population size of cities. Indicates city's share of industry-employment, relative to city's share of total urban employment.	Can be used for intra-industry & inter-industry comparisons between cities, but not for inter-industry comparison within a city.

- NOTES: (1) Index E2 is termed as Index of surplus Labour by Mattila and Thompson, in Urban Units as Functional Entities, Land Economics, August 1955.
- (2) Index L2 is derived by Sargent Florence, Report on Location of Industry, PEP, 1939.

Table 2 : A list of cities indicating a high degree of local specialisation (Application of Index E5). Critical Value chosen : 25.

NOTE : Words underlined indicate the names of the States in India. Value of the index is given against each city.

Andhra Pradesh: Vijyapuri: 71.1, Kothagudem: 54.4, Proddatur: 35.0, Assam: Shillong: 40.00, Gauhati: 25.4, Bihar: Dhanbad: 35.5, Jamshedpur: 29.5, Jammu & Kashmir: Jammu: 26.4, Kerala: Trivandrum: 26.4, Madhya Pradesh: Sagar: 34.1, Durg: 29.5, Madras: Valpari: 80.8, Aruppukottai: 55.5, Gudiyathem: 43.6, Kancheepuram: 43.3, Pollachi: 31.2, Salem: 31.0, Kurichi: 26.7, Coonoor: 25.8, Kallidai Kurichi: 25.5, Ootacamund: 25.2, Maharashtra: Ichelkaranji: 45.6, Malegaon: 40.5, Bhusawal: 33.9, Sholapur: 29.0, Mysore: Kolar: 55.7, Bhadravati: 31.0, Gadag Betgeri: 25.0, Orissa: Puri: 25.9, Punjab: Chandigarh: 36.5, Ferozpur: 29.8, Faridabad: 26.0, Uttar Pradesh: Firozabad: 31.0, Varanasi: 25.4, Etawah: 24.9, West Bengal: Titagarh: 52.9, Uluberia: 44.7, Bhatpara: 43.7, Halishar: 41.7, Bally: 37.9, Kamerhati: 36.0, Kharagpur: 30.5, Naihati: 29.9, Shantipur: 29.8, Kanchrapara: 27.7, Serampur: 27.4, Panihati: 26.7, Nabadwip: 25.9, Union Territory: Imphal: 43.2.

TABLE 3 : Cities specialising in given Industries. (Application of Index E4).

Industry Division III: Mining, Quarrying etc.

Andhra Pradesh: Kothagudem: 99.1, Bihar: Dhanbad : 100

Industry Division IV : Household Industry.

Andhra Pradesh: Proddatur: 98.8, Warangal: 97.6, Adoni: 87.8.

Eluru: 79.2, Nizamabad: 75.4, Bihar: Bihar: 94.7, Bhagalpur: 92.5, Gujrat: Cambay: 80.4, Madhya Pradesh: Sagar: 99.3, Burhanpur: 35.0, Madras: Salem: 100, Palayamcottai: 100, Kancheepuram: 100, Aruppukkottai: 100, Gudiyatham: 100, Nagercoil: 90.2, Kallidai Kurichi: 39.3, Maharashtra: Achalpur: 97.2, Dhulia: 36.7, Mysore: Gadag Betgeri: 93.4, Punjab: Panipat: 83.5, Uttar Pradesh: Sambhal: 92.9, Varanasi: 97.7, Amroha: 31.8, West Bengal: Santipur: 97.7, Nabadwip: 30.2, Union Territory: Imphal: 100.

Industry Division V : Manufacturing Other than Household.

Andhra Pradesh: Guntur: 95.3, Bihar: Jamshedpur: 89.4, Monghyr: 86.9, Gujrat: Ahmedabad: 100, Madhya Pradesh: Ujjain: 87.2, Indore: 79.3, Madras: Kurichi: 90.9, Maharashtra: Ichalkaranji: 100, Thana: 94, Bombay: 83.5, Malegaon: 75.7, Mysore: Bhadravati: 89.0, Punjab: Jagadhri: 96.3, Faridabad: 94.4, Ludhiana: 79.7, Uttar Pradesh: Firozabad: 99.8, Kanpur: 90.9, West Bengal: South Suburban Town Group: 100, Bhatpara: 100, Bally: 100, Baranagar: 100, Panipat: 100, Serampur: 100, Titagarh: 100, Naihati: 100, Halisahar: 100, North Barrackpur: 100, Uluberia: 99.2, South Dum Dum: 84.1, Kanchrapara: 78.3.

Industry Division VI : Construction.

Andhra Pradesh: Vijayapuri: 99.3, Madhya Pradesh: Bhopal: 96.3

Industry Division VII : Trade & Commerce.

Gujrat: Nadiad: 97.6, Madras: Virudhunagar: 91.3, Punjab: Rohtak: 77.6, Rajasthan: Ganganagar: 69.8, Uttar Pradesh: Hathras: 83.5, West Bengal: Ashoknagar: 77.2.

Industry Division VIII : Transport, Storage, Communication.

Bihar: Kathihar: 100, Baranni Teghra: 80.9, Madhya Pradesh: Ratlam: 96.6, Maharashtra: Bhusawal: 100, Rajasthan: Ajmer: 93.2, West Bengal: Kharagpur: 100.

Industry Division IX : Other Services.

Andhra Pradesh: Hyderabad: 97.4, Assam: Shillong: 100, Bihar: Patna: 98.2, Arrah: 89.4, Ranchi: 86, Muzaffarpur: 76.7, Gujrat: Rajkot: 95.4, Jamnagar: 81.9, Jammu & Kashmir: Jammu: 97, Kerala: Kottayam: 99.3, Trivandrum: 96.4, Trichur: 83.2, Palghat: 82.3, Madras: Ootacamund: 87.3, Palni: 79.5, Coonoor: 75.6, Maharashtra: Nasik: 96.7, Poona: 90.7, Ahmednagar: 86.2,

Aurangabad: 32.9, Mysore: Bellary: 98.5, Raichur: 78.4,
Orissa: Puri: 37.3, Punjab: Jullunder: 100, Ferozepur: 92.7,
Pathankot: 91.9, Ambala: 91.7, Patiala: 79.3, Uttar Pradesh:
Dehradun: 97.4, Meerut: 91.2, Budaun: 84.7, Mathura: 84.3,
Lucknow: 79.6, Shahjahanpur: 78.9, Allahabad: 75.9, West
Bengal: Midnapur: 88.6, Union Territory: Delhi: 86.2,

TABLE 4 : Location of industry as between cities (Application
of Index L2) Critical Value: 200.

Industry Division III : Mining, Quarrying, etc.

Andhra Pradesh: Kothagudem: 2917.4, Kakinada: 266.8,
Visakhapatnam: 265.7, Bihar: Dhanbad: 1956.9, Gujrat: Patan: 201.9
Kerala: Quilon: 433.9, Alleppy: 293.5, Calicut: 253.2, Madhya
Pradesh: Murwara: 293.7, Bilaspur: 213.1, Madras: Valparai: 4325,
Nagapattinam: 514.7, Coonoor: 429.5, Cuddalore: 331.7,
Tuticorin: 330.1, Palni: 293.5, Ootacamund: 243.5, Maharashtra:
Chanda: 267.3, Mysore: Kolar: 3013, Orissa: Puri: 272,
Rajasthan: Jodhpur: 242.2,

Industry Division IV : Household Industry.

Andhra Pradesh: Proddatur: 679.7, Adoni: 364.4, Warangal: 261.8,
Kurnool: 238, Eluru: 243.1, Nizamabad: 220.5, Vizianagaram: 216.1
Bihar: Bihar: 449.5, Gujrat: Cambay: 325.4, Patan: 254, Jammu &
Kashmir: Srinagar: 200, Madhya Pradesh: Sagar: 659.1, Bhuranpur:
399.2, Madras: Truppukkottai: 1016.0, Gudiyatham: 819.3,
Kancheepuram: 314, Salem: 611.9, Palayamcottai: 501.7, Kallidai
Kurichi: 475, Nagarcoil: 351.7, Rajapalayam: 291.3, Kumbadonam:
250.1, Truppur: 213.7, Madurai: 207.5, Cuddalore: 206.3,
Maharashtra: Sholapur: 395, Condia: 356.3, Achalpur: 342.4,
Nagpur: 289.3, Chanda: 230.1, Malegaon: 262.1, Dhulia: 252.5,
Jalna: 213.3, Mysore: Gadag Betgeri: 434.4, Orissa: Berhampur:
233, Punjab: Panipat: 403.1, Rajasthan: Sikar: 230.2, Uttar
Pradesh: Varanasi: 483.4, Sambhal: 472.6, Amroha: 295.4,
Mirzapur: 254.3, Farrukhabad-cum-Fategarh: 244, Etawah: 228.6,
West Bengal: Santipur: 530.3, Nabadwip: 443, Bankura: 212.5, Union
Territories: Imphal: 811.7.

Industry Division V : Manufacturing Other than Household.

Maharashtra: Ichalkaranji: 263.3, Malegaon: 213.3, Uttar Pradesh:

Firozabad: 217.5, West Bengal: Titagarh: 295.2, Uluberia: 263.8,
Bhatpara: 261, Halisaher: 254.1, Bally: 240.1, Kamarhati: 232.9,
Naihati: 210.4.

Industry Division VI : Construction.

Andhra Pradesh : Vijayapuri: 1913.9, Madhya Pradesh: Bhopal: 436.7,
Durg: 368.9, Orissa: Rourkela: 254.6, Punjab: Hissar: 229.6,
Rajasthan: Udaipur: 291.8, Kota: 286.2, Sikar: 242, Bikaner: 210.4.

Industry Division VIII : Transport, Storage and Communication.

Andhra Pradesh: Visakhapatnam: 223.5, Assam: Dibrugarh: 227.7,
Gauhati: 203.4, Bihar: Barauni Tegrah: 292.6, Katihar: 283.8,
Dinapur: 209.1, Madhya Pradesh: BIASPUR: 222.6, Ratlam: 214.0,
Maharashtra: Bhusawal: 493.7, Punjab: Bhatinda: 234.1,
Rajasthan: Ajmer: 305, Uttar Pradesh: Gorakhpur: 218.1,
Jhansi: 214.4, West Bengal: Kharagpur: 403.6, Siliguri: 207.

Industry Division IX : Other Services.

Assam: Shillong: 220.

TABLE 5 : A CORRELATION MATRIX FOR INDUSTRY DIVISIONS.

Industry Division No.	I - III Primary Industry.	IV Household Industry.	V Manufacturing other than household.	VI Construction	VII Trade & Commerce	VIII Transport, Storage & Communications.	IX Other Services.
I - III	1	0.0709	- 0.3563	- 0.0731	- 0.3455	- 0.2190	- 0.2217
IV		1	- 0.2804	- 0.1050	- 0.0812	- 0.1475	- 0.2831
V			1	- 0.1365	- 0.1931	- 0.1791	- 0.5294
VI				1	- 0.1871	- 0.0735	- 0.0344
VII					1	0.1663	0.2319
VIII						1	0.1074
IX							1

NOTE: The variables considered are % of workers in different Industry Divisions (of cities).

FOOT - NOTES

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1. Pethe V.P., (1) Means of Livelihood of City Populations, Indian Economic Journal, January 1963 (2) Economic Functions of Cities of India, Sociological Bulletin, March 1965.
2. The workers in Industry Divisions I and II accounted for only 3.22 per cent of the total number of workers in 250 cities taken together.
3. Cf. Sargent Florence, Report on Location of Industry, PEP, 1939; Mattila and Thompson, Urban Units as Functional Entities, Land Economics, August 1955; Nelson H.J. : A Service Classification of American Cities, Urban Research Methods, ed. Gibbs, 1961.

SUMMARY:

1. The 1961 Census of India contains detailed data on the economic activity of the working population for each city, town and village. These data for 250 urban centres (each containing a population of 50,000 or more persons) have been used in this paper for two purposes:

- (i) to identify and characterise the economic base of cities, and
- (ii) to throw light on the location of "industries" as between cities under consideration.

2. The analysis of the economic base of cities and location of industries has been done with the help of some statistical indices. The results have been presented in Tables 2 - 4.

3. An attempt was made to reduce the "Industry Division" adopted by 1961 Census into fundamental sets of industries, or "industrial complexes". However, there does not seem to be any significant correlation between Industry Divisions, as may be seen from the inter-correlation matrix given in Table 5.

20.9.1972

Territory-wise and Sector-wise Approved outlays
for Fourth Plan and Estimates for Fifth Plan

(Rs lakhs)

Union Territories	Agriculture & Allied Sectors		Irrigation & Flood Control		Power		Village & Small Industries	
	Fourth Plan Appd. outlay	Estim- ated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estim- ated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estim- ated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estim- ated outlay for Fifth Plan
1	2	3	4	5	6	7	8	9
1. Andaman & Nicobar Islands	158.10	-	-	-	55.00	-	5.11	-
2. Arunachal Pradesh	497.32	-	-	-	140.00	-	44.90	-
3. Chandigarh	31.00	-	-	-	175.00	-	28.00	-
4. Dadra & Nagar Haveli	91.50	-	4.00	-	34.00	-	10.00	-
5. Delhi	354.00	-	600.00	-	4219.00	-	475.00	-
6. Goa, Daman & Diu	1033.40	-	320.00	-	720.00	-	56.60	-
7. Laccadive, Amindivi & Minicoy Islands	116.10	-	-	-	18.11	-	4.00	-
8. Mizoram	-	-	-	-	-	-	-	-
9. Pondicherry	338.00	-	94.00	-	57.00	-	50.00	-
▶ <u>Total</u>	<u>2619.42</u>	-	<u>1018.00</u>	-	<u>5418.11</u>	-	<u>673.61</u>	-
10. Himachal Pradesh	3375.00	-	0.00	-	1544.00	-	200.00	-
11. Manipur	407.00	-	110.00	-	314.88	-	71.22	-
12. Tripura	855.35	-	100.22	-	901.27	-	111.88	-
<u>Grand Total</u>	<u>7266.77</u>	-	<u>1268.22</u>	-	<u>8178.26</u>	-	<u>1056.71</u>	-

(Rs lakhs)

Union Territories	Industry & Mining		Transport & Communications		Education		Health	
	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan
	10	11	12	13	14	15	16	17
Andaman & Nicobar Islands	-		781.73		105.00		23.52	
Arunachal Pradesh	4.53		598.55		205.18		91.50	
Chandigarh	1.00		14.00		80.00		23.00	
Dadra & Nagar Haveli	4.00		42.50		23.35		6.00	
Delhi	-		2078.00		2560.00		700.00	
Goa, Daman & Diu	63.00		451.00		294.10		296.00	
Laccadive, Amindivi & Minicoy Islands	-		10.00		36.29		12.00	
Mizoram	-		-		-		-	
Pondicherry	20.00		123.00		237.00		80.00	
<u>Total</u>	<u>92.53</u>		<u>4098.78</u>		<u>3640.92</u>		<u>1232.02</u>	
0. Himachal Pradesh	220.00		3032.00		711.00		415.00	
1. Manipur	46.00		1170.85		409.00		183.82	
2. Tripura	21.00		586.00		415.70		102.00	
<u>Grand Total</u>	<u>379.53</u>		<u>8887.63</u>		<u>5176.62</u>		<u>1932.84</u>	

(Rs lakhs)

Union Territories	Water Supply & Sanitation		Housing & Urban Development		Welfare of Backward Classes		Social Welfare	
	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan
	18	19	20	21	22	23	24	25
Andaman & Nicobar Islands	235.00		13.10		6.09		-	
Arunachal Pradesh	45.00		-		-		-	
Chandigarh	4.00		10.00		-		-	
Dadra & Nagar Haveli	10.00		6.00		-		1.00	
Delhi	3200.00		1700.00		90.00		70.00	
Goa, Daman & Diu	411.00		102.00		12.00		10.00	
Laccadive, Amindivi & Minicoy Islands	-		0.25		1.25		-	
Mizoram	-		-		-		-	
Pondicherry	104.00		80.00		27.00		10.00	
<u>Total</u>	<u>4009.00</u>		<u>1911.35</u>		<u>136.34</u>		<u>91.00</u>	
0. Himachal Pradesh	235.00		153.00		80.00		35.00	
1. Manipur	54.38		40.00		129.50		6.00	
2. Tripura	60.00		41.65		170.00		9.00	
<u>Grand Total</u>	<u>4358.38</u>		<u>2146.00</u>		<u>515.84</u>		<u>141.00</u>	

(Rs lakhs)

Union Territories	Labour Welfare & Craftsmen Training		Other Programmes		Total	
	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan	Fourth Plan Appd. outlay	Estimated outlay for Fifth Plan
	26	27	28	29	30	31
Andaman & Nicobar Islands	1.00		16.35		1400.00	
Arunachal Pradesh	16.12		155.90		1799.00	
Chandigarh	8.00		401.00		775.00	
Dadra & Nagar Haveli	-		1.65		230.00	
Delhi	163.00		56.00		16265.00	
Goa, Daman & Diu	23.00		53.90		3950.00	
Laccadive, Amindivi & Minicoy Islands	-		2.00		200.00	
Mizoram	-		-		-	
Pondicherry	14.00		16.00		1250.00	
<u>Total</u>	<u>225.12</u>		<u>702.80</u>		<u>25869.00</u>	
Himachal Pradesh	57.00		43.00		10140.00	
Manipur	2.00		80.35		3025.00	
Tripura	6.13		75.80		3466.00	
<u>Grand Total</u>	<u>290.25</u>		<u>901.95</u>		<u>42500.00</u>	

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Paper Code :

IX. 04

Demographic Factors in Investment, Savings and Capital
Formation in India

By

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Ministry of Home Affairs

New Delhi

" CENSUS CENTENARY SEMINAR "

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DEMOGRAPHIC FACTORS IN INVESTMENT,
SAVINGS AND CAPITAL FORMATION IN
INDIA

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DEMOGRAPHIC FACTORS IN INVESTMENT,
SAVINGS AND CAPITAL FORMATION IN
INDIA.

By P.V.Rama Raju*

The aim of this paper is to focuss attention on the influence of the population growth on the economy as a whole. An attempt has been made in this paper to analyse the demographic factors in Investment, Savings and Capital formation in India as a whole and as to how self-sufficiency could be achieved by 1980-'81 if the internal resources within the country are tapped better. Detailed analysis is made on the pattern of Investment, Savings and Capital Formation in the entire economy of the country as a whole.

2. Growth of population plays a vital role in the behaviour of the per-capita income, investment, savings and private consumption. The relationship between the per-capita income and other economic and demographic factors has been the subject of many investigations and considerable attention has been given to the analysis of trends in the income payments. Consistency between the estimates of savings and capital formation within the frame-work of national accounts deserves maximum care and attention. Aggregate saving (or investment) of the economy is defined as the sum-total of saving (or investment) of different economic units. The saving of an economic unit, by definition, is related to the corresponding investment, although the two need not necessarily be equal. Investment may, within a unit, partly or wholly, be influenced by its saving or through external resources or both. The relationship between the different types of aggregate saving (or investment) with respect to their foreign components are summarised below:-

"A" 'Classification of Aggregate Saving'
Saving of Indian nationals (including
Corporations and Government) in the form of

- (a) Assets held in India,
- (b) Assets held abroad,

(a) + (b) = Domestic Saving.

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"B" 'Classification of Aggregate Investment'

1. Investment in India by

- (a) Indian nationals
- (b) Foreign nationals

(a) + (b) = Domestic Investment.

2. Net foreign investment by Indian nationals =
Net financial investment of Indians abroad
minus net financial investment by foreigners
in India.

' Domestic investment' plus 'net foreign investments'
are of course equal to 'domestic saving'.

3. Economic activity must be so organised that the scales of production and growth and those of equitable distribution are balanced. A high-rate of economic growth sustained over a long-period is an essential condition for achieving a rising level of living for all the citizens and especially for those in low-income groups. Planning in India has thus to organise an efficient exploitation of the resources of the country, increased production and industrial development to the maximum extent. It may be useful to review and analyse the developments since the beginning of the Third Five-year Plan and to make an assessment of the existing situation. During the Third Plan period, national income (revised series) at 1960-61 prices rose by 20 per cent in the first four years and registered a decline of 5.7 per cent in the last year. The movement of the national income, and output of agriculture and organised industry during the last eight years is given in Table 1. It may be seen that the Per-capita income in 1965-66 was about the same as it was in 1960-61, the results of a meagre growth of national income, having been almost completely neutralised by the 2.5 per cent rate of growth of population. In 1966-67, following a severe drought, national income registered only a marginal increase of 1.1 per cent.

4. The second and Third Five-Year plans both envisaged a doubling of the per-capita real income in the course of nearly 20 years. The expectation of the population growth at the time of the formulation of the Third Plan was 1 per cent higher than assumed in the second plan. The higher growth-rate of .6 per cent envisaged in the long-term

perspective of the Third-plan was meant to off-set the effect of the observed faster rate of growth of population. The economy can achieve an average annual increase of about 5.5 per cent in total production during the Fourth Plan. However, aggregate income, and even more per capita income, likely to be achieved by 1973-74 will be well below than visualised for that year. The set-back in the recent past and the relatively slower growth likely in the next five years necessitate a reassessment of the long-term growth targets as well. The object should be to secure as rapid a development as is possible and the growth of outputs in the Fifth plan is determined by investments and the preparation for a larger investment in the future undertaken between now and 1973-74. A steady acceleration of the growth-rate must be aimed at but it will be unrealistic to postulate a growth-rate far in excess of what will be realised in the Fourth plan. Taking all these considerations into account, a reasonable target of growth for the Fifth plan and upto 1980-81 would be around 6 per cent per annum. On this basis, net domestic product (valued at 1967-68 prices) would reach Rs. 582 million by 1980-81, i.e., very nearly double the level attained in 1967-68. Since population would, in the meantime, have risen by about a third, per-capita income in 1980-81 would be about 55 per cent higher than in 1967-68 vide Table 2.

5. The assumption of population growth is an important variable determining the rate of improvement in per-capita income. According to the Registrar-General's Projections which form the basis of the calculations, total population would increase at the rate of around 2.5 per cent during the Fourth Plan, this rate would fall thereafter, reaching 1.7 per cent a year by 1980-81. Implicit in these projections is the assumption that there will be decrease in the birth-rate from 39 per thousand of population in 1968 to 26 in 1980-81 and a decline in the death rate from 14 per thousand of population to 9 over the same period. If population growth is brought down to 1.7 per cent by 1980-81 and averages 1.2 per cent in the subsequent 20 years, the population in 2000 A.D. (estimated 870 million) will be 300 millions less than what it would be, if the present rate continues unchecked.

6. The projected evolution of the economy over the next 12 years in terms of the broad aggregates can be seen from Table 2. In order to reach the target level of income in 1980-81 and sustain a growth-rate of at least 6 per cent a year beyond that year, it is essential to raise the ratio

of the net investment to net national product from the current level of about 12 per cent and the planned 13.8 per cent in 1973-74 to 17 - 18 per cent by 1980-81. The targets of income and investment are sought to be achieved without requiring any significant increase in the foreign aid beyond the Fifth plan. This implies (a) the internal savings of the economy after 1978-79 should be sufficient to finance not only the investment but also the payment liabilities of foreign debt, and (b) the growth of imports and exports is so managed that after 1978-79, the economy has a foreign trade surplus (inclusive of invisibles) equivalent to at least the interest payment to foreign creditors. The internal savings would be adequate for this purpose if a marginal saving rate of the order of 28 per cent were sustained throughout the period. The foreign exchange aspect of the problem could be taken care of by exports growing at 7 per cent a year. (with food imports being altogether eliminated during the course of the Fourth Plan).

7. With savings rising considerably faster than income, aggregate consumption necessarily has to increase at a relatively slow-rate. Aggregate consumption in 1980-81 is estimated to be about 30 per cent higher than in 1968-69, implying a rate of growth of 5 per cent per year compared to 6 per cent growth rate of aggregate income. In the course of the next twelve years, private consumption can be raised by approximately 80 per cent in the aggregate and some-what less than 40 per cent in per-capita terms. The private average per-capita consumption valued at 1967-68 prices would reach Rs. 690 by 1980-81. (Table 2). The private consumption expenditure is highly correlated with the gross domestic product, measured at 1960-61 prices. It may also be seen that the private consumption expenditure may be estimated from the gross domestic product using the relationship, $X = 2315.23 + 0.6581 Y$. The correlation coefficient 'r' is worked out to be 0.9930 and observed to be very high. The per-capita private expenditure may be estimated from the per-capita income using the relationship, $X = 115.58 + 0.4686 Y$. The correlation coefficient between the per-capita income and the per-capita expenditure is worked out to be 0.9540 and observed to be very high, vide Table 12.

8. The National Saving-income ratios (which is always measured net of depreciation unless otherwise specified) varied from roughly 6 per cent in the three year period preceding the first Plan, to 7 and 8 per cent during the five years of the First Plan and 9 to 10 per cent during

the Second Plan. The objective of a Self-reliant growth also requires that the supply of domestic savings is increased to a level adequate to finance projected investment and to pay at least the interest component on foreign debt. In order to reach the projected level of income in 1980-81 and to sustain at least 6 per cent rate of development thereafter, the net investment in the economy will, on a provisional estimate be required to reach Rs. 8,600 crores by 1978-79 and Rs. 10,250 crores by 1980-81. Given the objective of dispensing with net aid beyond 1980-81, the volume of domestic savings will have increased from Rs. 2,200 crores in 1967-68 to approximately Rs. 8,800 crores in 1978-79 and Rs. 10,500 crores by 1980-81. This means diverting approximately 28 per cent of the increase in national income for savings throughout the next 12 years. The average rate of savings will rise from about 8 per cent in 1967-68 to nearly 12.6 per cent in 1973-74 and 16.5 per cent by 1980-81 as shown in Table 4. There is a very high correlation between savings and Investment ($r=0.9935$) as it should be. The investment may be estimated from Savings using the relationship, $X = 0.8697 Y - 286.1675$. As the per-capita income increases, per-capita Savings also increases and similarly per-capita investment also increases as per-capita income increases. The correlation coefficient between the per capita income and saving work out to be 0.9942, while that of the per capita income and investment work out to be 0.9789. From the above observations, it necessary pre-condition that savings and investment should grow at a faster rate as envisaged, only when the rate of growth of the population is restricted to the order of 1.7 per cent by 1980-81. The correlation coefficient between the savings and net domestic capital formation which worked out to 0.9632 and is also very high. The net domestic capital formation may be estimated from the relationship, $X = 320.9469 + 0.7348 Y$. See Tables 5, 6 and 7.

9. Firm estimates of private savings are not available. The private sector is expected to generate savings amounting to Rs. 13,900 crores during the Fourth Plan. The Household and Cooperative sectors will contribute to Rs. 12,040 crores and the balance of Rs. 1,860 crores will be contributed by the corporate sector. The Central Government and State Government will draw on this pool of private savings as much as Rs. 3,930 crores for the public sector Plan. Private Savings thus available for private investment would amount to Rs. 9,970/- crores and the total reserves available for the private investment including the net amount of foreign funds directly flowing to private

sector would aggregate to Rs. 10,000 crores, the details of which are furnished in Table 5.

10. Based on the programme of investment for the Fourth Plan and the level of outputs expected to be reached in different sectors by 1973-74, it is estimated that the overall rate of growth during the Fourth Plan will be about $5\frac{1}{2}$ per cent a year. The estimates of

aggregate investment and rate of saving during the period 1960-61 are presented in Tables 7 and 8. It may be observed that the rate of savings, having duly increased appreciably, reflect the fact that more investment are made in the major sectors, like agriculture and allied activities, mining, industries and construction. This is well supported by the fact that the ratio of gross domestic capital formation to the gross domestic product is on an increase from 15.9 per cent in 1960-61 to 17.7 per cent in 1965-66, vide Table 9. It may also be seen from Table 10 that the net savings in India have fluctuated unevenly in respect of household and corporate sectors. However, there is positively a good trend in the case of household sector. The estimates of the gross capital formation are presented in Table 6. It may be observed that the gross domestic Capital formation in the public sector has increased by 412 per cent during the period under study and that in the private sector it has increased by 167 per cent as against the over-all growth of gross capital formation by 236 per cent. The geometric growth rates have been noticed to be 9.3, 4.3 and 6.0 per cent and the linear growth rates at 17.7, 5.7 and 9.1 per cent respectively.

11. The Capital formation in the construction activity by different categories is presented in Table 11 for the years 1960-61, 1965-66. It may be noticed that the capital formation in the House-hold sector has increased considerably from Rs. 554 crores in 1960-61 to Rs. 726 crores in 1965-66 and constitutes 42.0 per cent in 1960-61 and 38.1 per cent in 1965-66 of the total capital formation, registering an overall increase of 32.8 per cent during the period. It may be evident that the capital formation in Private Corporation Sector is not as encouraging as the household and Government Sectors during the period. It may, however, be interesting to note that there may be every likelihood that the rate of savings increase steadily as anticipated by the National Development Council and as the capital output ratio in agriculture and allied activities is comparably higher than in manufacturing and

other sectors, it may be certain that agriculture and allied activities would be more responsible to contribute a higher rate of savings for the investment. In other words, rural households may be in a favourable position to contribute a higher rate of savings than those from the urban areas. As the growth of population is expected to increase at the rate of 1.7 per cent by 1980-81 and the per capita consumption would increase at a slower rate than the per capita income, it is likely that there would be a favourable trend for a higher increase in the rate of savings. This leads to the conclusion that savings and investment may increase at a faster rate if the future rate of growth of population is less than the present rate of growth. In other words, per capita income may rapidly increase only when the rate of growth of population is slower than the present rate of growth.

REFERENCES

1. Fourth Five Year Plan, 1969- '74 issued by the Planning Commission.
2. Estimates of Saving 1960-61 - 1965-66 issued by the Central Statistical Organisation.
3. Estimates of Capital Formation 1960-61 - 1965-66 issued by the Central Statistical Organisation.
4. Some aspects of Economic growth - 1950-51 - 1964-65 by Dr. S.G.Tiwari.
5. Gross Capital Formation in construction in India-State - wise Estimates 1960-61 to 1965-66 by Shri R.N.Lal.

TABLE : 1

GROWTH OF NATIONAL INCOME : 1960 - '61 to 1968 - '69

Sl. No.	1960-'61 (Rs. crores) (at 1960-'61 Prices)	Index : 1960 - '61 = 100								
		1961-'62	1962-'63	1963-'64	1964-'65	1965-'66	1966-'67	1967-'68	1968-'69	
1	2	3	4	5	6	7	8	9	10	11
1. Total national income of which	13274	103.9	106.0	112.1	120.1	113.3	114.6	124.7	128.4	
2. agricultural allied sectors	6785	101.6	98.9	101.7	110.9	94.5	94.3	111.3	112.6	
3. mining and large scale manufacturing	1213	109.2	120.1	132.0	141.3	146.0	147.7	146.6	155.4	

Source: Fourth Five Year Plan issued by the Planning Commission.

TABLE : 2
PROJECTION OF NET DOMESTIC PRODUCT AND EXPENDITURE

(Figures in Rs. 100 Crores)

Sl. No.	1967-68	1973-74	1978-79	1980-81	Index of growth 1980-'81 over 1967-'68.
1	2	3	4	5	6
1. net domestic product at factor cost	281.9	384.7	513.7	582.2	207
2. net domestic product market prices	306.7	422.4	572.8	644.4	210
3. net imports of goods and services	7.8	3.0	1.5	3.0	-
4. net domestic expenditure of which	314.5	425.4	571.3	641.3	204
5. net investment	32.5	53.0	86.2	102.5	315
6. Government consumption	28.0	39.0	53.7	61.3	219
7. Private consumption	254.0	333.4	431.4	477.5	188
8. Per-capita private consumption (in Rs.)	494	559	648	692	140
9. Projected population (in Million)	514	596	665	690	134

SOURCE: Fourth Five-Year Plan issued by the Planning Commission.

TABLE : 3

SECTORAL COMPOSITION OF NET DOMESTIC PRODUCT - 1960-61 - 1980-81

(Figures in Rs. 100 Crores)

Sl. No.	Sector	1960-'61	1965-'66	1967-'68	1973-'74	1978-'79	1980-'81	Index of growth 1980-'81 over 1967-'68.
1	2	3	4	5	6	7	8	9
1.	Agriculture and allied activities	68.2	98.5	149.7	190.0	240.0	261.0	174
2.	Mining, manufacturing and construction	26.9	44.3	51.1	82.2	129.0	153.0	299
3.	Others	38.7	64.7	81.2	115.5	150.0	168.0	207
4.	Net Domestic Product:	133.8	207.5	282.0	384.7	519.0	582.0	206

SOURCE: 1. Fourth Five-Year Plan issued by the Planning Commission.
 2. Estimates of National Product issued by the Central Statistical Organisation.

TABLE : 4
RATIO OF NET DOMESTIC SAVINGS TO NATIONAL INCOME BY SECTORS

Sl.No.	SECTOR	1960-61	1965-66	1967-68	1973-74	1980-81
1	2	3	4	5	6	7
1.	Households	5.6	8.7	6.1	7.7	8.9
2.	Corporations	0.9	0.5	0.1	1.1	1.4
3.	Public Savings	2.4	2.7	0.8	3.8	6.2
4.	Total Domestic Savings	8.9	11.9	8.0	12.6	16.5

SOURCE: Estimates of Savings in India issued by the Central Statistical/
Organisation.

TABLE : 5
RESOURCES AVAILABLE FOR PRIVATE INVESTMENT

Sl.No.	I T E M	Fourth Plan Investment (Rs. Crores)
1	2	3
1.	Private Savings (2 & 3)	13,900
2.	Corporate savings	1,860
3.	House-hold and cooperation savings	12,040
4.	Central and State Government draft on private savings	3,930
5.	Private Savings available for Private Investment(1-4)	9,970
6.	Gross loans and investment from abroad	300
7.	Repayment of foreign loans	270
8.	Net inflow of foreign funds	30*
9.	Total Resources available for private Investment(5+8)	10,000

* Net of loan repayments only. Interest payments have been taken into account under item 1.

SOURCE: Fourth Five-Year Plan issued by the Planning Commission.

TABLE : 6
CAPITAL FORMATION BY PUBLIC AND PRIVATE SECTORS
1950-51 to 1965-66 (At 1960-61 Prices)

YEAR	Gross Capital Formation			Index of growth		
	Total	Public (y)	Private (x)	Total	Public	Private
	2	3	4	5	6	7
1950-51	1076	302	774	100.0	100.0	100.0
1951-52	983	374	884	116.0	123.8	114.2
1952-53	983	320	663	91.4	106.0	85.7
1953-54	1341	354	987	124.6	117.2	127.5
1954-55	1528	557	971	142.0	184.4	125.5
1955-56	1721	607	1114	159.9	201.0	143.9
1956-57	2398	769	1629	222.0	254.6	210.5
1957-58	1835	934	901	170.5	309.3	166.4
1958-59	2126	877	1249	197.6	290.4	161.4
1959-60	2127	1032	1095	197.7	341.7	141.5
1960-61	2570	1115	1455	238.8	369.2	188.0
1961-62	2627	1086	1541	244.1	359.6	199.1
1962-63	2736	1310	1426	254.3	433.8	184.2
1963-64	3202	1454	1748	297.6	481.5	255.8
1964-65	3616	1547	2069	336.1	512.3	267.3
1965-66	3269	2251	2018	303.8	745.4	260.7
Geometric growth rate	-	-	-	6.0	9.3	4.3
Linear growth rate	-	-	-	9.1	17.7	5.7

SOURCE: "Some Aspects of Economic Growth - 1950-'51 -- 1964-'65"
 By Dr. S.G.Tiwari.

Correlation coefficient: $r = 0.8674$
 $y = 1.0724x - 445.0586.$

TABLE : 7

ESTIMATES OF AGGREGATE INVESTMENT IN INDIA

(Rs. in Crores)

ITEM	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
1	2	3	4	5	6	7
1. Net domestic savings	1184	1344	1480	1903	2081	2186
2. Current account deficit on balance of payments excluding donations	438	329	414	433	580	557
3. Non-cash in-flow	43	16	26	17	20	13
4. Aggregate investment	1665	1689	1920	2353	2681	2856

Source: Estimates of Saving issued by the Central Statistical Organisation.

TABLE : 8

DATE OF SAVING 1960-'61 -- 1965-'66

I T E M	1960- 61	1961- 62	1962- 63	1963- 64	1964- 65	1965- 66
1. Net Domestic Saving (P. Crores) (x)	1184	1344	1480	1903	2081	2486
2. Net domestic product saving (Rs. crores) (y)	13380	14161	14999	14231	20229	20753
3. Net domestic product at market prices (Rs. crores)	14328	15241	16264	18797	22013	22839
4. Saving as percentage of net domestic product:						
a) at factor cost	8.85	9.49	9.89	11.04	10.29	11.98
b) at market prices	8.26	8.82	9.10	10.12	9.45	10.88

Source: Estimates of Saving issued by the Central
Statistical Organisation $r = 0.9935$,
 $x = 0.8697$, $y = 286.1675$

TABLE : 9

CAPITAL FORMATION PROPORTIONS (At Current
Prices)

I T E M	1960- 61	1961- 62	1962- 63	1963- 64	1964- 65	1965- 66
1. GDCF to GDP at market prices	15.9	15.6	16.6	16.9	16.5	17.7
2. NDCF to NDCF at market prices	11.6	11.1	11.8	12.5	12.2	13.4
3. GDFCF to GDFCF at market prices	13.7	14.8	15.4	15.6	15.4	16.6
4. GDFCF to GDCF	86.2	94.9	92.9	92.5	93.6	93.7
5. CC to GDP at market prices	4.9	5.1	5.4	5.0	4.8	5.0
6. CC to CDFCF	35.6	34.2	35.1	32.1	32.1	30.3

Source: Estimates of Capital Formation issued by the
Central Statistical Organisation.

ABBREVIATIONS:-

- GDCF :- Gross Domestic Capital Formation
NDCF :- Net domestic Capital Formation
GDFCF :- Gross domestic fixed capital Formation
CC :- Capital Consumption
GDP :- Gross Domestic Product
NDP :- Net domestic product

TABLE : 9
CAPITAL FORMATION PROPORTIONS (At Current Prices)

ITEM	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
1	2	3	4	5	6	7
1. GDGF to GDP at market prices	15.9	15.6	16.6	16.9	16.4	17.7
2. NDGF to NDP at market prices	11.6	11.1	11.8	12.5	12.2	13.4
3. GDGF to GDP at market prices	13.7	14.8	15.4	15.6	15.4	16.6
4. GDGF to GDGF	86.2	94.9	92.9	92.5	93.6	93.7
5. CC to GDP at market prices	4.9	5.1	5.4	5.0	4.8	5.0
6. CC to GDGF	35.6	34.2	35.1	32.1	32.1	30.3

Source: Estimates of Capital Formation issued by the Central Statistical Organisation.

ABBREVIATIONS:-

GDGF; - Gross Domestic Capital Formation
 NDGF:- Net domestic Capital Formation
 GDGF:- Gross domestic fixed capital Formation
 CC:- Capital Consumption
 GDP:- Gross Domestic Product
 NDP:- Net domestic product

TABLE : 10

SAVING IN THE INDIAN ECONOMY (Rs. in Crores)

YEAR	Net				Gross			
	House-hold sector	Private corporate sector	Public sector	Total saving	House-hold sector	Private corporate sector	Public sector	Total saving
1	2	3	4	5	6	7	8	9
1960-61	751	117	316	1184	1213	276	431	1920
1961-62	838	135	371	1344	1338	316	501	2155
1962-63	927	141	412	1480	1501	338	571	2410
1963-64	1211	148	544	1903	1796	387	714	2897
1964-65	1364	108	609	2081	2000	385	814	3199
1965-66	1811	105	570	2486	2519	395	785	3699
PERCENTAGE DISTRIBUTION								
1960-61	63.4	9.9	26.7	100.0	63.2	14.4	22.4	100.0
1961-62	62.4	10.0	27.6	100.0	62.1	14.7	23.2	100.0
1962-63	62.6	9.5	27.9	100.0	62.3	14.0	23.7	100.0
1963-64	63.6	7.8	28.6	100.0	62.0	13.4	24.6	100.0
1964-65	65.5	5.2	29.3	100.0	62.5	12.0	25.5	100.0
1965-66	72.9	4.2	22.9	100.0	68.1	10.7	21.2	100.0

SOURCE : Estimates of Savings in India, 1960-61 - 1965-66 estimated by the Central Statistical Organisation.

TABLE : 11
CAPITAL FORMATION IN CONSTRUCTION BY CATEGORIES

at current prices -----

	1960 - 61	1961 - 62	1962 - 63	1963 - 64	1964 - 65	1965 - 66
	2	3	4	5	6	7
1. State Government and local bodies	387.9	393.1	437.2	472.6	533.0	601.4
2. Posts & Telegraphs	10.1	10.6	15.0	23.1	28.5	19.3
3. Railways	140.1	143.5	182.0	218.4	228.9	215.5
4. Central Government	62.5	69.3	93.7	139.3	151.0	152.4
5. Non-departmental commercial undertakings	77.0	137.9	186.8	294.8	309.2	420.2
6. Private corporate sector	86.1	47.3	56.9	64.5	78.6	75.6
7. Household sector	554.1	654.0	596.9	552.7	658.3	735.7
All Categories:	1317.8	1455.7	1568.5	1765.4	1987.5	2220.1

SOURCE : Gross Capital Formation in construction in India - State-wise estimates 1960-61 to 1965-66 by Sri R.N.lal.

TABLE : 12

PER-CAPITA GROSS DOMESTIC PRODUCT AND PRIVATE CONSUMPTION
EXPENDITURE 1950-'51 - 1964-'65.

(at 1960-61 prices)

YEARS	Estimated mid-year population (million)	Gross at Domestic product Cost		Private consumption expenditure	
		Total (Rs. crores)	Per-capita (Rs.)	Total (Rs. crores)	Per-capita (Rs.)
1	2	3	4	5	6
		x		y	
1950-51	357.9	9787 (100)	273.5 (100)	8631 (100)	241.2 (100)
1951-52	363.8	10001 (102)	274.9 (101)	9064 (103)	249.1 (103)
1952-53	370.1	10336 (106)	279.3 (102)	9180 (114)	248.0 (103)
1953-54	376.6	10967 (112)	291.2 (107)	9475 (119)	251.6 (104)
1954-55	383.6	11267 (115)	293.7 (107)	9619 (125)	250.7 (104)
1955-56	390.9	11656 (119)	298.2 (109)	9842 (129)	251.8 (104)
1956-57	398.6	12261 (125)	307.6 (112)	10078 (138)	252.8 (105)
1957-58	406.8	12210 (125)	300.1 (110)	10512 (167)	258.4 (107)
1958-59	415.4	13131 (134)	316.1 (116)	11041 (171)	265.8 (110)

Contd....

1	2	3	4	5	6
1959-60	424.4	13350 (136)	314.6 (115)	11199 (174)	263. (109)
1960-61	434.0	14261 (146)	328.6 (120)	11944 (174)	275. (114)
1961-62	444.2	14918 (152)	335.6 (123)	12339 (193)	277. (114)
1962-63	456.0	15320 (15)	336.0 (123)	12537 (231)	274. (115)
1963-64	467.0	16128 (165)	345.3 (126)	12592 (280)	269. (112)
1964-65	478.2	17330 (177)	362.4 (133)	13638 (265)	285. (118)
Geometric growth rate	-	4.0	1.2	5.0	0.6
Linear growth rate	-	5.2	1.3	7.0	0.7

SOURCE: "Some Aspects of Economics Growth- 1950-51 - 1964-65"

By Dr. S.G.Tiwari

$$x = 2315.2271 + 0.6581 y$$

$$r = 0.9930$$

S U M M A R Y

The object of this paper is to examine the role of the population in the Investment and Savings of the Indian Economy at present and the evolution of the economic growth in future. It is intended to show that the investment and savings have to increase at a desired level of growth only when the growth of population increases at a slower rate from the present rate of growth of 2.5 per cent. It is also necessary that the quantum of imports is minimised and that the exports increase at a higher rate than at present to yield more foreign trade surplus and also to ensure that the foreign loans are altogether eliminated by the Government of India. It may be proper and legitimate to assume that the savings and investment should necessarily increase at a higher rate for the country as a whole and that the rate of population growth is minimised to an order of 1.7 per cent. The per-capita consumption increases at a slower rate than the per-capita income. The proportion of the investment from the private Sector should increase at a higher level as compared with the public Sector and that the savings from the household sector constitute a higher proportion than at present. The National saving-income ratio should increase at a higher rate of about 28 per cent by the end of the Fourth Five Year Plan and the subsequent years and that the per-capita private consumption expenditure increases relatively at a slower rate as that of the per-capita income.

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IX. 05

The Population Factor in India's Economic Development

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THE POPULATION FACTOR IN INDIA'S ECONOMIC DEVELOPMENT

V.K.RAMABHADRAN

- I. The Demographic Situation.
- II. Population and National Product.
- III. Aggregative analysis of population and some socio-economic variables.
- IV. The perspective of development.

THE POPULATION FACTOR IN INDIA'S ECONOMIC DEVELOPMENT

V.K.RAMABHADRAN*

1. THE DEMOGRAPHIC SITUATION:

Size and growth of the population of a country are important variables in determining the rate of improvement in the economy. Population constitutes the denominator of several measures or indices used in international comparison. The main determinant of human welfare is the per-capita income and the comprehensive index of the economy is its per-capita product. India is one of the developing countries which has a rapid population growth piled on top of an already low level of living. It is, therefore, useful to analyse how the present demographic situation in India has been brought about.

2. The table below gives the growth of population since 1901.

Table 1. Growth of Population in India since 1901

Year	Population (million)	Decennial growth
1901	238.3	
1911	252.1	5.75
1921	251.3	-0.31
1931	279.0	11.00
1941	318.7	14.22
1951	361.1	13.31
1961	439.2	21.51
1971 ^{1/2}	560.0	25.00

% Sources: 1) Census of India.
2) Report on the Population Projection, ---
of the Expert Committee, Registrar
General, India. 1968.

* Deputy Registrar General, India, NEW DELHI.

The spurt in growth in 1961 and the prospects of even higher growth in the decade 1961-70 has been a matter of widespread concern. To study the increase in growth rate, it is worthwhile to analyse the vital rates which for a closed country like India (with negligible migration) should provide a precise index. The trends in vital rates are indicated below:

Table 2: Trend in Vital rates in India 1901-1970.

Period	Birth rate per 1000	Death rate per 1000	Natural growth per 1000
1901-1910 *	48.1	42.6	5.5
1911-1920	49.2	43.6	5.6
1921-1930	46.4	36.3	10.1
1931-1940	45.2	31.2	14.0
1941-1950	39.9	27.4	12.5
1951-1960	41.7	22.8	18.9
1961-1965 †	41.0	17.2	23.8
1966-1970	38.6	14.0	24.6

Sources: * Census of India and
 † Report on the Population Projection, 1968.

3. In Western countries economic development generally preceded the decline in mortality and brought about a reduction in birth and death rates, thus enabling the 'demographic transition' from higher vital rates to relatively lower vital rates. To sustain a steady economic growth (and to some extent offset the ravages caused by war) considerable attention was paid to the health and working conditions of the people and as a result significant advances were made in medical and public health fields. These techniques could be readily applied to several developing countries to bring about a rapid

reduction in mortality during the last two decades. In particular, infant mortality - regarded as the psychological cause for higher birth has fallen considerably, but it had not produced the expected reduction in fertility among large sections of the people. To some extent, the absence of this phenomenon could be attributed to the lack of adequate socio-economic developments and also to the long period of time that population control measures take to produce adequate impact on the rural population. The death rate has nearly been halved during the 30 years 1940 to 1970 while the birth rate remained nearly constant leading to an increase in the natural growth rate from 12.5 per 1000 in the decade 1941-50 to 24.6 per thousand in the quinquennium 1965-70. In fact, therefore, while the 'humano' problem of higher mortality has been answered, it has resulted in exacerbating the population problem by increasing the growth rate. An all out effort has, therefore, been necessitated to limit the growth of Indian population. It is in this context that socio-economic development on the one hand and population control through family planning on the other, assume significance.

II. POPULATION AND NATIONAL PRODUCT:

4. To study how far the growth of population affects the national income is a complex matter involving demographic-economic-social inter-relationship. It is difficult to establish casual relationship between these variables by means of traditional statistical analysis. The study of casual relationship between economic and demographic variables would be meaningful only through a micro-economic analysis using the family as the unit of socio-economic behaviour. Through aggregative measures the inter-dependence can, be studied only in a general way.

5. Even at a global level the depressing effect of high population is clear from the fact that about 100 less developed countries with 66 percent of the world population have a combined gross national product (GNP) of less than 13 percent, while the affluent countries with 34 per cent of the total population account for 87 per cent of the global GNP. With two-thirds of the human race steeped in low standards of living, the advanced nations are called upon to make a greater effort to help the developing world if they have to preserve their own affluence. It is in this connection that the aid target of 1 per cent GNP of these countries is being strongly advocated for the success of the second development decade of the U.N.

6. India is a developing country whose 'demo-economic' status is described as high-fertility low-income. Its rising population and the agrarian economy depending upon the vagaries of weather have kept the income per-capita and per consumer at a low level. The table below summarizes the variations in per-capita income since 1954 by broad periods while the Annexure gives the year-wise data.

Table 3. Average national income per-capita and per consumer (at 1960-61 prices)

Period	National income	
	Per capita (Rs)	Per consumer (Rs)*
1954-56	276.8	335.2
1956-61	291.9	355.9
1961-66	314.9	386.7
1966-69	315.1	387.7

* The consumer population or 'equivalent adult consumer' is derived from the formula $1 \times M + .9 \times F + .5 C$ where M is the number of males over ten years, F the number of females over ten years and C the number of children under ten years.

During the decade 1961-70, while a steady growth was attained in the first half, the two unprecedented droughts in 1965-66 and 1966-67 have pushed back the economy to the 1960-61 level and the per-capita income to Rs. 306. While this level implied that in 1960-61 an Indian on an average had less than a rupee a day, a deeper analysis reveals how a large section of the people had to manage with a lower income. It has been estimated by analysing the household expenditure data by 'fractile group' (i.e. group of equal size) that the poorest decile of India's rural population (i.e. about 35 million persons had to subsist on less than 30 paise per day). 'It was only at the extreme top that the upper limiting value exceeded Rs. 390 per person per month which might be regarded as a level of affluence in Indian conditions.'

III. Aggregative analysis of population and some socio-economic variables.

7. Apart from the persistent low levels of income, the population growth and economic development have mutually interacted in several ways. As a concomitant of development, the percentage of urban population has increased considerably since 1951. The rural-urban distribution of population is shown below:

Table 4 - Rural-Urban distribution of Indian Population.

Year	1891 - 1971 Percentage distribution	
	Rural	Urban
1891	90.51	9.49
1901	89.16	10.84
1911	89.71	10.29
1921	88.82	11.18
1931	88.01	11.99
1941	86.14	13.86
1951	82.71	17.29
1961	82.03	17.97
1971*	80.27	19.73

* Projection

Source: Registrar General, India

By 1971 it appears that the percentage of urban population would be nearly twice the level at the turn of the century. Also the average annual growth of urban population is estimated at 3.6 per cent and that of rural population at 2.2 per cent. The consequences of these different rates of urban and rural population growth involve "the social cost of migration," since generally the expenditure for

Maintaining a person in an urban environment is higher than the requirements in a rural setting.

8. According to the recent estimates of capital formation and saving in India, the marginal rate of saving during the period 1960-61 to 1965-66 is 15 per cent in terms of net domestic product at factor cost. The estimates of saving and investment for the individual years are shown below:

Table 5. Estimates of saving and aggregate investment in India, 1960-66
in Rs. crores

Item	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
Net domestic saving	1,184	1,344	1,480	1,903	2,081	2,486
Aggregate investment	1,665	1,689	1,920	2,353	2,681	3,056
Aggregate (at 1960-61 prices)	1,665	1,624	1,794	2,120	2,286	2,442

Source: Estimates of capital formation and saving in India 1960-61 to 1965-66, Central Statistical Organisation.

The aggregate investment in the economy during the period 1960-61 to 1965-66 is of the order of Rs. 12,000 crores. Assuming a two year gestation period and a capital output ratio of 2.5 (in a predominantly agricultural economy like that of India), the income in real terms (at 1960-61 prices) should have risen in 1967-68 by about Rs. 4,800 crores over the level of Rs. 14,000 crores in 1962-63. However, the investment has not yielded this increase in national product because the growth of population has necessitated substantial investment in 'social over-heads', apart from the fact that India in its incipient stage of industrialization must bear a relatively high incremental capital-output ratio in view of investments in capital intensive projects linked with long-gestation period.

During the Fourth Plan period, more than a fifth of the total outlay would be directed towards development in social welfare category, of which housing and urban development with an outlay of Rs. 2,850 crores constitute more than half. The cumulative effect of the expanding population is that the consumer needs have gone up substantially and a good part of the public expenditure goes towards 'its maintenance' thus reducing the 'growth component of investment'.

9. The consumption needs are bound to increase further mainly because a bulk of the population is having low consumption levels. The analysis of the National Sample Survey (22nd round) July 1967- June 1968 by fractile groups reveals that in 1967-68 the first five deciles of population (i.e, one-half of the population) had a per capita consumption lower than Rs. 240 (at 1960-61 prices) which was deemed a minimum desirable consumption standard. Even in terms of per-consumer ^{b)} level of consumption the first four deciles or 40 per cent of the population did not have the minimum desirable consumption standard.

Table 6. Estimated per-capita consumption in Rs. in 1967-68 of different fractile groups at 1960-61 prices.

Fractile Group	Per-capita	per consumer
0 - 10	88	108
10- 20	130	160
20- 30	159	200
30- 40	188	231
40- 50	219	269
50- 60	253	311
60- 70	293	360
70- 80	346	425
80- 90	428	526
90- 100	662	814

a) Draft Fourth Five Year Plan, Planning Commission India, p. 33.

b) Equivalent adult consumer as defined by Coale and Hoover (2).

10. During the last 15 years, the per-capita public expenditure has risen four-fold as could be seen from the following table:

Table 7: Population and Public Expenditure - India

(Centre and States combined)

Period	Population in millions a) on 1st October	Expenditure on revenue account	
		Total b) (Rs. crores)	Per capita Rs
1955-56	391.7	1045	26.7
1960-61	435.1	1814	41.7
1966-67	502.0	4439	88.4
1967-68	514.5	4928	95.8
1968-69	527.3	5192	98.5

Source: a) 'Report on Population Projections -----'
Registrar General, India.

b) Statistical Pocket Book, India, 1968,
Central Statistical Organisation.

Currently more than one-third of this expenditure is related to social services (education, medical and public health, community development, civil administration etc.). Though immediate gains may not accrue to the economy, the augmentation of human capital resulting from this expenditure is likely to increase productivity and working conditions in the short run. This aspect is important in the Indian context where the higher rate of population growth was brought about through a relatively lower death rate as compared to the birth rate, which implies that with improved health standards and a longer expectation of life (currently estimated as 53 years at birth compared to 42 years in the mid-fifties) a longer span of life could be devoted to productive activity.

11. Another depressing effect of the growth of population has been on literacy. Unchecked population growth of which low GNP per capita is a concomitant, affects the level of literacy. A study conducted by the United Nations has brought to light that a positive correlation exists between the GNP per capita and literacy.

Table 8: Per-capita income and literacy

Group	GNP per capita (dollars)	Literacy % of population
I	895	96
II	301	73
III	287	49
IV	106	34
V	96	17

Literacy in India increased from 160 per 1000 population (excluding children in age group 0-4) in 1951 to 283 in 1961. But apart from the fact that this is hardly adequate for the needs of social and economic development, the pace of literacy drive has not yet caught up with the population growth. While literacy is hardly growing at the rate of 1 per cent per year, the population is increasing at a rate of more than 2 per cent. This is likely to lead to a paradoxical situation and the 1971 census might disclose a number of illiterates higher than in 1961. The implication of this widening illiteracy is that out of 260 million people, who are estimated to be in the age group 15-49 (and therefore a major constituent of the labour force), nearly two thirds are illiterates which itself acts as a drag on economic and social progress.

IV. The perspective of development

12. Having analysed the general effects on development, we might consider what are the over-all requirements of the economy in the context of pressure of population. It has been crudely estimated that the expanding Indian population requires an additional 1.25 million tonnes of food, 180 million metres of cloth, two and a half million houses,

over a million admissions to schools and 4 million jobs per annum.

13. The population problem as 'a race between the people and the food' might be in evidence in some degree and for some time. But in the perspective of a long-period development, this aspect of the population problem may probably be taken care of by the vast strides being made in agricultural technology. The wheat revolution has already been accomplished in India. There are hopes of rice revolution which would represent not only a quantitative break through (with a yield of six tonnes) but also a qualitative improvement through crossing with fragrant varieties. The Planning Commission has estimated ⁵⁾ that under conditions of price stability, the over-all elasticity of demand for food products would be of the order of 0.3. Applying this elasticity and the projected growth of population, and per capita private consumption, the Commission has estimated that the demand for farm products would be about 4.5 per cent per annum. A rate of agricultural production at 5 per cent per annum has, therefore, been targeted so as to eliminate imports of food grains. The pressure of population may not, therefore, be so much evident on the food front, if the nonsoons do not fail.

14. The form in which the population pressure would continue to be felt is in the over-all economic development, investment, employment and regional disparities. In regard to higher investment, the basic consideration is that the 'savings' must be considerably higher than the 'maintenance savings'. It is however difficult to/ identify the rural savings, in a subsistence economy with sizeable proportion of non-monetized transactions. It is estimated ^{a)} that even to maintain the existing per capita income levels in the context of the growth of population, it would be necessary to invest 6.75 per cent of urban income and 5 per cent of rural income each year. The economic growth, therefore, implies that the savings and investments each year must be substantially higher than this level. The Planning Commission has estimated ⁶⁾ that to secure the required growth of 5.5 per cent by 1973-74 and 6 per cent upto 1980-81 internal savings should correspond to a marginal savings rate of the order of 28 per cent throughout

a) taking the growth of population as 2.7% (urban) and 2% (rural) and considering a uniform capital-output ratio of 2.5.

the next twelve years (i.e. till 1980-81) as against the rate ^{b)} of 15 per cent during the Third Plan period. This implies ⁷⁾ that the ratio of net domestic savings to national income should be 12.6 in 1973-74 and 16.5 in 1980-81. During the same period public consumption expenditure mostly on education, health and social services would increase ^{c)} at the rate of 8 to 9 per cent to meet the demands of growing population.

15. Due to the growth of population there has been a vast increase in the labour force. It has been estimated that the labour force in the rural and urban population aged 15-59 years would be as follows:

Table 9. Quinquennial projections of labour force (in million)

-All-India, 1961-81.

Year	Rural	Urban	Total
1961	137.9	24.3	162.2
1971	169.1	34.3	203.4
1976	189.7	41.3	231.0
1981	213.6	49.6	263.2

Source: 'Report on the Population Projections---'
Registrar General, India.

According to these projections the labour force in the age group 15-59 would increase by about 22 millions during 1966-71 and by 28 million during 1971-76. The major objective of the Fourth Plan and the subsequent plans is, therefore, to create more employment opportunities in the rural and urban sectors. It is anticipated that the 5 per cent growth in agriculture and higher rate of growth in industrial activity would lead to larger employment in the tertiary sector.

16. Apart from the natural increase in the population of India, there is a disproportionate geographical distribution which has stood in the way of socio-economic develop-

b) Estimates of saving in India, 1960-61 to 1965-66
Central Statistical Organisation.

c) Fourth Five Year Plan, Planning Commission, India, p.32

States with massive population (notably Bihar and Uttar Pradesh) and high population density (Kerala) on the one hand, as well as States (Madhya Pradesh and Rajasthan) with extensive area and low population density on the other, have had a relatively low level of income as could be seen from the following table:

Table 10. Estimates of per-capita income in various States in 1964-65 and their population characteristics.

(at current prices)

State	Per-capita@ income (in Rs.)	Density of population per sq. km	Proportion of urban population
1	2	3	4
Andhra Pradesh	438	131	17.4
Assam	441	60	7.5
Bihar	229	267	8.4
Gujarat	523	110	25.8
Haryana	504	172	17.2
Jammu & Kashnir	341	-	-
Kerala	393	435	15.1
Madhya Pradesh	373	73	14.3
Maharashtra	526	129	28.2
Mysore	420	123	22.3
Orissa	347	113	5.2
Punjab(reorga- nised)	575	221	23.1
Rajasthan	356	59	16.3
Tamil Nadu	434	259	26.7
Uttar Pradesh	374	251	12.9
West Bengal	493	398	24.5
National average	422	134	16.0

@ Source: Col. (2) Central Statistical Organisation, Department of Statistics.

Cols. (3) & (4) Registrar General, India.

In view of this the pattern of Central assistance to the States evolved by the Planning Commission takes into consideration both population and per-capita income. According to the criteria laid down the Central assistance after providing for the special requirements of certain States would be distributed among others to the extent of 60 per cent on the basis of their population and 10 per cent on the per-capita income, if below the national average. This recognition of the regional economic imbalances caused by the population factor is one of the principal features of the Fourth Five Year Plan.

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ANNEXURE

POPULATION, TOTAL INCOME, INCOME PER CAPITA AND
PER-CONSUMER IN INDIA, 1954-55 to 1968-69 at
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Year	Net national product 1) (Rs. crores)	Mid year population 2) (millions)	Consumer population 3) (millions)	Income in Rupees per-capita	per consumer
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FOOT NOTES

- 1) L.J.Coale and B.M. Hoover; "Population Growth and Economic Development in Low-Income Countries" p. 238, Princeton University Press, 1958.
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- 6) ibid p.32
- 7) ibid p.42

THE POPULATION FACTOR IN INDIA'S ECONOMIC DEVELOPMENT

V.K.RAMABHADRAN*

1. THE DEMOGRAPHIC SITUATION:

Size and growth of the population of a country are important variables in determining the rate of improvement in the economy. Population constitutes the denominator of several measures or indices used in international comparison. The main determinant of human welfare is the per-capita income and the comprehensive index of the economy is its per-capita product. India is one of the developing countries which has a rapid population growth piled on top of an already low level of living. It is, therefore, useful to analyse how the present demographic situation in India has been brought about.

2. The table below gives the growth of population since 1901.

Table 1. Growth of Population in India since 1901

Year	Population (million)	Decennial growth
1901	238.3	
1911	252.1	5.75
1921	251.3	-0.31
1931	279.0	11.00
1941	318.7	14.22
1951	361.1	13.31
1961	439.2	21.51
1971 ^{1/2}	560.0	25.00

^{1/2} Sources: 1) Census of India.
2) Report on the Population Projection, ---
of the Expert Committee, Registrar
General, India. 1968.

* Deputy Registrar General, India, NEW DELHI.

The spurt in growth in 1961 and the prospects of even higher growth in the decade 1961-70 has been a matter of widespread concern. To study the increase in growth rate, it is worthwhile to analyse the vital rates which for a closed country like India (with negligible migration) should provide a precise index. The trends in vital rates are indicated below:

Table 2: Trend in Vital rates in India 1901-1970.

Period	Birth rate per 1000	Death rate per 1000	Natural growth per 1000
1901-1910 *	48.1	42.6	5.5
1911-1920	49.2	43.6	5.6
1921-1930	46.4	36.3	10.1
1931-1940	45.2	31.2	14.0
1941-1950	39.9	27.4	12.5
1951-1960	41.7	22.8	18.9
1961-1965 %	41.0	17.2	23.8
1966-1970	38.6	14.0	24.6

Sources: * Census of India and
% Report on the Population Projection, 1968.

3. In Western countries economic development generally preceded the decline in mortality and brought about a reduction in birth and death rates, thus enabling the 'demographic transition' from higher vital rates to relatively lower vital rates. To sustain a steady economic growth (and to some extent offset the ravages caused by war) considerable attention was paid to the health and working conditions of the people and as a result significant advances were made in medical and public health fields. These techniques could be readily applied to several developing countries to bring about a rapid

reduction in mortality during the last two decades. In particular, infant mortality - regarded as the psychological cause for higher birth has fallen considerably, but it had not produced the expected reduction in fertility among large sections of the people. To some extent, the absence of this phenomenon could be attributed to the lack of adequate socio-economic developments and also to the long period of time that population control measures take to produce adequate impact on the rural population. The death rate has nearly been halved during the 30 years 1940 to 1970 while the birth rate remained nearly constant leading to an increase in the natural growth rate from 12.5 per 1000 in the decade 1941-50 to 24.6 per thousand in the quinquennium 1965-70. In fact, therefore, while the 'humanc problem' of higher mortality has been answered, it has resulted in exacerbating the population problem by increasing the growth rate. An all out effort has, therefore, been necessitated to limit the growth of Indian population. It is in this context that socio-economic development on the one hand and population control through family planning on the other, assume significance.

II. POPULATION AND NATIONAL PRODUCT:

4. To study how far the growth of population affects the national income is a complex matter involving demographic-economic-social inter-relationship. It is difficult to establish casual relationship between these variables by means of traditional statistical analysis. The study of casual relationship between economic and demographic variables would be meaningful only through a micro-economic analysis using the family as the unit of socio-economic behaviour. Through aggregative measures the inter-dependence can, be studied only in a general way.

5. Even at a global level the depressing effect of high population is clear from the fact that about 100 less developed countries with 66 percent of the world population have a combined gross national product (GNP) of less than 13 percent, while the affluent countries with 34 per cent of the total population account for 87 per cent of the global GNP. With two-thirds of the human race steeped in low standards of living, the advanced nations are called upon to make a greater effort to help the developing world if they have to preserve their own affluence. It is in this connection that the aid target of 1 per cent GNP of these countries is being strongly advocated for the success of the second development decade of the U.N.

6. India is a developing country whose 'demo-economic' status is described as high-fertility low-income. Its rising population and the agrarian economy depending upon the vagaries of weather have kept the income per-capita and per consumer at a low level. The table below summarizes the variations in per-capita income since 1954 by broad periods while the Annexure gives the year-wise data.

Table 3. Average national income per-capita and per consumer (at 1960-61 prices)

Period	National income	
	Per capita (Rs)	Per consumer (Rs)*
1954-56	276.8	335.2
1956-61	291.9	355.9
1961-66	314.9	386.7
1966-69	315.1	387.7

* The consumer population or 'equivalent adult consumer' is derived from the formula $1 \times M + .9 \times F + .5 C$ where M is the number of males over ten years, F the number of females over ten years and C the number of children under ten years.

During the decade 1961-70, while a steady growth was attained in the first half, the two unprecedented droughts in 1965-66 and 1966-67 have pushed back the economy to the 1960-61 level and the per-capita income to Rs. 306. While this level implied that in 1960-61 an Indian on an average had less than a rupee a day, a deeper analysis reveals how a large section of the people had to manage with a lower income. It has been estimated²⁾ by analysing the household expenditure data by 'fractile group' (i.e. group of equal size) that the poorest decile of India's rural population (i.e. about 35 million persons had to subsist on less than 30 paise per day). 'It was only at the extreme top that the upper limiting value exceeded Rs. 390 per person per month which might be regarded as a level of affluence in Indian conditions.'

III. Aggregative analysis of population and some socio-economic variables.

7. Apart from the persistent low levels of income, the population growth and economic development have mutually interacted in several ways. As a concomitant of development, the percentage of urban population has increased considerably since 1951. The rural-urban distribution of population is shown below:

Table 4 - Rural-Urban distribution of Indian Population.

Year	1891 - 1971	
	Percentage distribution	
	Rural	Urban
1891	90.51	9.49
1901	89.16	10.84
1911	89.71	10.29
1921	88.82	11.18
1931	88.01	11.99
1941	86.14	13.86
1951	82.71	17.29
1961	82.03	17.97
1971*	80.27	19.73

* Projection

Source: Registrar General, India

By 1971 it appears that the percentage of urban population would be nearly twice the level at the turn of the century. Also the average annual growth of urban population is estimated at 3.6 per cent and that of rural population at 2.2 per cent. The consequences of these different rates of urban and rural population growth involve "the social cost of migration," since generally the expenditure for

Maintaining a person in an urban environment is higher than the requirements in a rural setting.

8. According to the recent estimates of capital formation and saving in India, the marginal rate of saving during the period 1960-61 to 1965-66 is 15 per cent in terms of net domestic product at factor cost. The estimates of saving and investment for the individual years are shown below:

Table 5. Estimates of saving and aggregate investment in India, 1960-66
in Rs. crores

Item	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66
Net domestic saving	1,184	1,344	1,480	1,903	2,081	2,486
Aggregate investment	1,665	1,689	1,920	2,353	2,681	3,056
Aggregate (at 1960-61 prices)	1,665	1,624	1,794	2,120	2,286	2,442

Source: Estimates of capital formation and saving in India 1960-61 to 1965-66, Central Statistical Organisation.

The aggregate investment in the economy during the period 1960-61 to 1965-66 is of the order of Rs. 12,000 crores. Assuming a two year gestation period and a capital output ratio of 2.5 (in a predominantly agricultural economy like that of India), the income in real terms (at 1960-61 prices) should have risen in 1967-68 by about Rs. 4,800 crores over the level of Rs. 14,000 crores in 1962-63. However, the investment has not yielded this increase in national product because the growth of population has necessitated substantial investment in 'social over-heads', apart from the fact that India in its incipient stage of industrialization must bear a relatively high incremental capital-output ratio in view of investments in capital intensive projects linked with long-gestation period.

During the Fourth Plan period, more than a fifth of the total outlay would be directed towards development in social welfare category, of which housing and urban development with an outlay of Rs. 2,850 crores constitute more than half. The cumulative effect of the expanding population is that the consumer needs have gone up substantially and a good part of the public expenditure goes towards 'its maintenance' thus reducing the 'growth component of investment'.

9. The consumption needs are bound to increase further mainly because a bulk of the population is having low consumption levels. The analysis^{a)} of the National Sample Survey (22nd round) July 1967- June 1968 by fractile groups reveals that in 1967-68 the first five deciles of population (i.e, one-half of the population) had a per capita consumption lower than Rs. 240 (at 1960-61 prices) which was deemed a minimum desirable consumption standard. Even in terms of per-consumer ^{b)} level of consumption the first four deciles or 40 per cent of the population did not have the minimum desirable consumption standard.

Table 6. Estimated per-capita consumption in Rs. in 1967-68 of different fractile groups at 1960-61 prices.

Fractile Group	Per-capita	per consumer
0 - 10	88	108
10- 20	130	160
20- 30	159	200
30- 40	188	231
40- 50	219	269
50- 60	253	311
60- 70	293	360
70- 80	346	425
80- 90	428	526
90- 100	662	814

a) Draft Fourth Five Year Plan, Planning Commission, India, p. 33.

b) Equivalent adult consumer as defined by Coale and Hoover (2).

10. During the last 15 years, the per-capita public expenditure has risen four-fold as could be seen from the following table:

Table 7: Population and Public Expenditure -
India

(Centre and States combined)

Period	Population in millions a) on 1st October	Expenditure on revenue account	
		Total b) (Rs. crores)	Per capita Rs
1955-56	391.7	1045	26.7
1960-61	435.1	1814	41.7
1966-67	502.0	4439	88.4
1967-68	514.5	4928	95.8
1968-69	527.3	5192	98.5

Source: a) 'Report on Population Projections -----'
Registrar General, India.

b) Statistical Pocket Book, India, 1968,
Central Statistical Organisation.

Currently more than one-third of this expenditure is related to social services (education, medical and public health, community development, civil administration etc.). Though immediate gains may not accrue to the economy, the augmentation of human capital resulting from this expenditure is likely to increase productivity and working conditions in the short run. This aspect is important in the Indian context where the higher rate of population growth was brought about through a relatively lower death rate as compared to the birth rate, which implies that with improved health standards and a longer expectation of life (currently estimated as 53 years at birth compared to 42 years in the mid-fifties) a longer span of life could be devoted to productive activity.

11. Another depressing effect of the growth of population has been on literacy. Unchecked population growth of which low GNP per capita is a concomitant, affects the level of literacy. A study conducted by the United Nations has brought to light that a positive correlation exists between the GNP per capita and literacy.

Table 8: Per-capita income and literacy

Group	GNP per capita (dollars)	Literacy % of population
I	895	96
II	301	73
III	287	49
IV	106	34
V	96	17

Literacy in India increased from 160 per 1000 population (excluding children in age group 0-4) in 1951 to 283 in 1961. But apart from the fact that this is hardly adequate for the needs of social and economic development, the pace of literacy drive has not yet caught up with the population growth. While literacy is hardly growing at the rate of 1 per cent per year, the population is increasing at a rate of more than 2 per cent. This is likely to lead to a paradoxical situation and the 1971 census might disclose a number of illiterates higher than in 1961. The implication of this widening illiteracy is that out of 260 million people, who are estimated to be in the age group 15-49 (and therefore a major constituent of the labour force), nearly two thirds are illiterates which itself acts as a drag on economic and social progress.

IV. The perspective of development

12. Having analysed the general effects on development, we might consider what are the over-all requirements of the economy in the context of pressure of population. It has been crudely estimated that the expanding Indian population requires an additional 1.25 million tonnes of food, 180 million metres of cloth, two and a half million houses,

over a million admissions to schools and 4 million jobs per annum.

13. The population problem as 'a race between the people and the food' might be in evidence in some degree and for some time. But in the perspective of a long-period development, this aspect of the population problem may probably be taken care of by the vast strides being made in agricultural technology. The wheat revolution has already been accomplished in India. There are hopes of rice revolution which would represent not only a quantitative break through (with a yield of six tonnes) but also a qualitative improvement through crossing with fragrant varieties. The Planning Commission has estimated⁵⁾ that under conditions of price stability, the over-all elasticity of demand for food products would be of the order of 0.3. Applying this elasticity and the projected growth of population, and per capita private consumption, the Commission has estimated that the demand for farm products would be about 4.5 per cent per annum. A rate of agricultural production at 5 per cent per annum has, therefore, been targeted so as to eliminate imports of food grains. The pressure of population may not, therefore, be so much evident on the food front, if the nonsoons do not fail.

ntify 14. The form in which the population pressure would continue to be felt is in the over-all economic development, investment, employment and regional disparities. In regard to higher investment, the basic consideration is that the 'savings' must be considerably higher than the 'maintenance savings'. It is however difficult to/ the rural savings, in a subsistence economy with sizeable proportion of non-monetized transactions. It is estimated^{a)} that even to maintain the existing per capita income levels in the context of the growth of population, it would be necessary to invest 6.75 per cent of urban income and 5 per cent of rural income each year. The economic growth, therefore, implies that the savings and investments each year must be substantially higher than this level. The Planning Commission has estimated⁶⁾ that to secure the required growth of 5.5 per cent by 1973-74 and 6 per cent upto 1980-81 internal savings should correspond to a marginal savings rate of the order of 28 per cent throughout

a) taking the growth of population as 2.7% (urban) and 2% (rural) and considering a uniform capital-output ratio of 2.5.

the next twelve years (i.e. till 1980-81) as against the rate ^{b)} of 15 per cent during the Third Plan period. This implies ⁷⁾ that the ratio of net domestic savings to national income should be 12.6 in 1973-74 and 16.5 in 1980-81. During the same period public consumption expenditure mostly on education, health and social services would increase ^{c)} at the rate of 8 to 9 per cent to meet the demands of growing population.

15. Due to the growth of population there has been a vast increase in the labour force. It has been estimated that the labour force in the rural and urban population aged 15-59 years would be as follows:

Table 9. Quinquennial projections of labour force (in million)

-All-India, 1961-81.

Year	Rural	Urban	Total
1961	137.9	24.3	162.2
1971	169.1	34.3	203.4
1976	189.7	41.3	231.0
1981	213.6	49.6	263.2

Source: 'Report on the Population Projections---'
Registrar General, India.

According to these projections the labour force in the age group 15-59 would increase by about 22 millions during 1966-71 and by 28 million during 1971-76. The major objective of the Fourth Plan and the subsequent plans is, therefore, to create more employment opportunities in the rural and urban sectors. It is anticipated that the 5 per cent growth in agriculture and higher rate of growth in industrial activity would lead to larger employment in the tertiary sector.

16. Apart from the natural increase in the population of India, there is a disproportionate geographical distribution which has stood in the way of socio-economic developmen

b) Estimates of saving in India, 1960-61 to 1965-66
Central Statistical Organisation.

c) Fourth Five Year Plan, Planning Commission, India, p.32.

States with massive population (notably Bihar and Uttar Pradesh) and high population density (Kerala) on the one hand, as well as States (Madhya Pradesh and Rajasthan) with extensive area and low population density on the other, have had a relatively low level of income as could be seen from the following table:

Table 10. Estimates of per-capita income in various States in 1964-65 and their population characteristics.

(at current prices)

State	Per-capita@ income (in Rs.)	Density of population per sq. km	Proportion of urban population
1	2	3	4
Andhra Pradesh.	438	131	17.4
Assam	441	60	7.5
Bihar	229	267	8.4
Gujarat	523	110	25.8
Haryana	504	172	17.2
Jammu & Kashmir	341	-	-
Kerala	393	435	15.1
Madhya Pradesh	373	73	14.3
Maharashtra	526	129	28.2
Mysore	420	123	22.3
Orissa	347	113	5.2
Punjab (reorganised)	575	221	23.1
Rajasthan	356	59	16.3
Tamil Nadu	434	259	26.7
Uttar Pradesh	374	251	12.9
West Bengal	498	398	24.5
National average	422	134	18.0

@ Source: Col. (2) Central Statistical Organisation, Department of Statistics.

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- 7) ibid p.42

INDIAN CENSUS CENTENARY SEMINAR

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SESSION :
Paper Code : **IX DEMOGRAPHIC ASPECTS OF ECONOMIC GROWTH**

IX. 06

Qualitative Population Norm

By

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Ministry of Home Affairs

New Delhi

QUALITATIVE POPULATION NORM

BY

Prof. Baljit Singh*

Current population policies in developing countries emphasise mainly fertility reduction for rapid economic development. Population economics on the other hand reveals that it is an improvement in the quality of manpower that is the main source of economic progress. Any quantitative norm of population can be valid only in relation to a qualitative norm. It is proposed to discuss in Section I the primacy of qualitative population norm for economic development and the relevance for its achievement of a more rigorous quantitative norm of zero population growth rate. In section II the policy and disciplinary bearings of this analysis are given.

SECTION I

A point of departure in the contemporary theory of economic growth is that increases of labour and capital un-accompanied by technical progress and improvements in economic organisation add to domestic product but not to productivity or to per capita income. The latter is a function of advances in technology and efficiency of economy which both depend on improvements in the quality of 'factor inputs' and not on accretions of their quantity. Once full employment is reached the economy under given techniques and economic organisation is at best subject to constant returns to scale and consequently to diminishing returns to factors. In the absence of technical progress and innovations output per worker and hence income per capita can increase only if capital stock increases more rapidly than labour. But this would tend to reduce the marginal productivity of capital and lower the capital coefficient (output-capital ratio). Hence output would increase at a declining rate making it impractical in long run for per capita income to rise. In the reverse case (capital-labour ratio falling) there would be explicit diminishing returns to labour with a decline in per capita income. At less than full employment in developed countries unemployment is accompanied by excess capacity whose elimination in any case does not obviously require increases in labour or capital. It is the Keynesian case of shortfalls in aggregate effective demand.

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2. In developing economies there is a large amount of under-employment or low marginal productivity of labour due to shortage of capital and land. To the extent this is absolute, underemployment is relieved by widening of capital through utilisation of surplus manpower and adoption of labour-intensive techniques. The scope for raising productivity by this process is however extremely limited. To a large extent under-employment is due to relative, as distinct from absolute shortage of capital reflected in very low capital-labour and low capital-output ratios. But these inhere in the prevailing techniques of the traditional sectors and processes and cannot be raised simply by accumulation of capital unless the techniques and organisation are also changed. Anyway removal of the relative shortage, of capital and land does not require more labour. But whether we are considering an economy at full employment, less than full employment or having underemployment it is obvious that increases in productivity and per capita income require qualitative improvements in factor inputs and organisation rather than increases in their quantity.

3. Improvements in factor qualities and organisation are a function of science and hence of education and research that find new techniques and organisation by (i) producing a flow of high talent scientific manpower to discover them; (ii) generating a climate for innovations and (iii) training the general labour force to apply them.

4. Further, in labour-surplus (capital-scarce) economies, a zero growth rate of labour force (population, is an ideal condition for rapid qualitative changes. This is so since any diversion of their resources for maintenance of larger quantities of labour force depletes resources for a qualitative improvement. Any such depletions widen further their existing 'qualitative gap' and deficit in world technology trade and thus aggravate their relative poverty. For economic development, growth theory thus points to a qualitative demographic norm for which a quantitative norm in labour surplus economies is a necessary but not a sufficient condition. Empirical studies have revealed that in the case of the developed countries the role of 'factor inputs' either of labour or capital in their economic development has been less weighty than of the 'residual' or technological progress and improvements in economic organisation. These certainly required new capital accumulation since technology is often 'embodied'. What is, however, more relevant is that only

a part their growth can be accounted for by direct increases in quantity of labour and capital. The rest and probably a major part is due to improvement in the quality of inputs.¹ This experience is highly relevant for the developing countries since the developed countries of to-day were in the past equally under-developed. They had also high reproduction rates which declined only gradually and they could modernise their economies with a net saving of ten to fifteen per cent of their income.

5. Dension² for instance found for U.S.A. that increases in inputs of capital, land and man-hours account for only 42 per cent of the growth in total national income from 1909-1957; 58 per cent from 1909-1929 and 42 per cent from 1929 to 1957. Accounting for improvement in the quality of labour in its quantity, he found that 2.22 percentage points or 77 per cent of the 2.89 per cent per annum growth rate of total real income from 1909-57 was the result of the growth of inputs and .67 percentage points or 23 per cent was the result of the growth of output per unit of input due to increasing scientific, technological and managerial knowledge, changes in the efficiency of the economy, economies and diseconomies of scale, and all influences not measured in the input indices. More or less similar results were obtained for 1909-29 and 1929-57. Taking improvements in the quality of labour in technology Kendrick has calculated that in U.S.A. during 1920-60 two third of average annual increase in real gross national product estimated at 3.2 per cent has been due to technology and only one-third or 1 per cent a year to 'total factor input'.³ An analysis of the development of four largest industrial countries (France, Germany, the U.K. and the U.S.A.) during forty years preceding World War I revealed that their output increased at an average rate of more than 2 per cent per year, with 0.7 per cent attributable to the increase in labour force, 0.4 to 0.8 per cent to capital accumulation and 0.5 to 0.9 per cent attributable to technical progress.⁴

6. A significant conclusion that follows from the history of economic development is that for economic growth the contribution of quality of labour including those via technical progress and improved economic organisation have been more important than those of quantities of labour and capital. New capital has certainly been necessary for 'embodying' new technology and for the replacement of the

existing one. But unskilled labour force and accumulation of capital of old vintage have contributed less than proportionately to their own rate of increase. It is improvement in their quality along with changes in economic organisation that alone raised the per capita output. Improvement in the quality of manpower, capital and economic organisation has its roots in a single source i.e. advance in knowledge which can take place only through education including scientific research and technical training.

7. Its necessity has ever been paramount not only as a goal in itself but equally as a means of economic development. But it is all the more so today for the developing countries whose growth is faced with certain dimensions which the developed countries had not to face. Firstly, in their case the period of development or achieving 'take-off' has to be shorter on account of the large 'lee way' that did not exist at the time of the development of the latter. Secondly, due to their 'population explosion' or a rate of population growth which is two to three times as high as was in the developed countries during their industrial revolution they must have several times higher rates of growth to raise their per capita income than the rates at which the latter achieved their development (4 to 6 per cent in contrast to 2 to 3 per cent of the latter). Thirdly, the developing countries have a very much larger incidence of underemployment and surplus labour than existed in the developed countries at the time of their take-off. Finally, there is a large 'qualitative gap' in manpower, capital equipment and economic organisation in their case to-day than ever existed in the past. All these point-out to the higher relevance of educated manpower in their case than was true at the time of the development of the developed countries. India's Education Commission has rightly emphasised that while growth requires both development of physical resources and development of human resources the latter through education is more crucial of the two since the former too cannot develop adequately without the latter.⁵

8. Several studies have established that education is the most important factor in temporal, national and personal income differentials. It adds earning power to both material and human resources of a country for beyond their costs.⁶ Hence educational outlay is like investment in human capital having not only internal but even higher external returns.⁷ Several countries particularly

Japan and U.S.S.R. based their growth, like individuals in all parts of the world, on the relations between education and income. From this viewpoint even primary education is investment in human capital as without it there cannot be that 'great ascent' as Robert Hellbroner has called it, of a tradition-bound society into modernage.⁸ Japan achieved during the first three decades of Meiji Restoration universal primary education. According to Okita this produced very satisfactory results in the farming community and paved the way for Japan's modern industrial development.⁹

9. This analysis emphasises the primary of a qualitative norm of population policy for economic development. Its attainment at ever rising levels, however, requires that less and less resources be diverted for increasing the quantity of labour since this reduces the resources available for the qualitative norm. In particular this applies to the developing countries who have a relative scarcity of resources in terms of the current supplies of labour (labour surplus). A corollary, therefore, follows viz; the qualitative norm necessitates a quantitative norm of zero growth rate of labour force and population. This is necessary though not a sufficient condition for the realisation of the qualitative norm for which education and research are the only means.¹⁰

10. The qualitative and quantitative norms of population are complementary to each other. But the latter derives its relevance from the former alone and is of little significance by itself. Their complementarity is obvious, Lower the fertility nearer is the quantitative norm and larger are the resources, both private and public, available for education to approach the qualitative norm. Similarly, as education spreads and nearer is the qualitative norm, not only does the total output increase inducing a fall in fertility but there is strengthening of motivation for smaller size family leading to the quantitative norm. There is a constant feed-back. But the quantitative norm does not raise per capita income and bring about development. In any programme or policy of development, therefore, the qualitative norm of population ought to be the frame of reference. Priority for the quantitative norm or fertility reduction is its derivative and though necessary it is only of secondary importance. Population policy should aim primarily at a qualitative improvement of the labour force and for this education has to be given top priority.

11. Quality norm of population and top priority to education may be criticised on several grounds. It is apprehended that it may lower the priority to family planning and fertility reduction i.e. the quantity norm programme. Actually, (a) the qualitative norm lays down a more rigorous quantitative norm of zero growth rate of population; (b) resources required to prevent births are only of fractional and marginal significance for education and can therefore, be left undiverted and even be increased; (c) education is significant in reducing fertility; and (d) it tends to give a positive and integrated approach to a negative and isolated programme of family planning and hence strengthen it. A second type of objection is that priority to education may divert resources away from investment 'proper' in infra-structure and capital formation and lower its rate. It is based on the assumption that educational outlay encroached upon savings. Private costs of education that account for a major part of total costs are however met largely by adjustments in the pattern of consumption rather than by reducing savings, motivations for which are strengthened by education. Education induces discretion in both private and public expenditures. Further, the real resources required for the two types of investments i.e. in human capital and in 'things' are different. Actually, the larger unemployed educated manpower in several developed countries at present in an index of their unutilised potential for investment in human capital. Moreover, the favourable impact of outlays on science and research on domestic discovery of new technology and its international trade would augment rather than reduce resources for capital formation.

12. Thirdly, it is stated that education and research are economically meaningful only when there is a market for their products in modern industries, transport, communication, financial and other institution as well as in agriculture and small-scale sector. In the absence of modernisation and industrialisation of an economy it would be wasteful to give high priority to education and research. A view of this type ignores that (i) it takes a decade to educate a child even at an elementary level and more at a higher level and that there is considerable time-lag in its output; (ii) education even primary education is a lever and precondition of modernisation and not vice-versa; and (iii) education transforms an economy to its own level. A more serious objection however is as to how can lower educational outlays bring any returns if there is already a high incidence of unemployment of the educated manpower including technicians and engineers particularly where

education makes them generally inefficient workers, managers and entrepreneurs on the one hand and indolent scientists and research workers on the other. But this is a criticism of the particular system, pattern or structure of education and not of education as such. Finally, on account of the long period required for output of education and research the qualitative norm may be of less significance than the quantitative norm for immediate and short period ranging over a decade or so. This again ignores the fact that as soon as a child goes to school the parents and the family begin to get educated. There is a change in their pattern of consumption, comprehension of things, values, perspective and even in the way of life. On the other hand the short period impact on savings of a quantitative norm in isolation is doubtful while it affects the flow of labour force only after 15 years or so.

13. To conclude a population policy for economic development ought to be based on a qualitative norm for improvement of labour force through education. A quantitative norm of zero population growth rate is its necessary adjunct through it has little direct significance of its own for the development of an economy.

SECTION II

14. A reference may be made to the three broad fields to which a survey of population economics draws attention. Firstly, there is a very large area over which the demographic and economic factors act and react on each other. To treat the size, structure, composition, rate of growth and internal and external movements of population as independent of the State of an economy, level of its development and rate of its growth would be as fallacious as to assume savings and investment, demand and its pattern, size distribution of income and its growth, choice of techniques and technical progress or economic organisation unaffected by demographic factors and changes. There are similar other areas of mutual interaction. But it is also not valid to assert that either of the two is entirely a dependent variable of the other or that all population changes are ever induced by only economic factors and per capita income or economic growth is a function of the size and rate of growth of population. There can be purely demographic changes as well as purely economic changes in the sense of being dependent exclusively on demographic and economic variables respectively. For instance, changes in age-structure and expectation

of life are functions of changes in fertility and mortality rates respectively. There may also be changes in birth rates and death rates independently of any changes in the economy. But these are not altogether unrelated and are also induced by economic progress. Likewise, there may be various relations among economic variables inter se but these may also be in part related to demographic changes. In general both the economic and demographic systems are exclusive in a static situation. Under dynamics they tend to coalesce into each other. The precise way and extent of such coalescence is only vaguely known at present and has still to be explored. But this much is already known that population policies have an economic impact as well and that most economic and fiscal policies have a bearing on population. No policy decision should therefore be taken in isolation.

15. Secondly, our analysis draws attention to the relevance of demographic criteria and propositions in welfare economics. Economic welfare is taken to be maximised when there is optimum resource allocation in the sense that 'a positive-weighted value sum of outputs' is maximised over the economic horizon and none can be better off in an alternative situation without at least someone being worse off. Whether we admit the possibility of the sum of separate economic welfare (independent or inter-dependent) of each member of the community or not and whether the distribution postulated under the maximisation condition does actually take place or not, the size of population and its rate of growth are not explicitly included in the welfare function. Compare two states in both of which the necessary and marginal conditions of welfare maximisation are satisfied but in one state, say, A, the population is larger than in the other say, B. It may be argued out that in state A as the total output is shared by more than in A. Hence A is preferable to B. But this leads to the absurd conclusion that smaller the population larger is the welfare. It still leaves unresolved the issue whether output in A does not compensate for its larger population and further which of the two states assures the rate of growth of the economy preferred by the community as distinct from/given by individual preferences. On the other hand the theory of optimum population which prescribes the quantitative demographic optimum is a static, incalculable and unworkable concept. Besides, it ignores altogether the dynamic issues centering round the rate of growth of the economy. Further, the per capita income maximisation criterion of optimum population assumes the community to be

that

indifferent to population size on any other basis. In reality this is not so and a definite proof is required of its underlying assumption that if 'p' be the population and 'y' is income per capita and further $p' \leq p''$ and $y' > y''$ that it invariably prefers $p'y'$ to $p''y''$. Moreover, it altogether ignores the quality of population which is goal of a community by itself as well as a means to economic growth. It appears that the validity conditions of population size propositions have still to be settled and welfare economics has to find a place for community preferences in respect of the size and quality of population as well as of its rate of growth.

16. Finally, population economics emphasises the importance of rigorous study and research into the inter-relations between economic and demographic factors both in the developed and developing countries. For any meaningful propositions and policy frames, therefore, the disciplines of economics and demography have to come closer. Currently, the dialogue between the two is far from satisfactory and very often demographers do not know the economic aspects of the problems that they are studying and vice versa. Similar conditions exist with regard to the teaching of the two subjects. If anything, this paper enters a strong plea for the demographers to be acquainted with basic propositions of economics and especially of the theory of economic growth and for the economists to take into account the interplay of demographic and economic variables rather than treat population as exogenous to their system.

FOOT NOTES

1. Simon Kuznet has found that modern economic growth in developed countries is characterized by a rise of per capita income of 15 to 30 per cent per decade. Less than one-fifth of this secular rise and a decreasing fraction in recent decades can be explained by increases in inputs of man-hours and capital per head. He concludes that the rise in per capita product was due primarily to improvements in quality; not quantity of inputs i.e. to increases in knowledge and better institutional arrangements for its utilization. Simon Kuznets - Modern Economic Growth, Rate Structure and Spread, 1967.
2. Dension Edward F- The Sources of Economic Growth in the United States and the Alternatives before Us. Jan. 1962 Chapter 13.
3. Kendrick John W-Productivity Trends in the United States. Princeton, 1961.
4. Tinbergen J and Polak J.J. : The Dynamics of Business Cycles, Chicago, 1950 pp. 127-128 & Chapter 2.
5. Report of the Education Commission (1964-66) Education and National Development, Government of India 1966 pp-4.
6. For instance - Dension - Opp cite John Vaizey. The Economics of Education; 1962; M.R.Sinha (Ed.) The Economics of Manpower Planning 1965; Horbison F and Myers Charles A. Education, Manpower and Economic Growth, 1964; Kothari V.N. - 'Disparities in relative earnings among different countries'. The Economic Journal, September 1970 pp. 605-616
7. Cf. Schultz. T.W. : 'Capital Formation by Education.' Journal of Political Economy, December 1960 pp. 571-583. Singh, Baljit (ed). Education as Investment, 1967 Smith C.Solly- 'Costs and Benefits in Further Education' The Economic Journal September 1970 pp. 583-604

Becker Garys - 'Underinvestment in Higher Education' American Economic Review, Papers and Proceedings May 1960.

8. The mere lay-in of a core of capital equipment, indispensable as that is for further economic expansion, does not yet catalyse a tradition-bound society into a modern one. For that catalysis to take place, nothing short of a pervasive social transformation will suffice; a wholesale metamorphosis of habits, a wrenching reorientation of values concerning time, status, money, work and an unweaving and reweaving of the fabric of daily existence itself.' Robert Hellbroner. The Great Ascent, 1963, p. 60 quoted by the Education Commission of India.
9. Saburo Okita- 'Manpower Policy in Japan' in M.P. Sinha (Ed.) opp cite p 180.
10. The structure, nature and type of education are assumed here to be those that are appropriate under the given conditions. Controversies in this respect are beyond the scope of this paper.

QUALITATIVE POPULATION NORM

SUMMARY

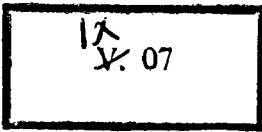
The paper emphasises the proposition that any quantitative norm of population growth to either achieve or maintain economic development is valid only in relation to a qualitative norm. The former is only a derivative of the latter - a point that is often missed in current population policies particularly in developing countries. What is relevant for raising per capita output anywhere is a qualitative improvement in factor inputs and this can be brought about through education and research. At the same time a quantitative norm of zero population growth rate is a necessary desideratum of raising the quality of labour force, but by itself this has little direct significance for economic development. Further a quality norm of population, necessary for economic development, carries within itself a rigorous quantitative norm of population growth (zero) but vice versa is not true. In this context high priority of education and research is revealed.

Section II of the paper deals with the interrelations between economic and demographic variables. This brings into focus the frame of reference of economics for demographic policies and measures and the necessity to incorporate in the former the character of population as an endogenous variable of an economy.

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Macro Models and Economic Implications of Population Growth

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MACRO-MODELS AND ECONOMIC IMPLICATIONS OF POPULATION GROWTH

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Rapid population growth is by now a well known experience in nearly all the less developed countries. This phenomenon is obviously due to the widening gap between fertility and mortality generated by improvements in public health and sanitation and new disease control methods which could be implemented even without a substantial measure of economic development. The growing concern over the threat posed by this phenomenon to the economy, society and polity is reflected in the volume of literature that has come up during the last two decades. It has many insights on the variables through which population growth interacts with the process of economic and social development. An attempt is made in this paper to indicate how the analytical findings as well as the policy perspectives are likely to get modified if we take cognizance of the diversity of demographic experience and behavioral relationships in different socio-economic settings.

Population Perspectives

The Study Committee of the Office of the Foreign Secretary, National Academy of Science, classifies the less developed countries into three groups on the basis of their population patterns;

- (i) Countries with both high birth rates and high death rates;
- (ii) Countries with high birth rates and low death rates;
- (iii) Countries with intermediate and declining birth rates and low death rates.[1]

A realistic assessment of the prospective demographic trends, however requires that countries in the second group are further

subdivided into those

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with high birth rates but low death rates that are close to the minimum observed in the developed countries and others where the death rates are declining but the process has not yet been completed so that they have the prospect of further reduction in mortality. India falls in the latter of these two subgroups. It had in 1961 an expectation of life around 45 years as against 60 years and over in less developed countries like Taiwan, Ceylon, Philippines and Thailand.[2] Within the country, the life expectancy ranged from 36.6 in Assam to 49.9 in Punjab.[3] The experience of several LDC's suggests that sustained improvement in public health and medical facilities as well as in the production and distribution of food will continue to bring down mortality until it reaches the minimum consistent with existing technology. The Expert Committee projected an annual improvement of 0.9 years in the expectation of life at birth in 1961-70 and 0.75 in the following decade.

Given the mortality trend, population growth obviously depends on the course of fertility. Modern technology of death control is easily adopted for it is a universal value but modern technology of birth control is not, since it comes into conflict with the established value system that evolved almost instinctively as a survival mechanism in periods of high mortality. As at present, many physiological and cultural factors keep Indian fertility well below the biological limits. Malnutrition, early maternity, ban on widow remarriage, prolonged lactation after childbirth and the practice of the young wife staying with the mother - all inhibit fertility. What of the future?

The impending changes seem to favor fertility. Improved nutrition and proper care of women would reduce the incidence of abortion and stillbirths.

The ban on widow remarriage may die hard, but improved survival probabilities would reduce the incidence of widowhood. Postponement of marriage age reduces the period available for reproductive performance but the effects of a limited rise in marriage age, as observed in India so far (13/14 to 17/18 years), may increase both gross and net fertility.[4] All in all, it appears that left to its natural course, fertility might slightly move up.[5]

The Government of India is evidently determined to alter the natural course by an intensive drive for family planning, having made a provision of more than ₹315 crores in the Fourth Plan as against 25 crores in the Third Plan and 5 crores in the Second Plan. The intention is to place the means of birth control within easy reach of large sections of population but as yet, it is too early to say anything with confidence about its likely impact on the fertility level in the coming years. There is no parallel experience of a programme of this kind in any other country at similar levels of social and economic development which may be drawn upon for any guidance about the likely trend of future decline in fertility. But relying on the judgement of knowledgeable persons and also on some fragmentary evidence, the Expert Committee on Population Projections appointed by the Government of India projected a decline of 5% during 1966-70, 10% during 1971-75 and 20% in 1976-80 or a decline of about 32% over a fifteen year period. Assuming 80% level of contraceptive effectiveness which may be taken as reasonably high for population at our levels of literacy and culture, a 32% drop in fertility would require, according to model estimates by Sheps and Perrin, some 60% of the couples to be practicing contraception.[6] This is indeed an optimistic projection. It is important to note that even if it comes out correct and the birth rate goes down to 29 by 1981, the rate of natural

increase would still be 20%.* However, if the frequency of the practice of contraception is limited to 40% of the reproductive couples and fertility declines only by 20%, the growth rate may as well be 25%. It appears that the phenomenon of rapid population growth is going to stay for some time. An analytic economic - demographic model must reckon with this fact if it is to yield meaningful results for the planners in India. In fact, the persistence of this situation in LDC's in the short period has led Leff to express "pessimism concerning the possibility of achieving substantial increases in the savings rates of under-developed countries unless birth rates are reduced".[7]

Fertility Decline, Age Structure and Dependency Burden

It has been demonstrated beyond doubt that variations in mortality have but second order effects on age distribution, while decline in fertility reduces significantly the proportion of children to persons in working age-groups and thus lowers the burden of childhood dependency.[8] This is illustrated by two sets of projections given below. The first set presents Coale and Hoover projections under the assumption of a constant course of decline in mortality and the alternative assumptions of fertility (1) remaining unchanged and (2) declining linearly by 50% between 1966 and 1981. The second set relates to the projections of the Experts Committee on Population Projections appointed by the Government of India.

*The enumerated population in 1971 Census is 547 million as against the projection of 559 million. This has set in rethinking on the assumptions regarding fertility and mortality decline. The revised assumptions are not yet available, but the consensus seems to be more in favor of a lower decline in mortality than projected earlier and also a somewhat smaller drop in fertility. In view of the height-slope relationship in mortality, this implies the prospect of a greater decline in mortality in the next decade and in consequence growth rate nearer 2.3% than 2%.

Projected Population, Children and Dependency Burden

	Dependency (Coale & Hoover Projections)		
	1966	1981	1986
1. Population (millions) Assumption I	473	683	755
2. Population (millions) Assumption II	473	603	634
3. % ratio of (2) to (1)	100	88	84
4. Children 0-14 (millions) Assumption I	192	286	329
5. Children 0-14 (millions) Assumption II	192	207	195
6. % ratio of (5) to (4)	100	73	60
7. % ratio of (4) to (1)	40.6	41.9	42.4
8. % ratio of (5) to (2)	40.6	34.3	30.7
9. Ratio of equivalent adult consumers to equivalent adult producers			
(a) Assumption I	2.28	2.35	2.38
(b) Assumption II	2.28	2.17	2.11
10. % of 9(b) to 9(a)	100	92.5	88.7
	(Expert Committee Projections)		
1. Population (millions)	494	694	747
2. Children 0-14 (millions)	206	262	251
3. % ratio of (2) to (1)	42	38	34
4. Ratio of equivalent adult consumers to equivalent adult producers	2.32	2.21	2.12

According to Coale and Hoover projections, a fertility decline of the order of 50% between 1966 and 1981 would imply a reduction of 12% in the size of population by 1981 and 16% by 1986. The reduction in the number of children is even more impressive, being 27% by 1981 and 40% by 1986. The differential increase in the number of children is clearly reflected in a decline in the ratio of children to total population from 40.6% in 1966 to 34.3% in 1981 and 30.7% in 1986 under the low fertility assumption as against a marginal rise in the ratio to 40.9% in 1981 and 42.4% in 1986 remains unchanged. Significant decline in the ratio of children to total population is also revealed in the projections of the Expert Committee though of a somewhat lower magnitude since they project a slower drop in fertility.

The decline in the ratio of children to total population that would follow a rapid drop in the birth rate does not provide a true measure of reduction in the burden of dependency since consumption per child is evidently lower than that per adult. To make the measure more meaningful requires an additional exercise of converting the entire population into equivalent adult consumers on the lines adopted by Coale and Hoover on the one hand and estimating the number of adult producers on the other. We accept the Coale and Hoover coefficients of consumer units; they are unity for adult males as well as children 10-14, .9 for females 10+ and .5 for children below 10. The estimate of equivalent consumers is obtained by applying these coefficients to the corresponding population groups. The size of labor force at different points of time is obtained by applying age-sex-specific labor force participation rates as in 1961 census to respective population groups, 15+. Further, we use a coefficient of .67 for female workers and 1 for male workers to get the figure of equivalent adult producers. It may easily be

seen that our method of estimating equivalent adult producers involves a small degree of relative under-estimation under the high fertility assumption since it excludes workers under 15 (who accounted for nearly 8% of the labor force in 1961 census).

The real dependency burden (as measured by the ratio of equivalent adult consumers to equivalent adult producers) declines by 7.5% between 1966 and 1981 even under the most optimistic assumption of 50% decline in fertility. On a more realistic view of fertility decline as taken by the Expert Committee, the drop in the consumer-producer ratio by 1981 is only of the order of 4.8%. With the extension of the period by another 5 years, the reduction in the ratio works out at 11% according to Coale and Hoover projections and 8.6% according to that of the Expert Committee.

Given the level of family income, reduction in consumer-producer ratio implies a corresponding increase in income and consumption per unit. The magnitudes involved are not impressive but even as such they do indicate some scope for better nutrition, housing and education of children and, in consequence, an improvement in the quality of the prospective entrants into the labor market.

Fertility Decline and Savings Rate

The availability of a large labor force and, for that matter, even of a somewhat improved quality is no guarantee that it will be productively utilized. In less developed economies the greatest bottleneck is inadequacy of capital stock and the low rate of its accumulation. The economic implications of fertility decline are thus better worked out in terms of its impact on the rate of saving, and this is precisely what Coale and Hoover have done in their pioneering work, *Population Growth and Economic Development*

in Low Income Countries. The specific model that forms the basis of their projections of saving and income takes roughly the following form:

$$S_t = P_t \left[\frac{S_{t-1}}{P_{t-1}} + \alpha \left(\frac{Y_t}{P_t} - \frac{Y_{t-1}}{P_{t-1}} \right) \right] \quad (1)$$

where S is the amount of investment (saving and investment being used interchangeably), P is population, Y is national income and α is the ratio of additional savings to increase in per capita income. The precise effects may be seen more clearly if the absolute magnitudes are reduced to ratios as in the following equation:

$$s_t = \alpha - \frac{(1+r)(\alpha - s_{t-1})}{1+s_{t-1} \cdot \beta} \quad (2)$$

where s stands for average rate of saving, β for the capital output ratio, r for the annual rate of population growth and α for marginal savings coefficient. α greater than s_{t-1} constitutes the basic strategy of growth in the model. It may be noted, however, that the foregoing model is constrained by initial conditions i.e. the values of s_{t-1} , β , and r at the start. If $s_{t-1} \cdot \beta$ is equal to the initial value of r , the rate of saving and, given β , also the rate of increase in national income, would remain constant, no matter how much α is greater than s_{t-1} . The model works only if the initial condition itself ensures a positive change in per capita income, i.e. $s_{t-1} \cdot \beta$ is greater than r . Assuming β to remain constant, the critical variable then in the model is α . Its value depends on institutional presuppositions. In a centrally planned economy, the planners can fix it at any level consistent with the limits of tolerance by the people of what it implies in terms of foregoing present consumption. If we assume that the economy functions in

the framework of a free market, the forces governing individual decisions can give α any value $\geq s_{t-1}$. Evidently, with $\alpha = s_{t-1}$, savings rates will remain constant regardless of the level of \underline{r} . Surprising results follow if the high consumption pressures of a modernizing society yield a value of α less than s_{t-1} . The negative term on the right side of the equation (2) then becomes positive and although there will be a decline in the rate of saving, α being less than s_{t-1} , the higher the rate of population growth, the slower would be the rate of deceleration.

The whole exercise in Coale and Hoover's study is based on the assumptions of appropriate initial conditions and α being greater than \underline{r} . Under these assumptions, the implications of alternative values of \underline{r} become obvious. Since \underline{r} appears in the negative component of the expression on the right side of the equation, the higher its value, the smaller is the rise in the rate of saving, given constant α . The depressing effects of \underline{r} become more pronounced, the more α exceeds the initial rate of saving.

Coale and Hoover economic projections are based on $\alpha = .3$. They indicate rise in the average rate of effective saving* from 11.1% in 1966 to 12.6% in 1981 if fertility remains constant and 15%, if fertility is reduced to half its level from 1966 to 1981.[9] In view of these differences in the growth of savings ratio, national income is seen to rise at a slower rate if fertility remains unchanged compared with that attained under the assumption of declining fertility. Annual growth in consumption per equivalent adult consumer actually declines from 1% in 1961 to 0.8% in 1981 in the high fertility case, but it rises to 1.9% in the case of declining fertility.

* The term 'effective saving' is used for 'G', i.e. direct growth outlays in Coale and Hoover Projections.

There is a progressive increase in consumption differentials indicating the rising cost of unaltered fertility over time. But it is distressing to note that consumption levels would rise by only 42% in 20 years even if fertility is cut down to half its present level within a limited span of 15 years. This clearly reveals the inadequacy of the growth strategy implied in the Coale and Hoover projections of income and the underlying assumptions. However, it must be realized that it was none of their intentions to provide such a strategy or to attempt economic forecasts. They carried out their analysis with the limited purpose of illustrating the economic benefits from fertility reduction and in this respect their conclusions appear beyond dispute. The validity of the savings - income relationship implied in their model is, however, open to question.

Alternative Hypotheses on Savings-Income Relationship

Coale and Hoover model is based on Keynesian savings function. Given *the* initial conditions, a higher rate of population growth implies a smaller increase in per capita income and therefore, a lower rate of increase in savings-income ratio. Keynes regarded it as a "fundamental psychological rule of any modern community that when its real income increase, it will not increase its consumption by an equal absolute amount" but was himself less definite about the rule that "a greater proportion of income(is) saved as real income increases." [10] The conflicting evidence obtained from the empirical investigations following the General Theory stimulated the formulation of more complex hypotheses concerning savings-income relationship. Of these, two deserve special mention: Friedman's 'permanent income' hypothesis [11] and Duesenberry's 'relative income' hypothesis [12]. According to Friedman, permanent consumption is a constant factor k of permanent income, given the

rate of interest, non-human wealth-income ratio and consumer preferences. Declining fertility may raise the value of k if it generates a tendency for the accumulation of non-human capital to replace that in the form of children as a way of achieving security for old age. This change is highly probable but would be realized, as Friedman himself mentions, in the long run when there is a change in the basic attitude towards inter-dependence between parents and children and, in the context of LDC's, a rise in income of a magnitude large enough to permit accumulation for old age. In the short run, two forces may work strongly to prevent the rise of savings rate with per capita income. First, the bulk of the people in LDC's are living at or below the subsistence level so that the demands for adequate nutrition, housing, schooling for children would constitute too pressing and heavy a charge on additional income to leave any perceptible margin for the rise in savings proportions. Secondly, the growing inter-communication among different countries as well as that between rural and urban areas within LDC's lends substance to Duesenberry's demonstration effect which would retard a rise in the marginal propensity to save above the average savings rate even among the relatively well-to-do.

Recently Leff has mobilized another demographic variable viz. dependency ratio to reinforce the per capita income hypothesis.[7] Children constitute a heavy charge for expenditure and because they do not contribute to production, a high ratio of children to the working age population imposes a constraint on a society's potential for savings.[7] It has already been noted that a given increase in child-population ratio implies a much smaller rise in relative dependency burden (measured in terms of ratio between standard consumer and producer units). As we proceed further with the analysis of the distributional pattern of income and savings, we will notice that the cut into savings potential gets further diluted and may turn out to be negligible.

Lewis finds that inter-country differences in savings behavior can be explained mainly by the classical savings function.[13] Thus he observes: "Practically all saving is done by people who receive profits. Workers' savings are very small. The middle classes save a little, but in practically every community the savings of the middle classes out of their salaries are of little consequence for productive investment. Most members of the middle class are engaged in the perpetual struggle to keep up with the Jones's; if they manage to save enough to buy the house in which they live, they are doing well ... Insurance is the middle class's favorite form of saving in the modern society, yet in the United Kingdom where the habit is extremely well-developed, the annual net increase in insurance from all classes, rich, middle and poor, is less than 1½% of the national income. It is doubtful if the wage and salary classes ever anywhere save as much as 3% of the national income, net (possible exception: Japan)."

The empirical counterpart of the classical savings function may be easily observed in the concentration of savings in the top income brackets. Per capita income in LDC's is too low to leave any margin for saving. Nearly all LDC's have positive rates of saving, nevertheless, which by implication are accounted for by a small fraction of the population. As Kuznets observes, even the top 5% in the under-developed countries may find it hard to save since their per capita income is no higher than the country-wide average income in the developed countries, but the very peak among them may have "a high enough absolute income to warrant a fairly high savings proportion." [14] His observation is well illustrated by the data from an Indian Survey. [15] About 9% of urban households report any savings at all; of these the top 1.5% save on an average over one-third of their income and account for three-fourths of all urban household savings.

Given the fact, that the savings behavior in the real world, and more particularly in the LDC's corresponds to the classical savings function, there are at least three reasons why variations in fertility may make no perceptible difference to savings rate in the economy:

(1) Evidence has accumulated to show that people in the top income brackets already have low fertility and the burden of child dependency among them is not likely to be affected much by variations in fertility at the national level.

(2) Even if they bear fertility and child dependency at the same level as the national average, the cut into savings potential implied therein would be limited because the expenditure linked to size of family on account of physical needs and conventions forms a comparatively small fraction of their total income. A very high income level relative to the average level for the country as a whole gives them proportionately large discretionary amounts which they can dispose of in whatever way they choose. If we assume that the family size - linked expenditure accounts for half of their total income, 8% increase in dependency burden (implied in the assumption of constant fertility relative to that with fertility declining linearly by 50% between 1966 and 1981) would raise expenditure by an amount equal to 40% of their total income and 8% of the residual part or the discretionary amount. Since the latter constitutes the source of savings, this also implies (under the assumption of constant propensity to save out of the discretionary amount) 8% cut into the savings potential. In other words, under the assumption of 50-50 proportions of family-linked necessary expenditure and discretionary expenditure, a given percentage increase in dependency burden implies an equivalent reduction in the savings potential. We have noted the rate of saving for the top income bracket to be 33% which works out at roughly two-thirds of the discretionary amount (under the assumption of 50-50 proportions of family-linked and discretionary expenditure), a very optimistic estimate of their average propensity to save, indeed. To take a more realistic assumption regarding the proportion saved out of the discretionary amount, say 50%, the latter (given 33% savings-income ratio) would form two-thirds and the family-linked expenditure only one-third of the total income. Eight per cent rise in dependency burden would then raise expenditure by 2.67% of income ($8\% \times 1/3$) and imply only 4% cut into the savings potential.

(3) The fall in the rate of saving would be even lower if we allow for

the offsets generated by the parents' propensity to accumulate assets for their children to give them a comfortable start in their career.[16]

Savings in the Government Sector

Our discussion so far suggests that fertility decline per se is not likely to make a perceptible difference to household savings. We may now consider savings in the corporate and the government sectors. Corporate savings account for a minor fraction, about 5%, of all savings and are insensitive to population growth except in so far as they are inter-substitutable for household savings. Again, savings in the government sector accounted for only 14% of national savings in 1961 and about 16% in 1968-69, but the proportion is projected to rise to about 34% by the end of the Fourth Five Year Plan. It is pointed out that a drop in fertility will reduce the claims of two important items viz. education and health on government revenues and release more funds for direct growth outlays. Outlays on education are mainly affected by differential growth of children 5-14 under alternative fertility assumptions. According to Coale and Hoover projections the number in this age group would be 163 million under the assumption of constant fertility and 135 million if fertility declines linearly to half its present level by 1981. Assuming a target of 100% enrollment in this age group - evidently ambitious when compared with less than 60% enrollment in 1967-68 - the drop in fertility by 50% would reduce the required number of seats in schools by about 17% and, given the same expenditure per child in school, imply a saving of about 17% on educational outlays. Government expenditure amounted to Rs. 239 crores on primary schools and 149 crores on secondary schools in 1967-68. Assuming half of the latter is also spent on children in primary and middle classes, the total outlay on

education for children 6-14 works out at 314 crores or about 4% of public expenditure. With the present level of school expenditure per child, the amount required under the constant fertility assumption in 1981 would be 785 crores implying an increase of about 6% per annum. If the increase of 8 to 9% per annum in all outlays on public account as experienced during the period of the plans, is sustained over time even an annual increase of 2 to 3% in average school expenditure per child would maintain a constant ratio of 4% between aggregate outlay on schools and public expenditure. (The quality of school expenditure could also be substantially improved by reshuffling of public expenditure between higher and primary level education). Fertility reduction/would thus release a mere .68% of public revenues (or .25% of national income) for accumulation of non-human stock.

Public expenditure on medical and health services amounted to Rs. 227 crores in 1967-68 or about 3% of all outlays on government account. Since maternity and child care account for but a minor fraction of expenditure on this account, expenditure on health may be taken as geared to total population. The projected population in 1981 with 50% decline in fertility would be 11% lower than that under constant fertility; the resources set free (with constant fraction of public expenditure devoted to health services) on account of comparatively lower demands on health services in the former case would be only .33% of government revenues or less than .1% of national income. It may be mentioned in parentheses that if the increase in public outlay is sustained at the same level as in the past, here again 5 to 6% increase in health expenditure per person would leave the proportion of public revenues spent on this account more or less unchanged. It is thus evident that savings on education and health outlays with fertility decline are not going to release much more than 1% of public revenues or .3% of national income for directly productive outlays.

The Indian Experience

The average savings rate in the Indian economy rose from around 5% in 1950-51 to over 8% in 1960-61 and 10.5% in 1965-66. It slipped down to 8% by 1967-68 but has since begun to look up. The rise in savings in the first three plans was contributed by additional taxation and growing budgetary surpluses as well as by increase in individual and corporate savings stimulated by rising incomes, new investment opportunities thrown up by the plan, a complex of institutions established for mobilizing deposits and above all some change in the outlook of the people in the new set-up. If we recall that the progress made in implementing all these measures during the fifteen years period was far from optimal, we would be readily convinced of the feasibility of much higher savings targets in the years to come.

Alternative Model and Contrast in Substantive Findings

Our analysis shows that the bulk of savings are accounted for by a small fraction of the total population and these are least likely to be influenced by changes in fertility and per capita income at the national level. What is needed to step up the rate of savings is an appropriate set of economic policies and institutions that capture an adequate fraction of additional income for investment. In symbolic terms, the model for the growth of saving may then be stated as follows:

$$S_t = S_0 (1 + \alpha \beta)^t \quad (3)$$

where S is aggregate savings, α is marginal savings coefficient and β is the output-capital ratio.

The fundamental departure in the above equation from Coale and Hoover's

model is that α is here the ratio between additional savings and changes in total income, whereas the latter relate it to changes in per capita income. Increase in the rate of savings and growth of national income, therefore, remain unaffected in our model by alternative rates of population growth. This does not imply that high rates of population growth do not involve economic sacrifices. Given a certain increase in national income and in aggregative consumption, the higher the rate of population growth, the smaller would be the rate of increase in per capita consumption and it is this which measures the inevitable cost of rapid population growth.

Equation (4) below shows how proportionate change in per capita consumption is related to the marginal savings coefficient and the rate of population growth, given the output-capital ratio and the initial rate of saving.

$$\frac{\Delta c}{c} = \frac{s_0[(1 + \alpha \beta)^t - 1] \left[\frac{1}{\alpha} - 1 \right]}{1 - s_0} \cdot [(1 + r)^t - 1] \quad (4)$$

where c is per capita consumption, r is rate of population growth, s_0 is the rate of saving in the initial period and α and β are the same as in equation (3).

It is evident that for large values of $\frac{1}{\alpha}$, $\alpha \cdot \beta$ and r are the dominant terms in the equation. r has a biologically set upper limit. On the other hand, it is the very essence of the growth strategy to keep $\alpha \cdot \beta$ greater than r . Consequently, in the long run, the influence of $\alpha \cdot \beta$ would progressively outweigh that of r . In the limit the rate of increase in aggregative consumption would equal $\alpha \cdot \beta$ and the difference in the rise in per capita consumption would be reduced to that between high and low rates of population growth. Evidently, the higher the value of $\alpha \cdot \beta$, the narrower

would be the relative differential in growth rates of consumption levels caused by alternative rates of population growth.

Apart from the basic difference in the nature of α , there are two formal differences in our model and that which underlies Coale and Hoover economic projections. First, unlike Coale and Hoover model, ours is not constrained by initial conditions. However low the initial rate of saving and/or high the rate of population growth, the process of economic development gets initiated and is sustained over time, given appropriate values of the parameters α and β . This does not mean that initial conditions are totally irrelevant. If they are extremely unfavorable, they would inevitably involve serious though not insuperable policy implications. Secondly, the model used here does not involve the asymmetry of Coale and Hoover type of analysis. A relatively high rate of population growth retards the rise in per capita consumption in a growing economy. In the declining phase, however, it speeds up the pace of deceleration, as conventionally expected, in our model but slows it down in the other model.

We now turn to the differences in substantive results which may be seen more clearly from the numerical calculations given below.

Table 1

$$s_0 = .09, \delta = .33$$

		Period			
		5	10	20	
(1)	Rate of saving	$\alpha = .33$	12.6	16.6	24.2
			$\alpha = .165$	10.0	11.5
(2)	Annual rise in per capita consumption ($r = .025$)	$\alpha = .33$	0.0	1.1	4.2
			$\alpha = .165$	0.4	0.8
(3)	Annual rise in capita consumption ($r = .0125$)	$\alpha = .33$	0.75	2.35	5.45
			$\alpha = .165$	1.65	2.05
(4)	$\frac{(3) - (2)}{(3)}$	$\alpha = .33$	1	.53	.23
	$\frac{(3) - (2)}{(3)}$	$\alpha = .165$.76	.61	.49

Note: All results relate to the mid-point of the quinquennium preceding the indicated period.

It is interesting to note that a higher marginal rate of saving not only increases the rate of saving but also accelerates the annual rise in per capita consumption after five years. What is still more interesting for the present purpose is that the proportionate differentials in the rate of increase in per capita consumption under alternative rates of population growth decline with time. This is in significant contrast to the trend of progressively widening differentials brought out by Coale and Hoover economic projections. Another difference of still greater significance is that the relative consumption differentials decline faster with a higher value of α in our analysis but rise even more rapidly under the alternative model. Our result perhaps conforms better to normal expectations. One would expect that with a greater plan effort measured in terms of higher marginal rate of saving and more rapid economic development, the economic handicap imposed by rapid population growth would be felt less severely. Contrary to this, Coale and Hoover economic projections indicate that the relative economic disadvantage of rapid population growth becomes more severe with plans for greater acceleration of the economy.

Attention may be drawn, however, to an important limitation of the model arising out of the assumption of a constant β regardless of the rates of population growth. A higher rate of population growth implies a smaller rise in per capita consumption and to the extent that there is any consumption-productivity linkage, it would lower the value of β . The objection is serious and applicable to both the models discussed in this paper since they make the same assumption about β . The objection, however, becomes weaker with time since there is a progressive rise in per capita consumption even with rapid population growth in the model used by us whereas it is not even sustained in the alternative. The real sore spot of our model, however, lies in the initial period when securing a high α may even cause a temporary absolute fall in per capita consumption. But, as discussed below, it can be overcome by suitably designed economic policies.

Let us not analyze the policy implications of our model if the conditions are unfavorable in the initial period. If initial savings are 9%, and α is .33, national income grows by 3% and by claiming one-third for investment, we leave only 2% for rise in aggregate consumption, which falls short of population growth reckoned at 2.5%. Employment at a given wage-rate is function of wage goods fund, and if this is taken to be identical with the consumption goods fund, there would follow either an increase in unemployment (assuming population and labor force grow at the same rate) or a cut in wage rate or partly an increase

in unemployment and partly a fall in wage rate. In either case, we come up against a clearly unacceptable position viz. absolute fall in workers' consumption. But consumption fund is not identical with wage-goods fund; it comprises both wage and non-wage goods. By altering the composition of the consumption package, substituting more wage for non-wage goods either through change in resource allocation or via foreign trade, one could safeguard workers' consumption and productivity. Of course, it would require soaking the consumption of some non-wage earning classes, particularly the rentier class who still continue to snatch roughly 20% of national income. The problem would be easier to solve if domestic efforts are supplemented by foreign aid in the initial period. But even without that, the period of crisis would be over in less than two years beyond which consumption would grow faster than population permitting a rise in per capita consumption consistent with higher savings targets.

Conclusion:

Our analysis reveals that demographic factors do not play a significant role in determining the rate of savings. First, a given reduction in fertility and child-population ratio implies a much smaller decline in real dependency burden. Second, the bulk of savings are accounted for by the top 1 or 2% of the population who probably have already small families and further that their conventional expenditure linked to size of family forms a relatively small fraction of their income so that the net put into savings potential would be limited even if they bear the fertility and dependency burdens of the rest of the population.

The high consumption pressure in the process of modernization in an underdeveloped economy would render a voluntary rise in savings with per capita income extremely difficult. What is needed to step up the rate of savings is an appropriate set of economic policies and institutions which raise the marginal savings coefficient above the initial rate of savings. If the marginal savings coefficient is related to changes in per capita income, it implies a slower rate of increase in savings and income under the assumption of constant fertility and a progressive widening of differentials in the rate of rise in per capita consumption with time under the alternative assumptions of high and low fertility. If, however, the marginal savings coefficient is related to total income, savings and income goals remain

undisturbed by population growth. What does follow rapid increase in population is greater relative sacrifice of per capita consumption; but in view of the relatively more accelerated growth of income implied in this strategy, there is a progressive absolute rise in the growth of consumption with time. What is of even greater interest in the present context is the progressive narrowing of differentials in the rate of growth of consumption levels with time under the alternative assumptions of high and low rates of population growth.

The discussion is not meant to minimize in any way the role of policies aimed directly at fertility reduction. Smaller family size will improve the nutritional, housing and educational levels and eventually give us a labor force of improved equality. A reduction in birth rate would have a softening effect on plan efforts in many other ways. Unfortunately, however, population control policies cannot deliver the goods in the initial period when rapid growth of population has the most severe impact on the economy. The purpose of our analysis is to point out that if the savings targets are not compromised on account of the persistence of rapid population growth for some time - and why they should be if population growth is by and large savings neutral - we will not only secure accelerated growth of income and consumption but also pay a lower price for high rates of population growth which are likely to stay for some time anyway. The results obtained from the numerical exercise in the paper are meant to be illustrative rather than predictive or prescriptive. They illustrate the economic implications of population growth in terms of a particular growth strategy. A discussion of policies and institutional changes needed to implement this strategy lies beyond the limits of this paper.

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X. 01

The Working Life Table of the Economically Active
Males in India and Madhya Pradesh
—A Comparative Study

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THE WORKING LIFE TABLE OF THE ECONOMICALLY
ACTIVE MALES IN INDIA AND MADHYA PRADESH-
A COMPARATIVE STUDY

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THE WORKING LIFE TABLE OF THE ECONOMICALLY
ACTIVE MALES IN INDIA AND MADHYA PRADESH -
A COMPARATIVE PICTURE
By S.N. Bagchi*

One way of interpreting the data on economically active population is to calculate what they imply in terms of the average length of working life of a generation. This technique has provided not only an important tool for measuring the average length of working life but also for showing the pattern of entrance to and exit from labour force activity. These tables of economically active life represent the life cycle of economic activity in hypothetical cohorts, that is, generations subject at each period of their lives to given rates of mortality and of participation in economic activities. They are useful in studying the process of growth and structural change of the labour force, estimating such quantities as life time expectation of earnings, evaluating returns from investments in human capital, assessing economic implications of changes in activity rates and age structure of the population etc.

2. An attempt has been made in this paper to construct and compare the tables of economically active life for males relating to India and Madhya Pradesh using 1961 census data on economic activity. The basic material needed for the construction of these tables are the age specific activity rates derived from the census together with a life table representing contemporary conditions of mortality in the population. Specific activity rates from the 1961 Indian Census data are available in respect of only the broad age groups 0-14, 15-34, 35-59 and 60+. "But activity rates for age groups at least upto seventy five years are needed for satisfactory calculations of the tables of economically

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active life,"¹ Since five yearly age classification is available in the 1961 Indian Census upto the age group 70 and above,² quinquennial participation rates have been estimated upto age 70 and above as illustrated in the methodological discussion below. In so far as life tables are concerned, the latest official Indian life tables relates to the period 1951-61³ while the estimates of life table functions l_x and L_x are required for the year 1961. Moreover, the official life tables available for regions below the country level correspond to the census zones. Fortunately, some useful clues are provided in the Report of the Expert Committee on Population Projection⁴, which have been adopted with suitable modifications. Since, main emphasis of this paper is on the construction of working life tables, the estimation procedure is explained hereinafter in discussion on methodology.

Methodological discussion.

Adjustment for age specific participation rates:-

3. In estimating the participation rate relating to the age group 10-14, it was assumed that children reported to be workers in the age group 0-14, belong mostly to the age group 10-14. For rates of participation in subsequent age groups, the results contained in the National Sample Survey*, Government of India - Reports⁵ No. 114 and 103 on the study of labour force participation in the rural and urban areas respectively, have been used.

4. At the outset, 1961 male population in five yearly age groups for the country as a whole was obtained from the age tables - Census of India Paper No. 2- 1963 for rural and urban areas separately. The number of rural and urban workers were then

* The NSS sixteenth Round Survey was conducted during July, 1960 - June 1961 and hence the survey period may be considered to broadly coincide with the period of 1961 Census operation. Comparison of the distribution by age groups as obtained from NSS with that of the 1961 Census, was, therefore, relevant after suitable adjustment of the concept of labour force. The age groups adopted for the tabulation purposes in the Census and NSS being the same, comparison became all the more meaningful.

estimated by applying the quinquennial age specific participation rates in 1961 as given in the afore mentioned N.S.S. reports. In estimating the urban workers, age-specific labour force participation rates as provided in the N.S.S. urban report, were converted into working force participation rates by adjusting for the unemployeds in different age groups on the basis of information contained in that report.

5. The rural and urban workers thus worked out, were then combined for individual age groups 15-19 to 50-59. First estimates of the age specific participation rates were obtained by working out the ratios of these workers (rural + urban) to total population in the corresponding age groups. The participation rate relating to age 30-39 was then split up into age groups 30-34 and 35-39 by simple interpolation techniques and adjustment by prorating to match the actual number of workers in the age group 30-39.

6. As a subsequent step the participation rates corresponding to the broad age groups 15-34 and 35-39 were worked out. The number of workers in these broad age groups were then prorated to conform to the actual number of workers as given in the census reports, thus adjusting the distribution of workers in the constituting age groups.

7. The working force participation rates relating to the different age groups as well as broad age groups were then recomputed on the basis of the adjusted distribution of workers. The adjusted male participation rates for the country as a whole, estimated in the above manner, are given in col.(2) of the table below:-

Table 1

Estimates male participation rates; 1961-
India and Madhya Pradesh.

Age group	Estimated male participation rates-India 1961	Estimated Male participation rates - M.P. 1961
1	2	3
10-14	33.16	45.03
15-19	68.76	80.30
20-24	88.97	93.72
25-29	96.89	93.29

Table 1 Contd....

Table. 1 Continued....

1	2	3
30-34	98.97	99.99
15-34	88.08	93.14
35-39	99.33	99.53
40-44	98.06	98.66
45-49	96.24	97.39
50-54	94.09	95.86
55-59	92.12	94.44
35-59	96.68	97.70

8. The quinquennial age specific participation rates for the country as a whole, thus worked out, were then used as standards in order to estimate similar rates for Madhya Pradesh. First of all the ratio of broad age specific participation rates for age 15-34 of M.P. males to the corresponding rate of Indian males was obtained. The India specific rates for age groups 15-19, 20-24, 25-29 and 30-34 were then multiplied by this ratio to obtain the first estimates of the age specific participation rates of M.P. males for these ages. Next, the ratio of non participation rate in the broad age group 15-34 (percent-age of non-workers to total population) of M.P. males to the corresponding rate of Indian males was worked out and applied to the non-participation rates of Indian males in age group 15-19, 20-24, 25-29 and 30-34 in order to obtain the first estimates of age specific non-participation rates of M.P. males for these ages. The first estimates of participation and non-participation rates of M.P. males, thus worked out, were then added up. The preliminary estimates of participation rates were divided by the sum of participation and non-participation rates against that age group and multiplied by 100.00 to provide the revised rates of worker participation in these age groups. These revised rates were finally prorated so as to conform to the actual number of workers. The age specific rates of participation of M.P. males corresponding to age 35-39, 40-44, 45-49, 50-54 and 55-59 were also worked out in a similar manner using the broad age participation and non-participation rates in age groups 35-59 of M.P. and Indian, males as elaborated above. The rates of participation for M.P. males; thus estimated, are given in col. (3) of the table 1 above.

9. In estimating participation rates for ages 60-64, 65-69 and 70+, both the Indian and M.P. rates relating to broad age 60+ were split up in exactly similar fashion with the help of 1960 U.A.R. (United Arab Republic) male participation rates as standards and then prorated so as to match the actual number of workers in the broad age 60+. Use of U.A.R. data, though somewhat arbitrary, appears justified in view of similarity in the value and trend of the schedule of participation rates of U.A.R. and India. The U.A.R. data, taken to be standard as well as the estimated participation rates for Indian and M.P. males relating to extreme ages above 60 years, are given in the next table.

Table 2.

Estimation of participation rates in extreme ages
60+ -India and Madhya Pradesh 1961

Age group	UAR male participation rate, 1960	Estimated male participation rate 1961	
		India	Madhya Pradesh
1	2	3	4
60-64	85.2	87.88	90.13
65-69	74.3	77.50	81.27
70+	58.5	60.75	66.10
80+	73.6	76.60	80.52

Estimation of liave table functions:

10. For estimating the life table functions L_x and l_x relating to the year 1961, the values of these functions from available life tables for males 1951-60 (assumed to correspond to the period 1955.5) were suitably projected with the help of the United Nations model life tables. Estimation procedure is detailed below.

11. India :- In accordance with the assumption made by the Expert Committee set up by the Planning Commission, Government of India⁶, a 0.9 years's annual increase in expectation of life at birth (e_0^o) has been assumed in this paper also during the period 1955-1961. According to this assumption, e_0^o for Indian males should have advanced from 41.9 years in 1951-60 to 46.9 years in 1961. In Appendix table IV of the United Nations Manual III on Methods for population Projections by sex and Age⁷, the male e_8^o values, viz., 46.9 years and 41.9 years correspond to mortality levels 56.121 and 45.494 respectively, the ratio of these levels being 1.2336. Next, 1951-60 values of L_x (males) from the available Indian life table for the quinquennial age groups 0-4, 5-9 and so on upto 85+ were physically traced down in the U.N. model life table referred to above and their mortality levels were determined separately by interpolation. These levels of mortality were then multiplied by 1.2336 to provide estimate of mortality levels relating to L_x (1961) for the different age groups. With mortality levels thus estimated, the values of L_x corresponding to these mortality levels were worked out by interpolation from the U.N. model life tables. For example, value of L_x for the age group 0-4 from life table 1951-60 is 407954 which corresponds to a mortality level of 51.7 in the model life table against that age group. Applying the ratio of 1.2336 to this, the mortality level for 1961 is advanced to 63.8 which provides a value of L_x of 426013 by simple interpolation. The sum total of L_x values thus estimated, provided a T_x value of 4676390 (i.e. $e_0^o = 46.76$) which was not significantly different from the assumed 1961 $e_0^o = 46.9$ years. Therefore, these estimates of L_x were accepted.

12. Exactly similar procedure was adopted for the estimation of l_x values using Appendix table III of the U.N. Manual.

Madhya Pradesh :- The 1951-60 life table relating to Central Zone was assumed to represent approximately the mortality conditions prevailing in Madhya Pradesh also. As per assumption of the Expert Committee on Population Projections, 1961 e_0^o

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for M.P. males was 46.2 years (41.2 yrs. in 1951-60+ 0.9 x 5.5), while the 1951-60 value of e_0^o relating to Central Zone was 39.8 years. In the United Nations Manual, table No. IV, these e_0^o values correspond to mortality levels 54.627 and 41.082 respectively their ratio being 1.3297. Subsequent steps were similar to those outlined above in the discussion of the case of India. This method provided a Tx value = 4606300 (i.e., $e_0^o = 46.06$) which approximated the assumed value of 46.2 years. Hence, these estimates of LX for the quinquennial age groups relating to 1961 M.P. males, were accepted.

13. Similarly, lx values were worked out corresponding to M.P. males, 1961 using Appendix table III of the same U.N. Manual.

14. The set of lx and Lx values thus estimated for India and Madhya Pradesh, 1961, are given in columns 4 and 6 of the working life tables for India and M.P. respectively, appended to this paper.

15. With the specific participation rates in five yearly age groups as well as the lx and Lx values from representative life tables estimated in the manner described above, it was possible to construct the tables of economically active life for Madhya Pradesh and India. In constructing these tables, the methodology described in Section D - Chapter 1 of the United Nations Manual on "Methods of Analysing Census Data on Economic Activities of the population", has generally been followed. The method has been summarized in Appendix Note 1 to this paper.

16. In the following paragraphs, an attempt has been made to evaluate the trends of and compare the principal indices involved in the abridged tables of economically active life for males relating to India and Madhya Pradesh for the year 1961 which are given as Appendix tables.

Measures of length of active life :-

17. The first measure of average length of economically active years provided in the table is that of expectation of active life, that is to say, the average number of economically active years to be lived per person in the hypothetical cohort at birth and among the survivors at each age. When this is subtracted from the expectation of life at each age, another measure indicating life expectancy beyond the age of retirement from active life, i.e., inactive years, is obtained. These indices for India and Madhya Pradesh are provided in column II and 12 of the respective working life tables.

18. Expectation of life for Madhya Pradesh males was greater than that of the country as a whole at each age from five years onwards. Only at birth, the expectation of life for M.P. males was 46.1 years which was less than the corresponding value for Indian males. Expectation of active life, on the other hand, was greater for M.P. than India not only at each age five years onwards but also at birth, reaching maximum at age 10 for both India and Madhya Pradesh and then decreasing consistently with advancement of age to reach its minimum at age 70. These maximum and minimum values for M.P. were 42.4 and 6.3 respectively as against 40.1 and 5.3 respectively in case of India. As far as expectation of inactive years of life was concerned, M.P. males recorded lower values as compared to their Indian counterparts.

at each age. Both India and Madhya Pradesh recorded a degree in the value of expectation of inactive years from age 0 onwards upto round about age 40 and then displayed an increasing trend in higher age groups. A comparison of their maximum values at age 0 relating to India and Madhya Pradesh reveals that expectation of inactive life at birth was less for M.P. as compared to India inspite of the fact that life expectancy (at birth) of the Indian males was comparatively more.

19. The second measure of length of economically active life is that of average remaining years of active life per economically active person among the survivors of the cohort at each age. Thus, the second measure relates to economically active persons in contrast to the first measure discussed above which corresponds to the population in general. In estimating the second measure, it has been assumed that

(i) all males who entered the labour force at any time in their lives did so prior to the age at which the activity rates reached the maximum, and no survivors retired into inactive status prior to that age.

(ii) the ages at which the individual males retired were independent of the ages at which they entered the labour force and

(iii) the rates of mortality at each age was the same for economically active and inactive males.

20. From a perusal of the col. 13 of the the working life tables it is obvious that average active years per active survivor was for each age^x greater than the first measure which relates to the expectation of active life per person. For example, at age 10, the values of the expectation of active life per survivor for the country as a whole and Madhya Pradesh were 45.8 and 46.5 respectively as against the corresponding values per person measuring 40.1 and 42.4 years respectively. The second measure of active life decreases consistently from age 10 onwards. Also, their values are greater for Madhya Pradesh than the country as a whole at each age.

Labour Force Potential

21. The sum total of col. 7, in the tables of economically active life, which represents the 'Stationary labour force' can be interpreted as indicating the total number of persons year in the labour force which could be experienced by a cohort of 1,00,000 persons under the mortality and labour force conditions of the given year to which they correspond. The labour force potential for M.P. males in 1961 was about 33.26 lakhs which was slightly higher than the corresponding value of approximately 32.22 lakhs for the country as a whole.

Entries into the labour force, retirements, losses
by death and related measures

22. Appendix table IV illustrates the derivation of the components of change in the number of economically active survivors during each age interval, which are reproduced in the tables of economically active life (columns 14, 15, 17 and 19). The method of derivation is explained in Appendix Note on the construction of working life table. In columns 16, 18 and 20, the adjusted estimates of deaths, net entries and net retirements are expressed as age specific rates per 1000 of the economically active stationary population for deaths and retirements, and per 1000 of the inactive stationary population for net entries into active status.

23. Death rates:- As expected, the death rates per 1000 economically active male displayed a uniformly increasing trend from age 10 onwards for both Indian and Madhya Pradesh. But the rates for India and Madhya Pradesh, on mutual comparison at each age, did not show any uniformity in variation of trends. From age 10 upto 10 upto 25, death rates for the country as a whole were greater than the M.P. values. But the trend was reversed between ages 25 to 40. From age 40 onwards, however, mortality rate of the Indian male labour force

appeared to have again exceeded the corresponding values for Madhya Pradesh somewhat significantly. Thus, barring the middle age group 25-40, the rates of mortality for the Indian male labour force were consistently higher than those of the M.P. economically active males.

24. Entry rates: Entry rates were significantly higher for M.P. males in all age group 10-15 to 30-35 as compared to Indian males. This is obvious from a perusal of the column 18 of the respective tables of economically active life. Even at the comparatively young age group 10-15, the M.P. rate was as high as nearly 228 per 1000 inactive males as against only 153 for India as a whole. Entry from inactive to active status appeared to be almost ten per cent in age group 30 - 35 in case of Madhya Pradesh while the rate was only 23.6 per cent relating to the Indian males. For India, the maximum entry rate (about 325 per 1000 in active) was recorded in age group 25-30.

25. Separation rates: While on the one hand, entry into labour force was greater, faster and more complete for M.P. males as compared to the country as a whole, separation from labour force corresponding to M.P. males was comparatively slow at almost all age groups from 40 onwards. Separation from labour force increased with advancement of age reaching maximum at age 70+. The maximum separation rate was about 87 per 1000 active males for India as against nearly 80 per 1000 active for Madhya Pradesh.

26. Combined impact of the rates of entry, separation and death is reflected in the estimated crude rate (for all age groups taken together) of labour force replenishment by entries and its depletion by deaths and retirements. These crude rates have been derived by applying the age specific rates given in Appendix table I and II to the actual economically active and inactive male population in 1961 for India and M.P. against corresponding age groups and summing up the results as illustrated in the Appendix table V. From the totals xx at the foot of the table, the following rates were worked out:

Table - 3

Particular	Annual crude rate per 100 male labour force, 1961	
	India	Madhya Pradesh
1.	2.	3.
Entry	34.56	32.16
Retirement	4.09	3.01
Losses by death	14.47	13.32

27. It is obvious that Madhya Pradesh has recorded lower crude rates as compared to India as a whole, not only in respect of retirement and death, but also relating to entry in spite of larger rates of entry per 1000 inactive males at each age group from 10 - 15 to 35 - 40, discussed in preceding paragraph.

28. Finally, it is of interest to calculate and compare the labour force replacement rates and replacement ratios which may be considered as indices respectively of the potential growth of the labour force and pressure on the labour market. The replacement rate, which could also be interpreted as a sort of natural increase of the labour force, is calculated by subtracting from the annual crude entry rate the sum of the annual crude rates of losses by death and retirements. The replacement ratio, on the other hand, could be taken as an index of pressure on the labour market represented by the demands of entering workers for jobs, in proportion to the number of jobs being vacated by retirement and death. It is defined as the annual number of entries into the labour force per 100 of the sum of retirements and losses by death.

Estimated replacement rates and replacement ratios of male labour force, 1961, as defined above, are reproduced in the following table relating to India and Madhya Pradesh.

Table - 4

Replacement rates and replacement ratios -
male labour force, 1961

Particular	Replacement rate per 1000 labour force	Replacement Ratio
1	2	3
India	16.00	186.25
Madhya Pradesh	15.83	196.93

29. Thus, although replacement rates for Indian and Madhya Pradesh Male labour force were almost identical, the replacement ratio of M.P. male labour force was significantly higher than the corresponding ratio for India. Thus, from economic point of view, particularly in the context of unemployment and under employment, Madhya Pradesh faces a proportionately greater challenge than the country as a whole.

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APPENDIX NOTE A

Construction of tables of economically active life:

The methodology for construction of tables economically active life is explained below with the help of data on 1961 Indian male population. For illustration, reference is invited to the abridged table of economically active life, male population of India - 1961 (appendix table I).

Using quinquennial age specific activity rates (column 2, 2), the specific rates for the beginning age of each interval (column 3) were obtained by simple interpolation, averaging the rates for successive pairs of five years intervals. Columns 4, 6, 8 and 10 provided life table survival functions l_x and L_x , life stationary population T_x and expectation of e_x respectively. Product of columns 4 and 3 gave the measure of economically active survivors at various ages (column 5). Similarly, economically active persons in the stationary population (column 7) were obtained by multiplying columns 6 and 2. The cumulated economically active stationary population (column 9) was derived by adding the values of column 7 at each age upto the end of life.

Measures of the length of active life

By dividing column 9 by column 4, the first measure of expectation of active life, given in column 11, was obtained. The expectation of in active life (column 12) at birth and at each subsequent age was then worked out by subtracting column 11 from column 10. The second measure of length of economically active life was that of average remaining years of active life per economically active person among the survivors of the cohort of each age (column 13). In calculating column 13, for ages above the point of which the specific activity rates reached their maximum (thirtyfive years in the present example), column

9 was merely divided by column 5. At ages below the point of maximal activity rate, a modification of the method was introduced, as illustrated in appendix table III so as to avoid the possibility of exaggeration of the values of average remaining years of active life for the younger ages arising out of the fact that the numbers of economically active survivors at the younger ages would not include persons expected to enter into economic activities later on in life, while the active years of the latter would be included in the cumulated economically active stationary population figures. The activity rates for the younger ages were replaced by "hypothetical activity rates" equal at each age to the maximal rates, as shown in column 2 of the appendix table III. The economically active survivors at each age (column 6 of appendix table III) were obtained by multiplying its column 2 with column 4. Similarly, economically active stationary population in each age interval (column 1 of appendix table III) was obtained by multiplying its column 2 by column 8). Column 12 of the appendix table III provided cumulated economically active stationary population above each age. Average remaining active years per active survivor (column 14 of appendix table III) were then computed for each age, by dividing column 12 by column - 6 of the same table. Values in column 14, thus worked out, were then transferred to column 13 of appendix table I against relevant age groups.

Entries into the labour force, retirement, losses by death and related measures:

Derivation of the components of change in number of economically active survivors during each age interval for the country average, is illustrated in appendix table IV, column 14 of the appendix table I was derived by taking the difference between the figures for successive ages in column 5 of the same table. The life tables mortality rate given in column 2 of the appendix table IV, represented the age to age difference in number of survivors (l_x) expressed as quotient of the stationary population in the age interval (L_x). By applying this act of mortality rates to column 5 of the table I, the first estimate of deaths (column 4 of appendix table IV) was obtained. Net entry or retirement rate for each age interval (column 8 - appendix table IV), related to the differences between the specific activity rates for successive age (column 3 of appendix table I), The first estimates of the net balance between entries into economic activity and retirements therefrom (column 10 of appendix table IV) was

obtained by applying the rate in its column 8 to column 6 of appendix table I.

The adjustment of the first estimates were made on a pro-rata basis, so that the sums (with due regard to sign) of the numbers of deaths and net entries or retirements during each age interval, were forced to agree with the corresponding increases or decreases in the number of economically active survivors during the age interval (column 14 of appendix table I), and the adjusted estimates were inserted in column 6 and 12 of the appendix table IV. These adjusted estimates in columns 6 and 12 of table IV were subsequently transferred to columns 15, 17 and 19 of appendix table I. In columns 16, 18 and 20 of the appendix table I the adjusted estimates of deaths, net entries, and net retirements were expressed as age specific rates per 1000 of the economically active stationary population for deaths and net retirements and per 1000 of the inactive stationary population (column 6 minus col. 7 of appendix table I) for net entries into active status.

Estimation of crude rates of replacement of the labour force by entries and its depletion by deaths and retirements - illustrated below in respect of H/Z I under assumption (A):

Applying the death and retirement rates (column 16 and 20) of the appendix table I) to the economically active persons and entry rate (column 18 of the appendix table I) to the inactive population in different age groups corresponding to the actual male population, it was possible to obtain estimated number of annual losses from labour force by death annual retirements from and entries into labour force status in each age group. These estimates are given in column 2, 6 and 4 respectively of the appendix table V. From the sum of these estimates relating to various age groups, annual crude rates (per 1000 of the economically active male population) of entries, retirements and losses by death, were computed in table 3 in the text. Another index namely replacement ratio, defined as annual number of entries into the labour force per 100 of retirements and losses by death taken together, was also worked out and discussed along with these crude rates in table 4 (text).

Note: The above methodology is based on discussed provided in section D. - Chapter I of the United Nations Report on "Methods of Analysing Census Data on Economic Activities of the Population," - United Nations, New York, 1968.

Summary

It is possible to undertake a more objective analysis of the data on working force of a country with the help of tables of economically active life. These tables provide information not only on the length of active life of the population but also on the pattern of entry into and exit from the labour force. In the opening section, this paper has attempted construction of such tables of economically active life regarding the male labour force of India and Madhya Pradesh corresponding to the year 1961. The various methodological aspects and estimation procedure have been explained and with the help of the principal indices worked out in the tables, comparison of the working force behaviour between Indian and Madhya Pradesh male workers in 1961 has been briefly attempted in the ~~xxx~~ concluding section.

References

1. United Nations, "Methods of Analysing Census Data on Economic Activities of the Population" - (New York - United Nations, 1968) - pp.22.
2. Registrar General, Government of India, - 1961 Census Report Part II C - Table C-II relating to each State.
3. Registrar General, Government of India - 1961 Census - "Life Tables, 1951-60".
4. Registrar General, Government of India, Report on the Population Projections Worked out under the Guidance of the Expert Committee set up by the Planning Commission under the Chairmanship of the Registrar General of India" - July, 1968.
5. The National Sample Survey, Government of India, Sixteenth Round: July 1960 - June 1961, Reports No.114 and 103 - "Tables with Notes on Employment and Unemployment in Rural - Urban Areas".

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6. Please See Reference No.4 above.
7. United Nations, Manual III on Methods for Population Projections by Sex and Age" - Appendix table IV (New York, United Nations).
8. Please see Reference No.4.
9. Please see reference No.1.

Appendix table I

ABRIDGED TABLES OF ECONOMICALLY ACTIVE LIFE,
Males POPULATION, INDIA, 1951

Age interval	Specific Activity Rates		Survivors at age x of 100000 born alive		Stationary population in age interval	
	In age interval	at beginning age(x)	Total (lx)	Economically active (4x3)	Total (Lx)	Economically active (6x2)
1	2	3	4	5	6	7
0-	-	-	100000	-	426013	432532
10-15	33.15	-	80440	-	395310	132577
15-20	68.75	50.95	79303	40413	392657	270018
20-25	68.97	78.87	77775	61341	385728	343182
25-30	95.89	92.93	76387	70935	377576	355930
30-35	93.57	97.93	74377	72837	365195	352424
35-40	99.33	99.15	71745	71135	348040	345708
40-45	98.03	98.70	67280	66405	322253	316001
45-50	97.24	97.13	61503	59750	291211	280261
50-55	94.09	95.17	56911	52259	256353	241212
55-60	92.12	93.11	47379	44115	215993	199564
60-65	87.88	90.00	38919	35045	172864	151913
65-70	77.50	82.69	30185	24950	125707	99748
70+	60.75	69.13	21559	14904	127465	113904

Age interval	Cumulated Stationary population in ages x-x		Expectation of life at age x		
	Total (2x)	Economically active	Total years ex(8+4)	Economically active years (9+4)	Inactive years (10-11)
1	8	9	10	11	12
0-	4676390	3221842	46.3	32.2	14.5
10-15	3945024	3221842	47.8	40.1	7.7
15-20	3445214	3009265	43.4	39.0	4.4
20-25	3052517	2819247	39.2	35.2	3.0
25-30	2656739	2476055	34.9	32.4	2.5
30-35	2239113	2110135	30.8	28.4	2.4
35-40	1822917	1747711	26.8	24.4	2.4
40-45	1574877	1402003	23.4	20.8	2.5
45-50	1252624	1035002	20.4	17.7	2.7
50-55	951413	803741	17.5	14.7	2.8
55-60	705030	564529	14.9	11.9	3.0
60-65	489057	165565	12.6	9.4	3.2
65-70	315203	21352	10.5	7.1	3.4
70+	187495	113904	8.7	5.3	3.4

Appendix Table II.

**ABRIDGED TABLE OF ECONOMICALLY ACTIVE LIME,
MALE POPULATION, MALAYA PENINSULA, 1961.**

Age interval	Specific Activity Rates		Survivors at age x of 100000 born alive		Stationary population in age interval	
	in age interval	at beginning age (x)	Total (Lx)	Economically active (Lx ₁)	Total (Lx)	Economically active (Lx ₁)
1	2	3	4	5	6	7
0-	-	-	100000	-	414447	-
10-15	45.03	-	78471	-	398382	175879
15-20	60.30	62.67	77546	48553	384546	305750
20-25	93.72	87.01	76188	66291	377952	354217
25-30	98.28	95.01	74882	71884	369337	353316
30-35	99.99	99.14	72704	72079	356342	355305
35-40	99.54	99.78	69622	69525	328157	333767
40-45	98.65	98.10	65307	64719	313191	303994
45-50	97.39	98.02	59834	58653	291995	276533
50-55	95.88	95.63	53641	51833	258825	240249
55-60	94.44	95.15	46462	44152	218850	201127
60-65	90.13	92.29	38438	35639	173489	155473
65-70	81.27	85.70	30467	26110	132284	107507
70 +	68.10	73.69	22518	16394	81350	44163

Age interval	Cumulated Stationary Population in age x - ∞		Expectation of lifetime at age x		
	Total (ΣLx)	Economically Active	Total years ex(Σ+4)	Economically out-living years (Σ+4)	Inertive years (10-11)
1	2	3	4	5	6
0-	4608300	3323371	45.1	33.3	12.8
10-15	3726510	3323371	43.4	42.4	6.0
15-20	3409555	3150452	41.9	40.3	3.3
20-25	3021410	2841702	39.7	37.3	2.4
25-30	2643458	2487483	35.3	35.2	2.1
30-35	2273821	2124169	31.3	29.2	2.1
35-40	1917479	1767853	27.3	25.4	2.1
40-45	1579122	1431095	24.1	21.0	2.3
45-50	1265931	1122102	21.2	18.8	2.4
50-55	981936	845519	18.3	15.8	2.5
55-60	731311	605270	15.8	12.0	2.8
60-65	518343	404143	13.4	10.3	2.9
65-70	345844	248670	11.4	8.2	2.8
70 +	213560	141163	9.5	6.3	2.8

Age interval	Average active years per active survivors of age X+	Components of annual change in economically active persons during age interval	
		Net increase (+) or decrease (-)	Deaths of active persons Rate per 1000 active (19-7)
		18	19
0-	-	-	-
10-15	46.5	+48558	418
15-20	42.0	+517683	1084
20-25	37.7	+5323	1232
25-30	33.4	+ 135	2275
30-35	29.1	+ 2584	2953
35-40	25.4	+ 4205	4280
40-45	21.1	+ 6254	5195
45-50	16.1	+ 5822	6022
50-55	10.3	-7881	6253
55-60	13.7	- 8491	7283
60-65	11.3	- 2549	7252
65-70	9.5	- 2516	6379
70+	8.5	-18524	3323

Age interval	Components of annual change in economically active persons during age interval.	
	Net entries into economic activity Rate per 1000 in-active	Net retirements into inactive States Rate per 1000 active (19-7)
	18	19
0-	-	-
10-15	+49015	222.10
15-20	+18787	247.69
20-25	+ 6315	287.87
25-30	+ 2480	309.18
30-35	+ 419	3
35-40	-	-448
40-45	-	-869
45-50	-	-794
50-55	-	-742
55-60	-	-1210
60-65	-	-2353
65-70	-	-2427
70+	-	-1265

+ Upto age 35.40 refer to appendix table III.

* Please refer to appendix table II.

@ represents actual and present entry.

Age interval	Average active years per active survivors of age x+	Components of annual change in economically active persons during age interval		
		Net increase (+) or decrease (-)	Deaths of active persons Number*	Rate per 1000 active (15-7)
		13	14	15
0-	-	-	-	-
10-15	45.8	+40413	377	2.84
15-20	41.4	+20928	1053	3.96
20-25	37.2	+7545	1239	3.61
25-30	32.8	+ 1851	1959	5.38
30-35	28.6	- 1702	2591	7.15
35-40	24.6	- 4730	4410	12.75
40-45	21.1	- 6855	5613	17.83
45-50	18.2	- 7491	8339	22.82
50-55	15.4	- 2144	7088	25.36
55-60	12.8	- 3070	7734	29.87
60-65	10.4	-10085	7591	41.97
65-70	8.6	-10056	6606	60.23
70+	7.6	-14964	5002	43.91

Age interval	Components of annual change in economically active persons during age interval			
	Net entries into economic activity		Net retirements into inactivity	
	Number*	Rate per 1000 inactive	Number*	Rate per 1000 active
	17	18	19	20
0-	+	+	+	+
10-15	+40730	152.64	+	+
15-20	+ 21951	172.71	+	+
20-25	+ 10884	85.62	+	+
25-30	+ 3220	25.22	+	+
30-35	+ 869	23.68	+	+
35-40	-	+	-312	0.90
40-45	-	+	-1020	3.23
45-50	-	+	-1132	4.11
50-55	-	+	-1056	4.36
55-60	-	+	-1446	6.71
60-65	-	+	-2694	10.42
65-70	-	+	-3490	14.58
70+	-	+	-4802	24.51

* Up to age 35-40 refer to appendix table III
 * Please refer to appendix table IV

Appendix table III

CALCULATION OF AVERAGE REMAINING YEARS OF ACTIVE LIFE
FOR ECONOMICALLY ACTIVE SURVIVORS AT AGES UNDER 35
INDIA, MALE POPULATION, 1961

Age interval	Hypothetical mortality rates		Survivors at age x of 100000 born alive		Economically active	
			Total (lx)			
	India	M.P.	India	M.P.	India	M.P.
1	2	3	4	5	6	7
10-15	99.15	99.76	80440	76471	79755	78283
15-20	99.15	99.76	79103	77546	78629	77360
20-25	99.15	99.76	77719	76188	77114	76005
25-30	99.15	99.76	76387	74882	75718	74702
30-35	99.15	99.76	75077	73604	74745	73330
35-40						

Age interval	Stationary population in age interval			
	Total (Lx)		Economically active	
	India	M.P.	India	M.P.
1	8	9	10	11
10-15	309310	306382	326412	322145
15-20	322657	314545	339399	333823
20-25	337120	327432	352149	347045
25-30	352676	342837	374468	369750
30-35	369151	359142	393083	389487
35-40	386640	376157		

Age interval	Cumulated economically active stationary population in age x to ∞		Average remaining active years per active survivors of age x	
	India	M.P.	India	M.P.
1	12	13	14	15
10-15	3553480	3642411	45.8	46.5
15-20	3257053	3258768	41.4	42.0
20-25	2867703	2869145	37.2	37.7
25-30	2485250	2482100	32.3	32.4
30-35	2119794	2123350	28.6	28.1
35-40	1747711	1767053		

Appendix table IV.

Calculation of components of change in numbers of economically active survivors during 1954-55 year age intervals, based on assumptions as to life, male population, 1957.

Deaths of Economically active persons during age interval

Age interval	Mortality Rate (100000)		First estimate of Deaths		Adjusted estimate of Deaths	
	India	H.P.	India	H.P.	India	H.P.
1	2	3	4	5	6	7
10-15	2.84	2.37	377	417	377	413
15-20	3.83	2.51	1050	1000	1051	1004
20-25	3.50	3.46	1233	1226	1232	1232
25-30	5.12	5.89	1947	2140	1949	2173
30-35	7.19	8.45	2603	3011	2601	2986
35-40	12.81	12.56	4438	4353	4438	4360
40-45	17.81	17.47	5921	5793	5919	5793
45-50	21.84	21.81	6345	6032	6339	6032
50-55	22.33	22.22	7037	6932	7036	6932
55-60	29.63	28.45	7776	7193	7734	7193
60-65	50.54	47.37	7691	7366	7691	7366
65-70	67.09	60.09	6933	6450	6933	6450
70+	114.93	103.44	13097	14024	13097	14024

Age interval	Net entries into economic activity (+) or net retirements (-) during age interval		First estimate of net entries (+) into or retirements (-) from economic activity		Adjusted estimate of net entries (+) into or retirements (-) from economic activity	
	India	H.P.	India	H.P.	India	H.P.
1	2	3	4	5	6	7
10-15	+50.86	+62.87	+40749	+48956	+40750	+48916
15-20	+27.91	+24.24	+21920	+18780	+21921	+18781
20-25	+14.01	+ 9.00	+10847	+ 6803	+10844	+ 6804
25-30	+ 5.00	+ 3.11	+ 3777	+ 2314	+ 3779	+ 2300
30-35	+ 1.22	+ 0.62	+ 891	+ 442	+ 889	+ 442
35-40	- 0.45	- 0.66	- 113	- 447	- 112	- 442
40-45	- 1.55	- 1.07	- 239	- 670	- 150	- 610
45-50	- 1.59	- 1.40	- 1193	- 793	- 1192	- 794
50-55	- 2.06	- 1.48	- 1026	- 742	- 1026	- 742
55-60	- 3.11	- 2.02	- 1243	- 1218	- 1243	- 1210
60-65	- 7.31	- 6.50	- 2027	- 2074	- 2024	- 2031
65-70	-13.53	-12.01	-1441	- 3777	- 1459	- 3747
70+	-28.13	-13.60	-2823	-1474	- 2823	-1474

Appendix table V.

**CALCULATION OF ANNUAL LOSSES FROM ECONOMICALLY ACTIVE
 POPULATION BY AGING AND RETIREMENT AND GAINS BY ENTRIES
 INTO THE INACTIVE BRAG POPULATION, 1957**

Age (years)	Estimated annual losses from eco- nomically active population by death (000)		Estimated annual entries into eco- nomically active population (000)		Estimated annual retirements from economically active population (000)	
	India	H.P.	India	H.P.	India	H.P.
	1	2	3	4	5	6
10-14	24	2	-	-	2517	242
15-19	49	4	-	-	1023	135
20-24	57	4	-	-	509	24
25-29	23	3	-	-	184	10
30-34	114	11	-	-	22	-
35-39	170	12	12	1	-	-
40-44	153	13	12	2	-	-
45-49	209	15	12	2	-	-
50-54	243	15	17	2	-	-
55-59	303	15	22	2	-	-
60-64	246	15	21	5	-	-
65-69	125	7	23	13	-	-
70+	102	5	210	13	-	-
Total	1857	143	519	30	-	-

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**X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT**

X. 02

Variations in Labour Force Participation—An
Inter-Regional Analysis

By

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VARIATIONS IN LABOUR FORCE PARTICIPATION -
AN INTER-REGIONAL ANALYSIS

By M.M. Dadar*
.

1. Manpower is the basic resource of a country. How well a country develops and employs human skills is fundamental in deciding how much it will accomplish.¹ The use of human skill or the level and structure of workers' participation, however, is a function of supply of manpower and the demand for it. The classical postulate that 'wages increase, people work less (and vice-versa)' alone by itself can not explain the supply function of labour. In addition to the remuneration rate, there is an array of factors which influence person's decision to work.

2. The supply of labour force is mainly affected by the population growth and changes in its composition. The demand side includes the factors such as the structure and the level of industrialisation, which in general determine the level of economic development. The process of economic development which creates more demand for labour, has also the effect of reducing its supply inducing the use of labour saving devices and lowering down the workers' participation rate. The present paper attempts to isolate and quantify the sources of variations in labour participation in different states. Both paucity and non-comparability of data in the form of time series have put a restriction on the analysis in favour of cross-section study for the year 1961, where states are taken as observation.

* The author is Reader in Economics at the M.S. University of Baroda. He is grateful to Professor V.N. Kothari and Dr. S.R. Hashim, both of the M.S. University of Baroda, for their helpful comments on the first draft of this paper.

I

3. The labour participation rates (workers as a proportion of population) in different age-groups of different states arranged in descending order of per capita income are presented in Table-1. The last row gives the coefficients of correlation between state per capita income and labour participation rate in different age-groups - 0-14, 15-34, 35-59 and 60 and above. The level of economic development, as it can be seen, is negatively related with work force participation rate in all the age-groups under examination. The existence of large self employing sectors in low income states make it difficult to demarcate the actual workers from dependents. The classification of workers and dependents in the sectors like cultivators, for example, turns out to be a matter of chance. Many of the family members who are in fact dependents get counted as workers giving a spurious rise in labour participation rates. The workers in a high per capita income state, on the other hand, form a distinct class making the number of dependents larger than what it should be in a poor state. Moreover, when income is higher we would expect more children to attend school and fewer to go to work. The support by the young members of a family in rich state would enable the old persons to leave their jobs earlier. The high degree of industrialisation and high standards of productivity in advanced states will also have its effects on labour participation of old people in the sense that it would make extremely difficult for the aged to retain their jobs.

4. As the development takes place, the new employment opportunities are created. This makes people to move from agricultural sector to non-agricultural sector and from rural to urban area. This shifting of population affects the labour participation in two areas differently. It can be seen from the last row of Table-2 that the coefficient of correlation between per capita consumption expenditure per month of rural areas and labour participation in rural areas of different states has turned out to be highly significant at -0.712 . While the coefficient of correlation between the urban per capita consumption expenditure and urban labour participation has been $+0.201$. Although the later coefficient is not significant, the positive relationship between the two variables does indicate that the urban labour participation is not inversely related with levels of economic

Area

II

5. An important question that arises is to what are the factors which make the labour participation vary from state to state. The participation ratio has been found to vary more among cities than in urban areas. The coefficient of variation in labour participation rates for class I cities (cities with population one lakh and above) of different states has been 11.04% as against that of 8.59% in the case of urban areas. Also, the labour participation ratio in urban area is, to a great extent, affected by heterogeneous character of small towns included in it. A small town although prosperous, might suffer from low labour participation due to "its remoteness from job opportunities offered in a large city; another town, equally small but unprosperous, might have a large labour force participation, not because people felt forced to work but because of their nearness to large city where jobs were abundant".² Big cities, on the other hand, provide a fairly high degree of homogeneity. Thus, in what follows, the class I cities are considered to explain the inter-state variations in labour participation rates.

6. Since the work-force participation is affected both by the population growth and changes in its age-sex composition, and by changes in industrial structure, the explanation of inter-state city variations has been attributed to: (i) workforce tendencies created by the factors like differences in industrial structure, employment opportunity, facility for primary and higher education, practices as regards wages and retirement etc., and (ii) age-sex composition of the population. Since the labour force is expressed as a proportion of the population, the labour participation will vary with different age-structure and sex-composition of the population. The lower proportion of men in a state, for example, would make the overall labour participation ratio to be lower than the one with equal population but higher proportion of men. Similarly a state with high proportion of population in the child or old-age group will pull down the labour participation considerably. The inter-state variations in the rates, thus, could be attributed to socio-economic forces and demographic structures.

Table - 1

Per Capita Income and Labour Participation Rates in Different Age-Groups in 1961 - by States.

Sr. No.	State	Per capita income (Rs.)	Labour Participation Ratio				7
			Total	0-14	15-34	35-39	
1	2	3	4	5	6	7	
1.	Maharashtra	479	0.479	0.0872	0.745	0.816	0.49
2.	West Bengal	462	0.332	0.0316	0.514	0.620	0.3
3.	Punjab	441	0.350	0.0597	0.557	0.637	0.4
4.	Gujarat	403	0.411	0.0693	0.672	0.725	0.4
5.	Madras	344	0.456	0.0801	0.666	0.743	0.4
6.	Assam	328	0.438	0.0713	0.715	0.795	0.5
7.	Kerala	326	0.333	0.0207	0.535	0.660	0.3
8.	Mysore	313	0.455	0.1003	0.705	0.783	0.5
9.	Uttar Pradesh	292	0.391	0.0646	0.535	0.675	0.5
10.	Jammu & Kashmir	289	0.428	0.0800	0.661	0.719	0.5
11.	Andhra Pradesh	289	0.519	0.1346	0.776	0.825	0.5
12.	Madhya Pradesh	293	0.523	0.1127	0.813	0.857	0.5
13.	Orissa	278	0.437	0.0945	0.655	0.707	0.4
14.	Rajasthan	272	0.475	0.1223	0.747	0.773	0.4
15.	Bihar	222	0.414	0.1569	0.639	0.733	0.5
	All India	336	0.430	0.0803	0.662	0.738	0.4
	Coefficient of Correlation		-0.349	-0.597	-0.826	-0.273	-0.3

(Critical values of correlation coefficients at 1% and 5% levels of significance are 0.641 and 0.514 respectively).

Source: (1) National Council of Applied Economic Research, Estimates of State Income; July, 1967.

(2) Census of India, 1961 IIB(i), General Economic Tables.

Table 2.

Per Capita Consumption Expenditure and Rural-Urban Labour Participation Rates.

Sr. No.	State	Per Capita Consumption Expenditure Per month in Rs.		Labour Participation ratio	
		Urban	Rural	Urban	Rural
1		2	3	4	5
1.	Assam	37.50	24.00	0.3700	0.4379
2.	West Bengal	35.99	22.81	0.3466	0.3267
3.	Punjab	33.70	31.40	0.3018	0.3617
4.	Maharashtra	32.74	19.13	0.3643	0.5242
5.	Mysore	30.23	21.42	0.3406	0.4876
6.	Gujarat	30.09	23.46	0.2938	0.4496
7.	Rajasthan	29.21	23.17	0.3023	0.5092
8.	Andhra Pradesh	27.93	19.50	0.3599	0.5522
9.	Bihar	27.55	25.51	0.3000	0.4216
10.	Madhya Pradesh	27.44	18.64	0.3494	0.5519
11.	Madras	26.50	18.57	0.3421	0.4963
12.	Uttar Pradesh	25.42	20.11	0.3095	0.4032
13.	Jammu & Kashmir	25.10	23.62	0.3018	0.4531
14.	Kerala	23.65	13.12	0.2956	0.3397
15.	Orissa	21.63	14.54	0.3752	0.4407
All India		29.32	21.44	0.3300	0.4508
Coefficient of Correlation				+0.201	-0.712

Source: (1) H.R. Mukerjee; National Income of India; Trends and structure, p.506. (for Columns 2 and 3).

Original source quoted is NSS Report No.101: Tables with notes on consumer expenditure (preliminary), 16th round, July 1960-August, 1961, Govt. of India, 1962.

(2) Calculated from the data given in Census of India 1961 (IB(i)), General Economic Tables.

7. To isolate the two sources mentioned above, the standardization procedure is followed.³ Column 3 of Table-3 gives the series of standardized labour participation rates which is caused by differences in work force tendencies. The differences in age-sex composition in this series are eliminated by associating the labour participation rates of different age-sex groups in each state with all India age-sex structure as fixed weights. The labour participation rates so calculated, give the rates due to labour force tendencies only. Column 4 of the table, similarly gives another standardized series of labour participation rates which is attributed to age-sex composition of the population. This is so, because the set of all India labour participation (age-sex) is kept constant and considered as fixed weights.

8. It can be seen from the table that there are five states, namely, Assam, West Bengal, Maharashtra, Orissa and Madhya Pradesh which display higher (observed) labour participation rates than the all India average of 33.15%. The high labour participation in Assam and Maharashtra is attributed both to work force tendencies and age-sex composition. The state of Madhya Pradesh show it to be higher only due to work-force tendencies, while in West Bengal and Orissa they have been due to age-sex composition. In the states of Bihar, Madras, Andhra Pradesh and Mysore, although the observed labour participation ratios are lower than the national average, the rates due to work force tendencies are above the national average. It is the age-sex composition of the population which has pulled down the observed rates in these states. This leaves six states, namely, Uttar Pradesh, Punjab, Gujarat, Kerala, Jammu & Kashmir and Rajasthan, with lower labour participation than the national average due to both work force tendency and age-sex composition. Columns 6 and 7 of the table show the extent to which the two sources explain the deviation of the observed labour participation rate (column 5) from the national average. For example, in the case of Assam, the observed labour participation rate is higher by 6.72% than the national average; of this 1.61% is due to work force tendencies and 5.31% due to age-sex composition. (-0.20% of cl. 8 is an unexplained residual - the combined effect of the two. The residual series has not been significant except in the case of Bihar where it is 1.52% lower than the national average.

L%

TABLE 12
Observed and Expected Labour Participation Rates of Class I Cities by States, 1961...

State	Labour Participation Ratio			Deviations of labour participation rates from the National Average			
	Observed	Due to work force tendency	Due to age-sex composition	Observed	Due to work force tendency	Due to age-sex composition	Residual
1	2	3	4	5	6	7	8
Assam	0.3987	0.3476	0.3846	+0.0672	+0.0161	+0.0531	-0.0020
West Bengal	0.3793	0.3143	0.3957	+0.0483	-0.0172	+0.0642	+0.0013
Maharashtra	0.3706	0.3459	0.3557	+0.0391	+0.0144	+0.0242	+0.0005
Orissa	0.3532	0.3200	0.3656	+0.0217	-0.0115	+0.0341	-0.0009
Madhya Pradesh	0.3355	0.3490	0.3185	+0.0040	+0.0175	-0.0130	-0.0005
Bihar	0.3247	0.3430	0.3284	-0.0068	+0.0115	-0.0031	-0.0152
Madras	0.3196	0.3372	0.3132	-0.0119	+0.0057	-0.0183	+0.0007
Andhra Pradesh	0.3179	0.3490	0.2971	-0.0136	+0.0175	-0.0344	+0.0033
Mysore	0.3141	0.3420	0.3024	-0.0174	+0.0105	-0.0291	+0.0012
Uttar Pradesh	0.3046	0.3181	0.3167	-0.0269	-0.0119	-0.0148	+0.0013
Punjab	0.3043	0.3156	0.3196	-0.0272	-0.0159	-0.0119	+0.0006
Gujarat	0.2981	0.3179	0.3116	-0.0334	-0.0136	-0.0199	+0.0001
Kerala	0.2869	0.3181	0.2946	-0.0446	-0.0134	-0.0369	+0.0057
Jammu & Kashmir	0.2857	0.3139	0.3022	-0.0458	-0.0176	-0.0293	+0.0011
Rajasthan	0.2835	0.3162	0.2984	-0.0480	-0.0153	-0.0331	+0.0004
India	0.3315						

We could as well do away with this series by dividing and distributing it equally into the two sources). The total observed difference is, thus, exhausted between the two sources. It should be noted that the positive and negative signs before the figures do not indicate anything about the situation being favourable, or unfavourable. The two sources of variations are isolated taking the national set as given, and there is no reason to believe it to be an ideal set.

III

9. We may conclude that there is a host of factors which influence a person's decision to work. The hypothesis that the labour participation is negatively related with economic development is, to a great extent, true for the work force in different age-groups. As the development takes place there is a tendency of the population to move from rural areas to urban areas. This affects the labour participation in two areas differently. The labour participation in urban area is relatively less affected by the over-enumeration due to self employing sector. The classification of population into workers and dependents in self employing sectors like cultivators in rural areas turns out to be a matter of chance, giving a spurious rise in labour participation rates.

10. The inter-state variations in labour participation rates are wider in cities than in urban areas. These variations are attributable to two sources: work force tendencies reflected in socio-economic factors, and age-sex composition of the population. The age-sex composition of the population pulls down the labour participation in all the states except Assam, West Bengal, Maharashtra and Orissa - states with the observed labour participation higher than the national average. The states where the labour participation has been pulled down both by the work force tendencies and age-sex composition are Uttar Pradesh, Punjab, Gujarat, Kerala, Jammu & Kashmir, and Rajasthan.

Notes and References :

1. United States of America; Manpower Report of the President 1963, p.xil.
2. C.D. Long, The Labour Force under changing Income and Employment (NCER, New York), 1958; p.49.
3. Let S=Sex; i=age-group; l= labour force participation rate - the proportion of the population which is in the labour force; and p= proportion of population in ith age-group to the total population, then the standardized labour participation rate is equal to

$$s=1 \quad i=1 \quad \sum_{i=1}^5 l_{si} p_{si}$$

The two national sets of fixed weights proportion of population and labour participation rate, used in the standardization process are :

Age-Group	Proportion of population to total population		Labour participation ratio	
	Male	Female	Male	Female
0-14	0.19518	0.18091	0.0286	0.0088
15-34	0.21123	0.15397	0.7601	0.1116
35-59	0.12693	0.08317	0.9293	0.1734
60+	0.02239	0.02092	0.5297	0.0854
Age not stated	0.00014	0.00011	0.2732	0.0538

VARIATIONS IN LABOUR FORCE PARTICIPATION -
AN INTER-REGIONAL ANALYSIS

By M.M. Dadi

Summary:

The paper attempts to examine the sources of inter-state differentials in work force participation rates. The inter-state (city) variations in the rates are explained in terms of two sources: work force tendencies and age-sex composition of the population. The study reveals that the labour participation both for overall and for different age-groups is negatively related with levels of economic development. However, the relationship has been positive in the case of urban labour participation and urban economic development. As the development takes place, the population tends to move from rural areas to urban areas; and this affects the labour participation in two areas differently.

The inter-state (city) work force participation rates varied from as high as 39.37% in Assam to as low as 28.35% in Rajasthan in the year 1961. The variations are attributed to (i) work force tendencies reflected in socio-economic factors, and (ii) age-structure and sex composition of the population. The states where the labour participation has been pulled down by the above two sources (which exhaust the total explanation), are Uttar Pradesh, Punjab, Gujarat, Kerala, Jammu & Kashmir, and Rajasthan.

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X DEMOGRAPHIC ASPECTS OF LABOUR SUPPLY AND EMPLOYMENT

X, 03

Census Data and Theoretical Frameworks : the Case
of Female Work Participation

By

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CENSUS DATA AND THEORETICAL FRAMEWORKS
THE CASE OF FEMALE WORK PARTICIPATION

BY

BY VICTOR S. D'SOUZA*

The census data provide a veritable mine of factual information which can be utilised for a variety of studies. However facts become relevant and significant when they are related to a system of theoretical framework or theory. The task of a scientist using census data, therefore is primarily to present these facts within appropriate theoretical frameworks which provide an explanation of the facts. This is an attempt to show how such a theoretical framework can be formulated in respect of facts pertaining to the participation of women in the working force.

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The study of the participation of women in the working force is beset with many difficulties. First of all the problem of measuring the extent of their participation in gainful employment has not yet been solved. Attempts at refining the definition of the working force have affected the measures of female work participation the most as in the rate of female work participation by changes in the definition of the working force apart, there are certain clearly discernible trends about female work participation which are quite puzzling.

A careful examination of the census figures shows that while the rate of male work participation is more or less uniform that of female work participation fluctuates very highly from region to region. The percentage of women workers in the total working force as well as their percentage in the total female population have been declining. Underlying the overall trend there are certain structural features and the changes in these features which can be gleaned from the census data as well as the various city surveys conducted recently. While among both male and female workers the majority of workers are illiterate, the percentage of illiterate workers among females is much larger than among males. When occupations are divided into different prestige grades the proportion of workers in the lower prestige grades is much larger among females than among males. The rate of female work participation declines from rural to urban areas and from smaller to larger urban communities (D'Souza 1959, 241, Nath 1968:1205-1213).

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It is possible to explain these trends with the help of a theoretical model using generalizations of an economic nature as I did in my earlier study (D'Souza 1959). The model is based on two hypotheses. First, the main reason why most women work is the low income of their menfolk. When the husband's income is not adequate for the support of the family the wife also is compelled to work. This hypotheses agree with the fact that the vast majority of women are employed at lower occupational prestige levels and it can be presumed that their husbands also are employed in correspondingly lower prestige occupations with very low incomes. The hypothesis is further corroborated by the data pertaining to rural agricultural labour families which show that the higher the wage rate for men the lower is the number of women per family in the working force (D'Souza 1959)

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occupations

The second hypothesis of the model is that with the socio-economic growth of a society the proportions of / occupations of lower prestige. This has been clearly demonstrated in the case of U.S.A. (Foot and Hatt 1953: 371-72) and I have indicated that a similar trend is visible in our country also (D'Souza 1959: 235).

proportion
of men
in higher
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and hence
higher

By relating these two hypotheses it is possible to derive some implications for trends in female work participation. It is obvious that the occupational structures of rural and urban communities are different. In the urban communities there are relatively lower proportion of occupations in the lower prestige levels. So also there are lower proportions of occupations of lower prestige in larger urban communities as compared to smaller ones. Since in the urban areas as compared to the rural ones, and in larger communities as compared to smaller ones there are higher/income occupations, lesser proportions of women will have need for employment. Hence the differential female work participation rate. In the country as a whole it is evident that the proportion of urban population has been increasing in the recent decades and so is the proportion of people living in larger cities. There is also continuous socio-economic growth. These trends account for diminution in the rate of female work participation.

It is on the basis of this analysis that I predicted that the proportion of women workers in the working force would come down so long as the proportion of occupations at the lower prestige level keep on diminishing as a result of socio-economic growth (D'Souza 1959:241) Nath's analysis of female working force in the 1961 census lends support to my prediction (Nath 1968).

But there is another important trend about female work participation which although I noticed in my study referred to above, I did not take into account in the analysis because it was then of a small magnitude. The trend is that while at the lower levels of education, say below Matriculation, with increasing education of women the rate of female work participation declines (which is consistent with my above theoretical framework) at higher educational level the rate goes on increasing (which is inconsistent). This trend was relatively more prominent in 1961 census (Nath 1968: 1206-7). If it is assumed that at higher educational levels the husbands or fathers of working women are also working in higher prestige and higher income occupations, there is no ostensible economic reason for the women to work. Therefore, the hypotheses that the low income of their menfolk is the main reason why some women work, which is an important assumption of my theoretical framework, stands unsupported. It has therefore become necessary for me to reexamine the model.

The contradictory evidence shows that I had given too narrow an interpretation to the factor of economic motive, by regarding it as the need to make both ends meet for a mere subsistence. It would however appear that the economic motive is almost universal, if one has enough income for a subsistence one would desire more income for raising one's standard of living; and even if one has enough wealth for a comfortable living one would still desire more money for the power and prestige which wealth brings. If economic motive for women to work is almost a universal one, obviously it cannot account for the fact why some women work while others do not.

The revised theoretical framework has to reconcile two apparently irreconcilable trends: (a) In the lower educational levels the rate of female work participation declines with the increase in education, and (b) in higher educational levels the rate increases with increase in education. The two trends together represent a curvilinear relationship between the rate of female work participation and the education of women. It would appear that the change from the linear to the curvilinear relationship between these variables is relatively a recent one given rise to by the growth of education.

One of the important assumptions of the earlier theoretical framework is that the work participation on the part of women is related to the type of employment of their male relatives like husbands and fathers. A major dimension of occupations which is relevant for studying the relationship between the occupations of women and their male relatives, say, husbands, is the prestige of occupations.

But the earlier observation was that with the increase in the occupational prestige of husbands the rate of work participation on the part of wives declined in a linear relationship.

The observation of the more recent trend of the curvilinear relationship between the education of women and their work participation led to a reexamination of the relationship between the rate of work participation of women and the occupational prestige of their husbands with reference to more recent information. The relevant data from the study of Chandigarh (D'Souza 1968) are presented in Table I according to the percentage of working wives in the various occupational prestige categories of husbands who are heads of households. The occupations are classified into seven prestige categories from the highest prestige to the lowest according to an objective scale of occupational prestige devised for that study (pp.379-83). It can be seen that in the lower prestige levels of husband i.e. from category VII to category V the percentage of working wives goes on diminishing with the increase in prestige. But from category V onwards, by and large, it goes on increasing. Thus the variation in the rate of participation in work by wives in different prestige levels of husbands' occupations is more or less similar to the rate of female work participation in different educational levels/we have two contradictory trends:(1) At lower prestige levels of husbands' occupations the rate of work participation by wives goes on diminishing with increase in occupational prestige and (2) at higher prestige levels the rate goes on increasing with increase in occupational prestige.

observed
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tional levels

TABLE I
PERCENTAGE OF WORKING WIVES IN THE OCCUPATIONAL
PRES-TIGE CATEGORIES OF HUSBANDS

Occupational prestige categories of husbands	No. of working wives	Total No. of heads of households with wives	Percent of work wives total.
1.	2.	3.	4.
I	3	62	4.8
II	12	173	6.9
III	8	287	2.8
IV	24	569	4.2

1.	2.	3.	4.
V	0	125	0
VI	5	170	2.9
VII	11	39	28.8
Total	63	1425	4.4

Source: Victor S. D'Souza, Social Structure of a Planned City.
Chandigarh New Delhi Orient Longman Limited 1968.

Another important element in the relationship between the employment of wives and their husbands is the relationship between the occupational prestiges of husbands and wives. This is given in Table II in respect of a sample of married working women in Chandigarh taken from a field study conducted for her Ph.D. thesis by Kulwant Anand. As in the case of the Chandigarh Study referred to above the occupations in this case also are classified into seven prestige categories in a descending order using the same occupational prestige scale.

TABLE II

OCCUPATIONAL PRESTIGE OF WIVES AND HUSBANDS

Occupational prestige categories of wives	Occupational prestige categories of husbands							No. infor- mation	Total
	I	II	III	IV	V	VI	VII		
I	15	4	2	2					23
II	5	12						1	18
III	3	25	5	15				3	51
IV		1	3	5				2	11
V			1	8	3	4		3	19
VI					3	4	1	6	14
VII			1			1	35	2	39
Total	32	42	12	30	6	9	36	17	175

Source: Kalwant Anand, Impact of Changing Status of Women on
Population Growth, Ph.D thesis, 1970 Panjab University.

mostly primary school teachers who along with secondary school teachers are included in prestige category III, whereas their husbands who are

There is a remarkable association between the occupational prestiges of wives and husbands. Out of 168 cases for which complete information is available 79 women (47 per cent) are in the same occupational categories as that of their husbands. In another 45 cases (27 per cent) the occupational prestige categories of wives are just one step lower than those of their husbands. The general trend is for wives to have occupations either of the same prestige levels or of levels one step lower than those of their husbands. It may, however, be pointed out that in the occupational prestige category III of wives quite a substantial number of women have occupations one step higher in prestige as compared to the occupational prestige of husbands. This apparent discrepancy is due to the coarseness of the scale for occupational classification. The women in question are mainly clerical workers are included in prestige category IV. If primary school teachers are equated in prestige with clerical workers, these women would mostly have the same occupational prestige as that of their husbands. Thus the evidence on the whole confirms the statement that when both husband and wife work, the wife follows an occupation either of the same or slightly lower prestige as compared to the occupational prestige of husband. The prevalence of wide disparity between the occupational prestige of husband and wife, and also cases in which wife has higher occupational prestige are very rare. These findings are supported by the evidence reported in another study of the same community but using a different sample (D'Souza 1968: 80).

In addition to the two hypotheses noted above this evidence provides a third hypotheses stemming from the relationship between the employments of husbands and wives This may be stated as follows: (3) There is an association between the occupational prestige of husbands and wives, the wives occupation prestige on the whole being slightly lower than that of husbands.

While the first two hypotheses indicate contrary trends in the work participation of women at different prestige levels the third hypothesis points to a uniform pattern in the association between the occupational prestiges of husbands and wives at all levels. The third hypothesis or generalization, therefore, suggests the possibility of finding a larger generalization which can explain all the three different trends.

In the three hypotheses just discussed the unit of analysis is husband and wife pair and the major variable

considered is occupational prestige. It would therefore occur to one that for a logical explanation of the phenomena under study one should consider the family and its status as important elements in one's analytical framework. In sociological literature family is usually taken as a status unit meaning thereby that husband and wife who constitute integral member of a family have the same status. To be more specific in most of the societies including Indian which are male dominated the wife occupies a slightly lower status in the family/status the husband and the wife should have near equal status the husband being slightly superior to wife. Family status consistency is necessary for an efficient functioning of the family and the family being an integral unit of the society it can be assumed that there is always a tendency for the family to maintain a consistent status system.

as compared to the husband. Therefore for the consistency in family

On the other hand the status of a person is usually derived from his occupational prestige. Generally it is the man who is considered to be the natural breadwinner in the family and the various members of the family including his wife derive their status from his occupational prestige. So long as only the man in the family is working there is no ambiguity about the statuses of different members in the family. If also the wife is working this raises problems for family status consistency. For consistency the wife would should follow an occupation which is almost equal in prestige as compared to the husband's occupation. The wife's occupational prestige, however can be slightly inferior to that of her husband. If the wife is not able to fulfill this condition she does not participate in work.

The above reasoning gives rise to a fourth more general hypothesis namely, the work participation of wives or female work participation is a function of family status consistency, This generalization is in conformity with the third hypothesis that the occupational prestige of women is either the same or slightly less than that of their husbands which provides positive evidence of concomitant variation in support of the former. To substantiate the fourth generalization more fully it is also necessary to adduce negative evidence of concomitant variation. It would consist in showing that if the wife is not working it is because she is unable to secure an occupation at the level of family status consistency. Since occupational prestige and educational level are interrelated, it would mean that in the case of working wives their education is almost equal to that of their husbands as a consequence of which they have succeeded in securing occupations at consistent levels; on the other hand in the case of non-working wives there is a wider disparity between their education and that of their husbands and because of which they are unable to secure occupations at consistent levels.

The above hypothesis can be tested from data taken from the study by Kulwant Anand referred to already. The study consists of two samples, one working married women and the other of non-working married women, but derived from the same community, namely, Chandigarh. In Table III the samples of working and non-working women are classified according to their own educational levels and those of their husbands. It can be seen that in the case of working wives there is a great similarity between the levels of their and their husbands' education whereas in the case of non-working wives there are wide disparities; while 117 out of 169 (67 per cent) working wives are in the same educational levels as those of their husbands the corresponding number among the non-working wives is only 26 out of 150 (17 per cent). Therefore the hypothesis that if the wives are not working, it is because they are unable to secure occupations at consistent levels stands confirmed.

Now it can be explained why at the lower educational levels of women and at the lower prestige levels of husbands the rate of female work participation decreases and at higher levels it increases. The explanation has to take into account several factors. (a) First of all for participation in work a women's education should be more or less equal to that of her husband (b) A second factor is the requirement that the wife should be subordinate to the husband. Because of this a man usually marries a woman younger to him in age and also less educated than he. If we look at Table III we find that it is only rarely that wife's education is higher than that of the husband. Among working women such cases are only 11 out of 169 and among non-working women they are 4 out of 150. Then again in 12 out of total of 15 aberrant cases the difference between the wife's and husband's educational levels is only one step. It is also possible that in such cases what is lacking in the quantity of education of husband is made up by its quality, as for instance in the case of a husband who is first class graduate married to a third class post-graduate wife.

(c) A third factor in the explanation is that hitherto the education of women has been more neglected than that of men so that in every level of education there are relatively more men than women.

From an analysis of these three factors it becomes evident why the variation in the rate of female work participation in different educational categories follows a curvilinear pattern. According to factor (b) at the one extreme all illiterate men have to marry only illiterate women and at the opposite extreme all higher educated women have to marry only highly educated men. Therefore because of factor (c) the chances of husbands and wives having equal

educational background are the greatest in the case of wives who are either illiterate or highly educated. Hence by factor (a) the rate of work participation on the part of women is greater when they are illiterate or when they are highly educated.

Because of the intimate relationship between educational levels and occupational prestige the above reasoning can be employed also to explain the curvilinear relationship between the variation in the rate of female work participation and occupational prestige levels of husbands.

The preceding analytical framework can also be used to show why there is a marked decline in the rate of female work participation from the rural to urban communities and from smaller to larger urban Communities. In the rural areas the overwhelming majorities of men and women are illiterate and consequently most of the husband wife pairs have equal education making it possible for relatively more women to take to gainful employment. In the urban communities, because of the growth of education the disparity in the education of husband and wife occurs in greater proportion of husband and wife pairs and consequently relatively a lower proportion of women are able to secure occupations at consistent levels. The larger the community, the greater the development of education, the greater proportion of husband-wife pairs with educational imbalance and so smaller the rate of female work participation.

The tendency for the rate of female work participation to decline in the urban communities, however, is not an indiffinate one. In these communities while the chances for husbands and wife wives to have equal education at lower levels diminish such chances increase at higher levels. But eventually its increase at the higher level would more than offset the decrease at the lower level and on the whole the rate would increase. I have discussed this phenomenon elsewhere (D'Souza 1969).

Thus I have demonstrated in this paper that through a system of logically interrelated propositions it is possible to explain the different features of the female work participation. It may be pointed out that social causation is a highly complex phenomenon involving a large number of factors making up the causal nexus. For a satisfactory solution of a problem all the relevant factors have to be identified and the nature of their relationship should be specified, and this has to be accomplished in a theoretical framework. I should admit that in the present case I have not taken into account all the factors, but indicated some of the important ones. For instance, while the consistent educational background is an important factor in a wife's participation in work, by itself it may not be sufficient; in addition it is necessary that a suitable occupation should be available and also that it should be

conveniently located-so that her customary residence with her husband is not disturbed. The type of occupational structure of the community is also an important variable. Factors like these should be taken into account in formulating a theoretical framework for the actual solution of a given problem about female work participation. It should also be borne in mind that the propositions put forward may not be adequate for explaining problems of all kinds in the field under consideration. For instance, one may use the generalization that female work participation is determined by family status consistency, to explain changes in the rate of female work participation in a given region and over a period of time, but it cannot provide an explanation of the variation in the rate among different regions, without taking into account important historical and cultural factors. My major concern in this paper has been only to show how census data can be made to reveal their true significance by viewing them through theoretical frameworks.

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TABIE III

SAMPLE OF WORKING (N=169) and NON-WORKING (N=150) MARRIED WOMEN IN CHANDI-
GARH CLASSIFIED ACCORDING TO EDUCATION OF THE SUBJECTS AND OF THEIR HUSBANDS

	Working women					Non-working women						
Education of husbands of wives	Illiterate	Below Matric	Matric	Graduate	Post graduate and Professional	Total	Illiterate	Below Matric	Matric	Graduate	Post graduate and Professional	Total
Illiterate	<u>43</u>	6	1			50	<u>3</u>	6	4	7		20
Below Matric	<u>2</u>	<u>10</u>	9			21	<u>3</u>	26	19	7		55
Matric	1		<u>9</u>	<u>11</u>	3	24	2	<u>10</u>	20	16		48
Graduate			1	<u>13</u>	11	25			2	15		17
Post-graduate & Professional	1		1	5	<u>42</u>	49			2	<u>8</u>		10
Total	47	16	21	29	56	169	3	11	40	50	46	150

SOURCE: Kulwant Anand, Op. Cit.

CENSUS DATA AND THEORETICAL FRAMEWORKS;
THE CASE OF FEMALE WORK PARTICIPATION

BY

VICTOR S. D'SOUZA

AN ABSTRACT

The purpose of the paper is to emphasize the fact that for a fruitful explanation of the factual information from census data the scientists should formulate theoretical frameworks. The case of the trends female work participation has been discussed as an illustration. When the rate of female work participation is seen from the educational background of women there are two apparently contradictory trends. With the increase in education the rate of female work participation declines in the lower educational levels, but it increases in the higher educational levels. In an attempt to resolve this contradiction a theoretical model has been formulated by logically relating a number of findings from available empirical studies. The model yields the major hypothesis that the female work participation is a function of family status consistency, which can be used for explaining the contradictory trends.

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Work Participation Rates Among Males in Class
I Cities of India

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WORK PARTICIPATION RATES AMONG
MALES IN CLASS I CITIES OF INDIA

.....

By K.S. KRISHNAN*

.....

INTRODUCTION

1. In the 1971 Census of India, a new approach was adopted to determine the working population. Every individual was required to declare himself, what according to him was his main activity. If the individual reported participation mainly/any productive work of economic value by his physical or mental activity, he was considered a "Worker". For regular work in trade, profession, service or business, the individual must have put in gainful work on any one day of the preceding week or be only temporarily, out of work, to justify inclusion as a worker. In the case of persons not engaged in regular work i.e. types of work not carried on throughout the year, such as cultivation, live stock keeping, working in plantations and certain seasonal types of household industry, participation was ascertained with reference to work done in the last one year in stead of the preceding week. This new approach of classifying a person as worker considering only the main activity, has ensured exclusion of persons basically doing household duties or whole time students from the concept of worker unlike the procedure adopted in the 1961 census. The latest Census data on workers give, therefore, a picture of only that section of the economically active population, who for the major part of their time, are engaged in production and distribution of economic goods and services. Data on workers who contribute to economic activity only on a secondary basis, are yet to become available. The participation rate of workers defined in this manner, will be an index of public participation in economic activity based on the main activity of each individual. Or in other words, it will indicate the extent of utilisation of manpower resources of the nation, measured, albeit, in a crude form of proportion of persons engaged in economic activity as a major occupation.

@ Cities with population one lakh or more.

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Contd.....2/-

It should be noted that participation as main activity as referred to here, is in terms of time devoted among different activities by the individual and aspects of adequate remuneration to the person or productivity of performance of work are ignored for judging the main activity. It should not also be taken as full-time work done by the individual. If one of the goals for an employment policy is accepted as utilisation of man-power resources in economic activity on a principal basis by every individual belonging to a specific group like those aged between 15 and 59 years among men, the data now available from the Provisional Population Totals of the 1971 Census, make it possible to analyse the progress made towards such a goal. Further, as the 1971 Census data cannot yield statistics of the unemployed, the next best thing of interest related to the subject of labour force is the level of worker rates in the country.

2. The all-India work participation rates for the males and females and rural and urban areas by bivariate classification are as under according to the 1971 Census (provisional) data.

		<u>Rural</u>	<u>Urban</u>
Male	...	53.55	48.62
Female	...	14.55	7.37

Understandably, the rates are higher in the rural areas because agriculture allows participation by large number of persons unlike industry, although, as a result, there is under employment or more idling and less per capita earning in the rural areas. On the other hand, the urban population cannot engage itself in agriculture and urban youth are inclined to continue studies, the opportunities for higher education being more readily available in the urban areas. A detailed comparison of rural-urban differences in the work participation rates is not therefore easy. Even the urban areas as a whole do not form a homogeneous group from the view point of opportunities for economic activity because the concept of urban area adopted in the Indian Census covers even small places with population of only 5000 but having mainly non-agricultural activity and a density of population of atleast 400 per sq. km. As it will be essential to restrict comparison to like areas and the purpose of this paper is to consider the variations in work participation rates revealed by the data, it is necessary to ensure prevalence of roughly

similar conditions for employment opportunities in the areas selected for study. Accordingly, the paper analyses the Census data for class I cities only i.e. only those cities with population 1 lakh and more, which now number 142. Hereafter, these cities will be referred to as merely cities and the class not specified.

MALE WORKERS ACCORDING TO
1971 CENSUS RESULTS

3. The following table gives the number of cities of each State falling in the different groups of male worker participation rate groups suitably formed. Only States and Union Territories with atleast one class I city, are included. In the subsequent analysis, Assam, Chandigarh, Delhi and Manipur are omitted as there is only one city in each of them.

TABLE 1: Frequency distribution of cities by State and male worker participation rate group.

State/Union Territory	Male worker participation rate group					
	40.00	40.01 to 45.00	45.01 to 50.00	50.01 to 55.00	55.00 +	All
Andhra Pradesh	1	1	5	6	-	13
Assam	-	-	-	1	-	1
Bihar	1	4	4	-	2	11
Gujarat	-	1	5	1	-	7
Haryana	-	1	1	-	-	2
Jammu & Kashmir	-	-	2	-	-	2
Kerala	-	5	-	-	-	5
Madhya Pradesh	-	4	6	1	-	11
Maharashtra	-	8	7	1	1	17
Mysore	-	3	8	-	-	11
Orissa	-	-	2	2	-	4
Punjab	-	-	2	2	-	4
Rajasthan	-	4	3	-	-	7
Tamil Nadu	-	-	10	6	1	17
Uttar Pradesh	-	2	17	3	-	22
West Bengal	1	2	-	2	-	5
Chandigarh	-	-	-	1	-	1
Delhi	-	-	-	1	-	1
Manipur	1	-	-	-	-	1
Total	4	35	72	27	4	142

*The cities are Hyderabad, Monghyr, Kharagpur and Imphal.

4. The desirable level of male worker participation rates in a city, will depend on the average age of an individual when he first offers himself for and seeks employment, the general age of retirement and the structure of age pyramid of the male population for the city. The example of Bokaro Steel City provides an extreme case. The city has a population of 1,08,012 and the males number 65,464. Although, age details are not available, looking at the sex ratio of 650, it can easily be imagined that construction of the steel mill being the chief activity in this city, the males are likely to be young and mostly unmarried and these married and if staying with families have very few male children. This might explain the highest worker rate of 64% there. At the other extreme is the case of Imphal in Manipur State having the lowest participation level which is perhaps due to the matriarchal customs prevalent in that region. The participation rates among females in Imphal is noted to be 19% which is quite high. Thus, it is difficult to indicate a satisfactory norm of participation rate in cities for the country as a whole. An examination of the fractile distribution of the cities reveals the following statistics.

TABLE 2: Fractile limits based on male worker rates for the cities.

Fractile limit	Value (%)
First decile	42.69
Second decile	43.95
First quartile	44.51
Third decile	45.10
Fourth decile	46.35
Median	47.12
Sixth decile	48.10
Seventh decile	49.05
Third quartile	49.47
Eighth decile	50.44
Ninth decile	52.12

Contd....

It looks like an almost symmetric and platykurtic distribution, which suggests that one can ignore the extreme values to arrive at a desirable norm of worker rate in the present condition of the cities of India. The cities contained in the topmost 10%, are having rates above 52.12%. Also taking into consideration, the value of the third quartile which is 49.47%, it seems reasonable to accept the norm 50% for the worker rate for males in these cities.

Only 4 cities viz. Dhanbad (Bihar), Bokaro Steel City, Greater Bombay and Tiruppur (Tamil Nadu) have high worker participation rates, exceeding 55%. About 4/5th of the cities have rates 50% or lower. The cities in the lowest category i.e. with less than 40% rate are Hyderabad, Monghyr (Bihar), Kharagpur (West Bengal) and Imphal (Manipur). The position is really serious for Hyderabad city which has a population of nearly 18 lakhs and is the fifth largest urban area of India. Viewed for individual States, all the 5 cities in Kerala have male worker participation rates ranging from 40% to 45% only. In Jammu & Kashmir, Orissa, Punjab and Tamil Nadu, all the class I cities have rates higher than 45%. Unlike Greater Bombay with quite a high rate, the cities of Calcutta and Delhi have rates little higher than 50% while Madras city's rate is slightly less than 50%.

MEASURING LEVEL OF UNDER PARTICIPATION

5. As one will be naturally curious to know more about the cities with low participation rates, it becomes necessary to quantify the extent of under participation at macro level. If 50% can be considered as a desirable norm of male worker participation rate as explained above, one could express under participation for each city on an average basis at the following rates:

Current level of Male worker participation (%)	Extent of under participation (%)
45-50	2.5
40-45	7.5
Less than 40	10.0

Contd.....6/-

By applying these weights to the cities falling in the three low categories for each State, summing up and dividing the total by the number of cities, the State level rates of under participation (per city on an average basis) work out as under for the different States.

TABLE 3: State level rates of under participation among males in cities (first method)

.....

State	Rate (%)
Andhra Pradesh ..	2.3
Bihar ..	4.6
Gujarat ..	2.9
Haryana ..	5.0
Jammu & Kashmir ..	2.5
Kerala ..	7.5
Madhya Pradesh ..	4.1
Maharashtra ..	4.6
Mysore ..	3.9
Orissa ..	1.2
Punjab ..	1.2
Rajasthan ..	5.4
Tamil Nadu ..	1.5
Uttar Pradesh ..	2.6
West Bengal ..	5.0

Contd.....7/-

As already stated, under participation rate is largest for Kerala, namely 7.5%. For Maharashtra, Rajasthan, West Bengal, Haryana and Bihar, the under participation rate is 5% or roughly that much. The index is lowest for Orissa, Punjab and Tamil Nadu.

6. Yet another way of measuring under participation in quantitative terms is to estimate the size of the male population affected by under participation in each State and also express it as a percentage of the total male population of all cities of the respective States. These values are computed and given in the following table. The estimated number of male population who need to be provided with work so that they can consider themselves economically active for major part of the time, are also given.

TABLE 4: State level rates of under participation among males in cities (second method) and estimated number of persons affected.

State	Rate (%)	Estimated number of persons
Andhra Pradesh	5.5	1,14,800
Bihar	3.7	53,500
Gujarat	2.6	47,500
Haryana	2.8	6,400
Jammu & Kashmir	2.5	7,600
Kerala	7.5	55,600
Madhya Pradesh	4.4	73,200
Maharashtra	1.9	1,08,700
Mysore	3.4	62,300
Orissa	1.3	4,300
Punjab	1.2	8,600
Rajasthan	4.8	43,400
Tamil Nadu	1.9	54,600
Uttar Pradesh	2.2	84,000
West Bengal	0.5	21,400

Contd.....8/-

The second method can be easily seen to be more appropriate as it takes into account the male population of the cities also. As a result, there is a change in the picture as compared to table 3. While Kerala State still shows the highest rate, Rajasthan also remains with a rate around 5.0%. Andhra Pradesh has suddenly sprung up with a rate of 5.5%, as a result of the position in Hyderabad city. Similarly, Calcutta and Bombay having populations dwarfing the populations of other cities in the concerned States, the rates by this method indicate very low values for West Bengal and Maharashtra States. As a result, the rates computed either way along, cannot be accepted as criteria for judging relative levels of under participation among the States. Weight may also be given to the absolute number of persons, as estimated to be affected on account of under participation prevailing in some of the cities using the technique of measurement outlined earlier in this paper. It may be repeated here that the State-wise comparisons are made, in so many ways, only to highlight the problem of under participation considering the State as a unit of study. Ultimately, each individual city needs attention in its own right and it has to be emphasised that raising worker rates, is not the same thing as removing unemployment. Mobility or induced shifting of population between urban areas cannot, therefore, be a solution to the problem.

7. Viewing these statistics for the purpose of focussing attention on the need to take some ameliorative measures in the respective urban areas, one would be more concerned with the estimated number of the affected male population. For the country as a whole, the 131 cities where under participation among male population prevails, population affected is estimated to 7,56,000. Hyderabad, Nagpur and Indore cities which have more than 5 lakhs population and are falling in this category, have 93,000, 34,200 and 23,100 males (estimated) respectively, who need to be provided with work, if these cities are to attain 50% of worker participation among males. Seen in terms of States, the problem is acute in Andhra Pradesh and Maharashtra, as these States have more than a lakh of male population affected.

EVOLVING PLANS TO RAISE
WORKS PARTICIPATION RATES

8. The question may be asked as to what measures can be considered and what kind of economic activity can be thought of, to keep as many persons principally occupied as possible in the very cities to which they belong. One way of tackling this matter will be to analyse the occupational/industrial pattern of workers in these cities and compare it with a model pattern obtaining in the cities which can be accepted as better off. Such a study might bring out, into focus, imbalances in the occupational/industrial pattern and indicate the categories which could be encouraged. Another way will be examine the non-working population, in the age group 15-34 years and ascertain reasons for not being at work other than forced unemployment. Perhaps, the civic and other needs of these cities by way of "services" might be awaiting better attention, thereby showing scope for new jobs. Or the city might require, labour intensive household or large scale activities besides construction work. If the data for 1971 of some cities are collected and studied in this manner. Guidelines can broadly be evolved.

9. Making use of the statistics contained in the volumes of 1961 census², an attempt has been made to present the pattern of industrial categorisation of workers in the class I cities. To allow comparability, the computations have been done including males aged 15 to 59 only, by adding the two broad age groups 15-34 and 35-59, for which data are available. Further, as detailed break-up of the last category of workers (i.e. those concerned with industrial divisions 5 and 8) were not available for class I cities alone, the sub-divisions for this category were assumed to correspond to the pattern for all urban areas. The following table indicates the pattern of 1961 Census data computed in the manner stated above.

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TABLE 5: Percentage distribution of male workers aged 15 to 59 years classified according to important industrial categories for class I cities included in the census of 1961.

Industrial category	Percent
Household industry ..	3.6
Other manufacturing industries ..	29.4
Construction work ..	3.6
Trade and commerce ..	18.1
Transport & Communications ..	11.2
Civic services ..	1.5
Public services ..	10.1
Educational services ..	2.8
Personal services ..	7.4
Other services ..	9.2
Other industrial categories ..	3.1
	100.0

This table has been presented only to show the variety of industrial activities that constitutes urban life and the scope for engineering changes in the pattern, if desired.

10. The benefits that will accrue to the population of these cities by a concerted action programme to ascertain and provide some economic activity in the city itself and raise worker participation rate among the males, to mention only the important, will include -

- i) keeping the unemployment problem within control;
- ii) larger average income for the families;
- iii) regulation of rush to institutions providing higher education;
- iv) ensuring a balanced growth of the city; and
- v) higher standard of living to the masses.

From the foregoing paragraphs, the areas having under participation and the intensity thereof, have become clearer.

References to statistics given in this paper:

1. Census of India, 1971, Series 1, Paper 1 of 1971 - Supplement, "Provisional Population Totals".
2. Census of India 1961, vol. I, India Part II. (i) "General Economic Tables".

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It now calls for detailed studies in selected cities where the problem is more acute, with a view to formulate suitable remedial action by both the Governments and the local civic authorities.

Summary

Based on the data given in the Supplement to Paper I of 1971 census, series I entitled "Provisional Population Totals", the paper examines the variation in worker rates among males from city to city and attempts to quantify under-participation with reference to a norm. The frequency distribution of cities according to worker rate is noted to be almost symmetric and platykurtic and a norm of fifty percent of workers considered as appropriate for an Indian city on the basis of the observed frequency distribution. The cities with lower participation level than the norm have been grouped broadly into three categories of extent of under-participation. State level rates of under participation have been computed by two methods. While the first method takes into account merely the number of cities with low participation level, the second method is a modification considering also the population of each city. However, the figures of population in the few large cities tend to vitiate the rates for some States in the second method also. It is, therefore, suggested that the absolute value of estimated number of persons affected by the extent of under-participation should also be considered for a comparative study.

A study of the occupational/Industrial pattern of the cities is suggested to identify areas where there is need to raise over all participation levels. As the data of 1971 census with such details are yet to become available, the relative sizes of the Industrial categories of workers in the age group 15-59 in the cities according to 1961 census data, have been presented.

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**X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT**

X. 05

Age Patterns of Working Life of Males

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AGE PATTERNS OF WORKING LIFE OF MALES

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I. Introduction

The study dealing with age patterns of working life is an essential prerequisite for the formulation of realistic manpower plans in relation to the economic development of the country. Such a study identifies and quantifies the variety of factors influencing the size and composition of the labour force.¹⁾ A comparison of the characteristics of labour force with the population brings out the imbalances between the available human resources and existing manpower and indicates the necessity of strengthening the educational and training facilities according to the future needs.²⁾ The principles of some relevant analytical methods for the analysis of age patterns of working life are demonstrated here with reference to the male labour force enumerated in the 1961 Census of India.

In the 1961 Census, the concepts and definitions employed in connection with the compilation of labour force statistics were based on "work" approach. Briefly, the total population of India was first divided into two broad categories, namely, workers and non-workers. A "worker" was defined as a person whose main activity was participation in any economically productive work by his physical or mental activity. The reference period

for seasonal activities was the "current or last working season" while for regular employment it was a "fortnight".

Those persons who were tabulated as workers constituted the employed category of the labour force and persons who were classified as non workers but looking for the jobs the unemployed. The unemployed category consisted of all such persons who had worked previously but were out of jobs and were looking for jobs and persons who had never worked previously but were looking for jobs for the first time.

The workers were tabulated into four broad age groups i.e. 0-14, 15-34, 35-59 and 60 and above. In the case of unemployed category, the 1961 census distinguished between the unemployed seeking work for the first time and others who had jobs previously but were out of job at the time of enumeration and these two categories were tabulated in different age groups in urban areas. The age groups for the freshers were 10-14, 15-19, 20-24, 25-29, 30-34, 35-59, 60 and above and for non freshers 10-14, 15-19, 20-24, 25-34, 35-44, 45-59 and 60 and above, assuming all unemployed in ages 0-14 in 10-14 age group. The age groups for unemployed persons of both types in the rural sector of the country were similar to those used for workers.

Any study on labour force based on such broad age groups^{as} are available in the 1961 census does not provide a complete picture of age specific variations of the working life. Finer age groups are needed for such a study to throw light on the age profiles of participation in economic activity, entries into and withdrawals^a from labour force. This gap was filled in, for the purpose of this study, by interpolating^e the number of workers and unemployed persons tabulated in a broad age group of 1961 census into five year age intervals withⁱⁿ that broad age group³⁾.

II. Participation in Economic Activity

A simple way of measuring the extent of participation of population in economic activity is the crude activity rate, defined as the percentage of the economically active population to the total population of all ages. The extent of participation varies from age group to age group and hence the age-specific activity rates defined as the percentage of economically active population among the population in individual age groups are generally compared. These age specific activity rates for males are affected by the age composition of the population on the one hand and by socio-economic conditions and cultural practices prevailing in the country on the other.

Standardisation is a convenient method for estimating and eliminating the effects of variation of population age composition upon the age specific activity rates. The differences between the standardized and unstandardized activity rates represent the effects of variations of population age composition subject to some interactions. Table 1 shows the use of standardization for analysing the factors of difference between rural and urban male activity rates. The difference of 8.70% between rural and urban age standardized activity rates is an estimate of the net effect of urban-rural differences in all factors influencing the activity rates of males with the exception of the age composition. The difference

Table 1

Computation of Age Standardized Activity Rates for Males in Rural and Urban India, 1961.

Age Group	Specific Activity Rate		Percentage Distribution of Population			Standardized Activity Rate	
	Rural	Urban	Rural	Urban	All-India	Rural	Urban
1	2	3	4	5	6	7	8
All ages	58.08	54.08	100.0	100.0	100.0	59.39	50.63
0-4	-	-	15.1	12.9	16.2	-	-
5-9	2.91	0.54	15.0	13.1	13.0	0.38	0.07
10-14	34.26	11.50	11.7	11.3	11.3	3.87	1.30
15-19	78.23	45.67	8.0	9.1	9.8	7.67	4.48
20-24	95.42	85.00	7.6	9.9	8.6	8.21	7.31
25-29	97.36	96.83	8.0	9.1	7.8	7.59	7.55
30-34	97.50	97.61	6.9	7.9	7.0	6.82	6.83
35-39	97.79	97.73	5.9	6.5	6.0	5.87	5.86
40-44	97.84	96.78	5.3	5.7	5.1	4.99	4.94
45-49	97.81	95.68	4.3	4.2	4.3	4.21	4.11
50-54	97.65	92.15	4.1	3.8	3.5	3.42	3.23
55-59	96.29	81.49	2.4	2.1	2.7	2.60	2.20
60-64	90.74	70.53	2.6	2.1	1.9	1.72	1.34
65-69	84.61	58.89	1.1	0.9	1.3	1.10	0.77
70-74	73.04	48.90	2.0	1.4	0.8	0.58	0.39
75 +	50.84	35.59			0.7	0.35 0.36	0.25

between unstandardized activity rates for urban-rural males is smaller which means that there is an urban-rural difference in population age composition exerting an influence on the activity rates in rural and urban areas. This is true because the rural population contains disproportionately many children under 14 years of age and men in older ages and their presence tends to depress the rural unstandardized rates.

There are methods to use standardization and multistandardization to estimate and single out the extent of effects of various factors causing variations in the age specific activity rates but due to lack of information these are not demonstrated here.

Table 2 shows that in the 10-14 age group 30 percent of male population of India were working or looking for work in 1961. This proportion rose very rapidly after age 14. This explains the fact that at these ages young men leave educational centres to join the labour force. Between ages 15-19, a little more than 41 percent of the age group population began their work career and between ages 20-²⁴~~24~~ about 22%. As seen from Table 3, the labour force participation rates for males reached a peak in ages 25-29 and remained stable at a level of little over 97 percent upto age 54 and after 51 years of age it declined very slowly. In India, nearly 50% of the population of age 75 years and above participated in economic activity in 1961.

Table 2

Average Age Specific Activity Rates for Males in Countries Classified according to the Industrialization and in India around 1960.

Degree of Industrialization	Age in years							
	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+
Industrialized Countries	a) 4.1	72.4	91.5	96.7	97.6	95.9	85.6	37.7
Semi-Industrialized Countries	a) 13.2	70.3	91.8	96.2	97.1	95.9	88.9	61.0
Agricultural Countries	a) 23.9	78.4	91.2	96.3	97.5	96.3	91.6	70.1
India	30.1	71.5	93.1	97.5	97.8	97.1	90.6	67.7

a) Excluding those countries where a minimum age limit of 15 years was adopted for enumeration of the economically active population.

Sources:-

- 1) United Nations - Demographic Aspects of Manpower, Sex and Age Patterns of Participation in Economic Activities, 1962.
- 2) For India - Table 3.

The comparison of the age specific activity rates of India with those of countries classified according to the level of industrialization is made in Table 2. Three categories of countries are identified as follows and the average age specific activity rates are calculated:-

1. Industrialized Countries: Countries having less than 35% of active males engaged in agriculture and related activities;
2. Semi-Industrialized Countries: Countries having 35-59 percent of active males engaged in agriculture and related activities; *and*
3. Agricultural Countries: Countries having 60% or more of active males engaged in agriculture ^{*and*} ~~or~~ related activities.

The comparison shows that the participation rates in younger and older age groups vary inversely to the stage of industrialisation. While working conditions in agriculture and other allied activities permit the children to work at an early age, there are fewer such opportunities in non-agricultural activities. Moreover, industrially advanced countries can afford greater investment in education for keeping the children in school for a greater period and can provide funds to finance the old age security schemes.

III. Working Life Table

The table of working life provides a measure of the average number of working years remaining per person at each age. It represents the life cycle of economic activity in hypothetical cohorts subject to given specific rates of mortality and of participation in economic activity at each age of their lives. The difference between an ordinary life table and a working life table is that the former reflects the effects of mortality while the latter reflects the effects of both mortality and the labour market. Among the principal applications of a working life table are the computation of estimates of entrants into and separations from the labour force, estimates of life time job changes, estimates of life time expectation of earnings and consumptions and estimates of the future replacement needs for the economy as a whole or in any particular industry or occupation under certain assumptions.

There are two concepts of measuring the working life, gross and net. The gross years of working life represent the average number of ^{remaining} economically active years for those men out of a generation who do not die before retirement ⁴⁾ age, while the net years ^{of working life} represent the average number of ^{remaining} working years for a generation of males, including those whose working life is curtailed by death before they reach retirement ⁴⁾ age.

Thus the gross years of active life depend only on the ages at which men begin to work and the ages at which they retire, while the net years ^{of working life} are affected also by the force of mortality. The difference between the two concepts corresponds to the difference between the gross and net reproduction rates as measures of fertility and population replacement.

Computation of Gross Years of Working Life:

As the concept represents the average number of working years for those members of the cohorts who do not die before they reach the upper limit of age for participation in economic activity, an upper limit of working life span is arbitrarily fixed and the current age specific activity rates are assumed for each member of the cohorts throughout his working life span. The method of computation is analogous to that of age standardization as illustrated in table 3. The age specific activity rate of 97.36 per cent in the age group 35-39 means that each individual of the cohort is supposed to spend 97.36 per cent of five years (between 35 and 40 years of his life) i.e. 4.86 years in some economic activity. The products of the age specific activity rates and the number of years in the age intervals are summed over the age groups to arrive at the estimate of gross years of active life. The gross years of working life for males in India came out as 55.58 years and 63 years out of a potential maximum of ~~55.58~~ 65 years and 80 years respectively.

Table ³₂

Computation of Gross Years of Working Life

Age Interval (exact ages x to $x+4$)	Number of years in age interval	Specific Activity Rates	Average number of active years in age interval ($3x2$)
1	2	3	4
10-14	5	30.12	1.51
15-19	5	71.46	3.57
20-24	5	93.07	4.65
25-29	5	97.33	4.87
30-34	5	97.61	4.88
35-39	5	97.86	4.89
40-44	5	97.71	4.89
45-49	5	97.50	4.88
50-54	5	96.75	4.84
55-59	5	93.89	4.69
60-64	5	87.61	4.38
65-69	5	80.73	4.04
70-74	5	69.72	3.49
75 & Above	15	49.46	7.42

Total 10-74	65		55.58
Total 10-∞	80		63.00

Computation of Net Years of working Life:

The computation of net years of working life is, in fact, an elaboration of the ordinary life table ~~is~~ with the help of age specific activity rates. The net years of working life ^{expectancy} at an age x are calculated by using the following formula:

$$e_{ow}^x = \frac{\sum_{x+n}^M (nlx \times nax)}{l_x}$$

where the notations are the life table columns as explained below:

l_x : The l_x column in the life table shows the number of survivors at exact age x of 100,000 born alive. This column is taken from the official Life Table ⁶¹ prepared by the Registrar General of India for 1951-60.

nax : This is the proportion of labour force to the total population of the age group. The age specific activity rate (nax) in an age interval is computed with the help of the labour force (obtained as mentioned in Introduction) and the total population of the age group.

nlx : The stationary population nlx representing the number of years lived collectively with in age interval by the cohorts subjected to the given rate of mortality, is computed by the standard formula meant for construction of Abridged Life Tables, i.e.,

$$nlx = \frac{1}{2} (l_x + l_{x+n})$$

except for the 0-4 and 75+ age groups, nlx is taken as the sum of L_0, L_1, L_2, L_3 and L_4 given in the official

Life table while $nL75$ is estimated ⁷⁾ as $n\bar{l}_{75} = \frac{l_{75}}{n\bar{d}_{75}}$

where $n\bar{d}_{75}$ was the actual death rate in the population of 75 years and above ⁸⁾.

ω
 nL_x^W : The stationary economically active population (nL_x^W) representing the working man-years of the cohorts with in the age group is derived as the product of $n\bar{d}_x$ and $n\bar{l}_x$.

T_x is the cumulative stationary population showing the number of years lived by the generation from the given age upwards.

T_x^W is the cumulative economically active population representing the number of man-years worked by the generation from the given age upwards.

e_x^O is the expectation of total life calculated by dividing the T_x by l_x .

e_x^{OW} is the expectation of working life and is similarly calculated by dividing the T_x^W by l_x .

e_x^{OI} is the expectation of inactive life taken as the difference between total expected life and expected working life.

Length of Working Life:

The total expectation of life at birth in 1961 was 41.8 years for males out of which 28.6 years would be expected to be spent in economic activity and 13.2 years in unproductive activity. The corresponding figures for survivors to the age of 10 were 45.1 years of total

Table 4
Computation of Net Years of Working Life

Age Group	Survivors at exact age of x : 100,000 born alive	Specific activity Rates	Statutory Population in age interval	Economically Active	Cumulative Statutory Population in age x-	Economically Active	Average Number of remaining Life at age x		
	L_x	nW_x	nL_x	w_{nlx}	T_x	w_{Tx}	e_x^0	e_{xow}	e_{opl}
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
0 - 4	100,000	0	407,954	0	4,183,446	2,859,368	41.8	28.6	13.2
5 - 9	77,605	a)	382,028	0	3,775,492	2,859,368	48.7	36.9	11.8
10 - 14	75,206	30.12	372,660	112,245	3,393,464	2,859,368	45.1	38.0	7.1
15 - 19	73,858	71.46	364,613	260,552	3,020,804	2,747,123	40.9	37.2	3.7
20 - 24	71,987	93.07	354,900	330,305	2,656,191	2,486,571	36.9	34.5	2.4
25 - 29	69,973	97.33	344,005	334,820	2,301,291	2,156,266	32.9	30.8	2.1
30 - 34	67,629	97.61	330,215	322,323	1,957,286	1,821,446	28.9	26.9	2.0
35 - 39	64,457	97.86	310,813	304,162	1,627,071	1,499,123	25.2	23.2	2.0
40 - 44	59,868	97.71	284,945	278,420	1,316,258	1,194,961	22.0	20.0	2.0
45 - 49	54,110	97.50	254,088	247,736	1,031,313	916,541	19.1	16.9	2.2
50 - 54	47,525	96.75	219,315	212,187	777,225	668,805	16.4	14.1	2.3
55 - 59	40,201	93.89	181,323	170,244	557,910	456,618	13.9	11.4	2.5
60 - 64	32,328	87.61	141,498	124,142	376,587	286,374	11.7	8.9	2.8
65 - 69	24,351	80.73	103,030	83,176	234,889	162,232	9.7	6.7	3.0
70 - 74	16,861	69.72	68,305	47,622	131,859	79,056	7.8	4.7	3.1
75 and above	10,461	49.46	63,554 b)	31,434	63,554	31,434	6.1	3.0	3.1

a) Children under ten years of age tabulated in the 1961 census as economically active were numerically small to make any significant effect.

b) Calculated by using the formula $nL_x \frac{lx}{nM_x}$ where nM_x is death rate for males of age 75 and above

expected life, 38 years of expected active life and 7.1 years of expected inactive life. At the age of 75, a man in India in 1961 was expected to live, on an average, 6 years, half of which period was expected to be spent in participating in some economic activity.

If measures of average annual time worked per economically active male are available by age, they can be used for reducing the expectation of active life to the expectation of working time in hours or equivalent years of full time work and so on.⁹⁾

The expectation of life and net years of working life in India are compared with the average of countries classified according to the degree of industrialization in Table 5 and with selected individual countries in Table 6. The expectations of total life, active life and inactive life are longer in industrialized countries but the fraction of life spent in economic activity varies inversely with the level of industrialization. Thus most significant finding emerging from the analysis of data is the increase in both the net years of working life and the net years of inactive life associated with the economic advancement of the country. A comparison at two point of time is made for Japan and it is found that an increase of 22 per cent in male life expectancy at age 15 is associated with ~~an~~ an increase of 18 per cent in working life expectancy and doubling the inactive life expectancy.

Table ⁵/₄

Expectation of Life and Average Net years of Active Life for Males at Birth and at 15 years of Age in Countries Classified according to Degree of Industrialization

Degree of Industrialization	Expectation of Life in years	Net years of Active life		Average years of Inactive life
		Average Number	Percentage of expectation of life	
<u>At Birth</u>				
1. Industrialized Countries	65.0	42.2	64.9	22.8
2. Semi-Industrialized Countries	52.8	35.6	67.4	17.2
3. Agricultural Countries	48.3	33.9	70.2	14.4
4. India	41.8	28.6	68.4	13.2
<u>At 15 years of Age</u>				
1. Industrialized Countries	54.5	45.3	83.1	9.2
2. Semi-Industrialized Countries	49.5	43.1	87.1	6.4
3. Agricultural Countries	46.1	41.5	90.0	4.6
4. India	40.9	37.2	90.9	3.7

Sources: 1. United Nations - Demographic Aspects of Manpower - Sex and Age Patterns of Participation in Economic Activities, 1962.

2. Table 2, for India.

Table 6

Expectations of Life, Working Life and Inactive Life for Males at age 15, selected countries and, periods.

Country	Period	Life expectancy at age 15	Average net years of active life remaining at age 15		Average net years of inactive life remaining
			Number	Percent of life expectancy	
1. Ghana	1960	39.4	38.1	96.7	1.3
2. Japan	1930	43.6	41.5	95.2	2.1
	1955	53.2	49.0	92.1	4.2
3. Malaya	1957	49.4	46.0	93.1	3.4
4. Hungary	1949	52.3	45.7	87.4	6.6
5. Canada	1961	56.2	48.0	85.4	8.2
6. U.A.R.	1960	52.2	48.6	93.1	3.6
7. India	1961	40.9	37.2	90.9	3.7

Source: Working Life Tables of respective country.

Loss of Active Life by Mortality:

The difference between the gross years of working life and net years of working life provides the losses due to mortality. The losses of active years due to mortality can be estimated at any age. These losses at birth and at the age of entering the labour force (10 years in the present case) for all ages and for ages between 10 and 75 are summarised below.

	Active years in all age 10 and over	Active years in ages between 10 and 75
	-----	-----
1. Gross years of active life	63.0	55.6
2. Expectation of active life at birth	28.6	28.3
3. Loss of active life by mortality (1-2)	34.4	27.3
4. Expectation of active life at age 10	38.0	37.6
5. Loss of active years due to mortality after age 10(1-4)	25.0	18.0

Average gross and net years of active life in countries classified in three categories by levels of industrialization are given in Table 7 for comparison with India. It is seen that whereas there was a difference of only about 5 years between the gross and net years of active life per male in the industrialised countries, this difference amounted to more than 14 years in India, and more than 11 years in agricultural

Table 7

Average Gross and Net Years of Economically Active
Life Between Ages 15 and 70 for Males in Countries
Classified according to level of Industrialization

Degree of Industrialization	Gross years of active life, ages 15-69	Net years of active life, ages 15-69	Loss in yrs. of active life due to mortality, ages 15-69
1. Industrialized countries	48.4	43.6	4.8
2. Semi-Industrialized Countries	49.6	41.1	8.5
3. Agricultural Countries	50.8	39.4	11.4
4. India	50.6	35.8	14.8

Sources: 1. United Nations - Demographic Aspects of Manpower, Sex and Age Patterns of Participation in Economic Activities, 1962.

2. Tables 3 & 4 for India.

countries. It is also to be noted that while the net active life increases with industrialization, the gross active life is affected inversely by it.

IV Entry into and Separation from Labour Force

The study of variation in size and structure of labour force is more complicated than that relating to population. The components of population change are fertility, mortality and migration while the components of labour force variations are governed by four factors^s, namely, entry from inactive population to labour force, retirement into inactive population to labour force, status, losses due to death and migration. This section of the study is devoted to derive estimates of age specific rates relating to the first three components of variation in labour force with the application of working life tables. With the ^{help} aid of age specific entry rates, an estimate of number of persons who are expected to enter into labour force in the years ahead can be made. Similarly age specific withdrawal (due to death or retirement) rates when applied to the age distribution of projected manpower in an occupation or category provide an indication of estimation of additional replacement needs of such manpower, so that ^{the} educational and the training facilities may be strengthened^{ed} accordingly.

1) Rate of Entry into and Retirement from labour force:

The computation of rate of entry from inactive population to economically active population and rate of retirement (withdrawal) from labour force to inactive status is illustrated in Table 8. In column (2) is given the stationary inactive population taken as the difference between the total stationary population (nL_x) and economically

Table 8

Computation of Rate of Entry into Economic Activity
and Rate of Retirement into Inactive Status.

Age Group	Inactive Stationary Population to x+4) $(5L_x - 5L_x^w)$	Specific Activity Rates at age x (W_x)	Net Entry(+) or Retirement (-) Rate $(W_{x+5} - W_x)$	Net Entries (+) or Net Retirements (-) in the age group	Rate of Entry per 1000 inactive population	Rate of Retirement per 1000 active population
1	2	3	4	5	6	7
-14	260,415	16.31 ^{a)}	+34.48	+25,698	98.7	-
-19	104,061	50.79	+31.47	+22,949	220.5	-
-24	24,595	82.26	+12.94	+9,185	373.5	-
-29	9,185	95.20	+2.27	+1,562	170.1	-
-34	7,892	97.47	+0.26	+ 172	21.8	-
-39	6,651	97.73	+0.05	+ 31	4.7	-
-44	6,525	97.78	-0.13	- 103	-	0.4
-49	6,352	97.60	-0.43	- 244	-	1.0
-54	7,128	97.12	-1.80	- 790	-	3.7
-59	11,079	95.32	-4.57	-1,657	-	9.7

a) Average of 5-9 and 10-14 age groups.

active stationary population (nLx) given in Table 4. The specific activity rate (W_x) denotes the activity rate at exact age x and is obtained by a simple interpolation formula averaging the age specific rates for successive pairs of five years age interval shown in column (nwx) of Table 4. For example, the activity rate at exact age 20 is estimated as the average of specific rates for 15-19 and 20-24 age groups.

The net entry or retirement ~~or~~(withdrawal) rate in the age interval, column (4) is obtained by taking the differences between the specific activity rates for successive ages shown in column (3). These rates are applied, age to age, to stationary population (nLx) (Table 4) to obtain the estimates of net entries into or net retirements from the economically active stationary population and these figures of net annual entries or retirements are put in column (5). As the five yearly rate is applied to five years stationary population, the product is divided by 5 to obtain the annual net entries or retirements in column (5). The (+) sign indicates that gross entries, in the age groups, exceed the gross withdrawals while the (-) sign indicates the reverse case.

There is not much error in treating these net entries or withdrawals as gross figures in case of males most of whom join labour force only once. Such an assumption does not hold good in the case of female population. Assuming the net figures as gross, rate of entry per 1000 of inactive population column (6) and

rate of retirement per 1000 active population column (7) are obtained by dividing the figures of column (5) having (+) sign by inactive stationary population ($nLx - nLx^w$) and figures having (-) sign by economically active stationary population (nLx^w) respectively.

Extending the Table 8 upto the age which covers most of the labour force (74 years in this case), the estimates of median age of entry and of withdrawal can be obtained. The median age of entry into labour ^{force} was found as 15.9 years and of withdrawal 64.1 years for males in India in 1961.

Losses by Death: Mortality is the vital event associated with diminishing the labour force of a country. It affects all ages but not ^{uniformly} ~~uniformly~~. Estimates of age specific death rates per 1000 of active population can be obtained with the help of working life tables as explained in Table 9.

l_x^w : represents the economically active survivors at age x of 100,000 born alive and is obtained by applying the specific activity rate (a_x) at age x to the corresponding total survivors (l_x). The differences between the figures of economically active survivors (l_x^w) in successive ages provide the magnitude of increase or decrease of economically active survivors in the age group ^{as} shown in column (3). Assuming the migration as negligible, the increase or decrease in

Table 9

Computation of Age Specific Death Rates

group (to x+4)	Economically Active Survivors at age x of 100,000 born alive (L_x^w)	Increase (+) or Decrease (-) of Economically active survivors in age group $(L_{x+4}^w - L_x^w)$	Number of Deaths among Economically active popu- lation in age group	Death rate per 1,000 Active population
1	2	3	4	5
0-14	12,266	+25,246	492	4.0
5-19	37,512	+21,705	1,244	4.8
10-24	59,217	+ 7,597	1,758	5.4
15-29	66,614	-696	2,258	6.7
20-34	65,318	-2,924	3,096	9.6
25-39	62,994	-4,455	4,485	14.7
30-44	58,539	-5,720	5,025	30.2
35-49	52,011	-6,655	6,411	25.9
40-54	46,156	-7,876	7,046	33.2
45-59	38,320	-8,962	7,325	45.0

^{economically}
 n active survivors is the resultant of three forces
 i.e. entry, retirement and death. Entry increases the
 labour force while retirement and deaths decrease it.
 Thus the number of deaths (d_i) among economically
 active population of i th age group is found by
 using the following relationship:

$$n_i - d_i = \Delta i$$

where (n_i) is the net entries (+) or net retirements
 (-) and Δi is the increase (+) or decrease (-) of ^{economically}
 active ^usurvivors in i th age group. The column (5)
 showing the death rate per 1000 active population
 is obtained by dividing the number of deaths by the
 economically active stationary population (nL_X^u).

Replenishment:
Labour Force Replenishment: The overall crude rates
 of entry, retirement and losses by deaths ^{ave} and obtained
 by applying the 1) age specific rates of entry to the
 inactive total population in the age group; and 2) age
 specific rates of retirement and death to the total
 labour force in the age group. The last row of Table 10
 10, gives the estimates of the total number of annual
 entries into ^{and} annual withdrawals from labour force
 and annual losses by death in labour force. These
 annual estimates when divided by the total number of
 economically active persons provide the following
 crude rates:-

	Annual crude rate per 1000 Labour force
Entries - 29.5	29.5
Retirement ¹⁰⁾ - 0.8	0.8
Losses by deaths _{12.7}	13.7

Table 10

Computation of Annual Entries (from Inactive Population) to and Annual losses by Death and Retirement from Labour Force.

Age Group (x to x+4)	Population (Thousands)	Labour force (thousands)	Inactive population (thousands)	Annual losses from labour force by Death	
				Rate per 1000 of labour force	Estimated Number (thousands)
1	2	3	4	5	6
10-14	26,274	7,914	18,360	4.0	31.6
15-19	18,599	13,290	5,309	4.8	63.8
20-24	18,199	16,937	1,262	5.4	91.5
25-29	18,532	18,037	495	6.7	120.8
30-34	15,988	15,605	383	9.6	149.8
35-39	13,604	13,312	292	14.7	195.7
40-44	12,087	11,809	278	20.2	238.5
45-49	9,736	9,493	243	25.9	245.8
50-54	9,131	8,835	296	33.2	293.3
55-59	5,283	4,960	323	43.0	213.3
Total (10-59)	147,433	120,192	27,241		1644.1

Contd...Table 10

Annual Entries into labour force		Annual Retirements from labour force	
Rate per 1000 of Inactive population	Estimated number (thousands)	Rate per 1000 of labour force	Estimated number (thousands)
7	8	9	10
98.7	1,812.1	-	-
220.5	1,170.6	-	-
373.5	471.4	-	-
170.1	84.2	-	-
21.8	8.3	-	-
4.7	1.4	-	-
-	-	0.4	4.7
-	-	1.0	9.5
-	-	3.7	32.7
-	-	9.7	48.1
-	3,548.0	-	95.0

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X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT

X. 06

Demographic Considerations in Manpower and
Employment Policy

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DEMOGRAPHIC CONSIDERATIONS IN MANPOWER AND EMPLOYMENT POLICY

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Of the three key resources factors, human, physical, and financial - that determine a country's capacity for economic development, the human resource factor is, in the ultimate analysis, the most important element. Natural and financial resources may be adequate but unless there are the men who can utilise these resources for the economic good, the pace of development is likely to be extremely slow. Basically, economic advance is closely linked with technical and professional skills and shortages of these skills can be serious checks on economic progress. One of the most important facets of economic planning is to identify the types of technical and professional skills that the economy needs and to plan for their development. This, in essence, is the core of a manpower policy.

The formulation of manpower policy depends on the systematic assessment of the current and future manpower situation in the country. Such an assessment is necessary for the correct appraisal of the manpower resources and requirements for development programmes; for formulation of programmes for the organisation, development and utilization of the manpower resources of the country and for integrating the strategy of manpower development with an employment plan and general development plan. A systematic assessment of manpower is a prerequisite for the authoritative determination and co-ordinated execution of manpower policies and programmes.

There are inherent statistical, technical and methodological difficulties in assessing the current and future manpower situation in the country. Inadequate data is itself often one of the formidable difficulties. The difficulties are greater in the assessment of future manpower requirements. However, despite the gaps in information, it is still possible to assess with some degree of certainty the manpower situation based on available data, particularly the type of demographic data normally available through the Census.

Manpower assessment must start with an analysis of the current manpower situation in the country. In fact, for the determination of the policies and programmes aimed at the full and effective utilisation of manpower resources the study of the growth, composition and distribution of current

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Manpower resources is of basic importance. The main demographic characteristics that influence manpower policies and programmes may be considered as falling under the following broad heads:-

- (a) size and composition of the population;
- (b) size and composition of the labour force, and
- (c) employment and unemployment patterns.

The size, structure and growth patterns of the population are characteristics of great significance. To a large extent, the magnitude of the manpower problem is set by the size of the population and its age distribution. Similarly, in relation to employment policies, the proportion of the population in the working age groups and the size of the labour force are important. Both are influenced by the pattern of future population growth.

The distribution of the population between the sexes and among different age groups is an important consideration influencing both the scope and content of manpower programmes. This information is also essential for estimating future school enrolments, provision of training programmes, etc. The greater the specificity in age classification, the more accurate can such estimations be. However, the age classification by five year age groups generally provides the necessary categories for most analytical purposes.

Manpower policy is also influenced by the geographical distribution of the population within the country. Demographic studies of the distribution of population, internal migration and other factors including economic forces that influence population distribution are most useful for manpower policy formulation. These demographic aspects would influence the intergration of manpower with those relating to location of industrial or other economic projects. Regional demographic aspects such as the density of population the rural-urban composition, the size of the urban units themselves would influence the assessment of the requirements and possibilities of investment for development of different areas. These factors also help to identify areas where an excess or deficit of population exists in relation to natural resources, investment and employment possibilities and would also

provide guidelines for the appropriate policy of manpower utilization and distribution. The trends in population growth in each economic region as derived from previous censuses are of the great value for manpower policy as they provide indicators of the likely trends which would have to be taken into consideration in the formulation of a long term manpower policy.

Manpower policy is most intimately connected with educational policy. Both manpower and educational policies have to be subservient to the needs of society and its economic and social development. One of the objectives of manpower policy is the evaluation of the present stock of literate and skilled personnel in the country. Based on this evaluation and taking into consideration the future needs of special skills, the pattern of investment in education and training can be determined. The regional literacy levels and the specific educational attainments of the population are important demographic characteristics that influence manpower policy. The differences of the situation in different parts of the country and among different categories of the population, the estimate of changes in literacy levels over the past decades and the availability of skills in the labour force are of vital importance for the formulation of educational and training programmes.

Educational needs would have to be based on the current situation which would also influence policy decisions such as the location and spread of educational institutions and the provision of special courses for the development of specific skills. This is particularly important in a country where the pace of development and the growth of population are both rapid. It is specially important to consider the geographical distribution within the country of the present and expected future school population, and the variations of educational levels and consequently the educational needs of the population in different areas.

Manpower policy would be greatly assisted by detailed analysis of the age and sex structure of the population regionwise. The classification by single years of age within the school going age is important because it provides the basis for an analysis of the educational level of enrolments. Also, the single year classification of pre-school children is important as a basis for estimates of the annual number of children who reach schooling age in the near future.

In fact, from the long range manpower point of view so far as school going children are concerned, fertility becomes the main determinant of the trend. The study of fertility is, to this extent, a component of manpower programming.

The literacy and educational skills of the adult population are important indicators of the quality of human resources. Demographic data by sex for the weaker sections of society or by population groups which are handicapped in various degrees in the matter of education would permit the formulation of special policies for such groups. It is useful to compare the present and projected future distribution by educational level of the population and labour force with estimates of present and anticipated future requirements of educated manpower for various types of economic activities. Such a comparison would serve as a guide for both policies of education and investment decisions which require particular skills or educational levels.

Migration patterns also influence manpower policy. Migration may be both internal and international. In a manpower policy, both are important depending on the particular aspect to which the policy relates. Where a high degree of specialisation is associated with certain jobs, international migration is of importance in association with internal migration. When, however, the programmes relate to large areas where average or middle level skills or no skills are needed, internal migration is more important. Internal migration, when studied in association with local factors such as rates of natural increase, population density and social and economic characteristics of an area influences manpower policy for that area. However, migration trends have to be analysed in great detail and studied more continuously than at present when migration data is usually collected only at each census if such trends have to be useful for manpower policy.

An important part of manpower policy and indeed, of economic and social policy is a commitment to an active policy for ensuring full employment. Full employment is considered one of the essential ingredients of social justice and as important as economic growth itself. The content and scope of employment policy depend on various demographic and social facets of the population, more particularly of that part of the population which constitutes the labour force. The composition and distribution of the labour force are of fundamental importance for the formulation of policies aimed at the fuller and more effective use of human resources. Demographic data on these characteristics furnish the basis for

an assessment of the current situation and future projections. Such an assessment is necessary for estimating the number of jobs to be provided currently and the number which would have to be created in future to ensure the degree of employment considered optimum and also for determining the scale and sectors of investment for effective utilisation of the labour force and the development of necessary skills.

An employment policy is primarily concerned with the provision of jobs for those in the labour force. The bulk of the labour force is generally considered as made up of those in the age-group 15 to 59 years. This is for convenience of analysis but in addition to those in this age group, persons of other ages outside these limits usually also contribute labour. There is a correlation between population growth rates, the age and sex structure and the proportion that is in the labour force. An employment policy has, therefore, to be based on a careful analysis of available demographic data. The analysis must, among other things, include an assessment of the population structure, the magnitude of the current labour force and its age and sex distribution, its educational and skill levels, the likely trends of future growth, the magnitude of the educated ~~xxxxxx~~ unemployed etc.

re An employment policy is concerned with the degree of unemployment and seeks to find suitable solutions. The basic issue of the number of employment opportunities that have to be created would depend on the essential demographic characteristics of the number of workers who will enter and withdraw from the labour force annually, the proportion of those in the labour force ~~who are~~ gainfully employed and the scale of unemployment. An Analysis of such data in relation to regional labour situations would yield indicators regarding the magnitude of investment required for effective use of the current and future labour force, the types of skills to be developed and would also provide guidelines for decisions on the magnitude, sector and location of investment expenditure. Such an analysis is also essential for determining the nature and character of current manpower surpluses and shortage, particularly of professional and technical manpower. In any such analysis it would be necessary to take into consideration other important demographic, economic and social factors. Long term trends in fertility, mortality and migration determine the size of the population and its composition with respect to age and sex and establish the maximum limits of the number or that can

participate in economic activity. Other demographic factors that are important are the participation rates, the rural-urban composition and regional concentration of skills.

As mentioned earlier, the primary issue in an employment policy is the providing of job opportunities to those in the labour force. The size of the labour force is therefore a very important constraint. The number of people in the labour force unemployed and the addition to the labour force over time set the scale for the optimum necessary employment opportunities to be created. For example, the data for India is given below:

ESTIMATES OF EMPLOYMENT AND UNEMPLOYMENT IN THE FIVE YEAR PLANS* (IN MILLIONS)

	I Plan	II Plan	III Plan	Three Annual Plans
1. Labour force in the beginning of the Plan	185.2	197.0	215.0	229.0
2. Net addition to the Labour force during the Plan	9.0	11.3	17.0	14.0
3. Backlog of unemployment in the beginning of the Plan	3.3	5.3	7.1	9.6
4. Total (2 plus 3)	12.3	17.1	24.1	23.6
5. Additional jobs created	7.0	10.0	14.5	0.4 to 1.4
6. Backlong of unemployed at the end of the Plan	5.3	7.1	9.6	N.A.
7. Unemployed as percent of the total labour force	2.9	3.6	4.5	9.6

*Note: This table is based on published data and a similar table used to be presented in the Plan Volumes published by the Planning Commission, Govt. of India recently. However, in the draft Fourth Five Year Plan, no attempt has been made at presentation of data in this manner as recommended by the Committee of Experts on Unemployment Estimates. It has been felt that considerable divergence of opinion exists regarding definitions and measurement of Employment and Unemployment and that surveys in depth are still to be conducted in order to be able to cast estimates as attempted in the Table. However, the table is presented here more to indicate how the scale of the problem is influenced by the demographic variable of addition to the labour force over periods of time.)

It will be noticed that unemployment has been growing steadily which would call for a more radical employment policy.

wherever

Another important demographic facets is the participation rates which are useful for making manpower projections by sex and age-groups of those likely to be economically active. Where the participation rates can be assumed as not likely to undergo serious changes, the rates computed on the basis of the latest census can be adopted for such estimations, but ~~whereas~~ current policies are likely to influence future participation rates, necessary adjustments based on continuous surveys would have to be made. The participation rates in conjunction with other demographic data such as the life tables would give information regarding the duration of the working life of males and females and also of the rate of accession of the young in the economically active population. The participation rates and the age-structure of the population are important considerations in employment policy formulation. The former help to assess the proportion of those in the working age groups who are not economically active and therefore represent unutilised manpower while the latter would influence both educational policy and type of occupations that have to be provided. The table below gives the age-sex labour force participation rates for India (based on the 1961 Census):

Age-group	Males		Females		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
0 - 14	10.61	3.55	7.63	1.57	9.16	2.59
15 - 34	91.13	76.92	49.78	15.79	70.29	49.50
35 - 59	97.47	93.31	52.29	22.38	75.98	63.65
<u>15 - 59</u>	<u>93.78</u>	<u>83.20</u>	<u>50.76</u>	<u>18.32</u>	<u>72.60</u>	<u>54.76</u>
60	79.89	58.44	24.31	11.41	52.04	35.20
<u>Total</u>	<u>58.22</u>	<u>52.40</u>	<u>31.42</u>	<u>11.09</u>	<u>45.07</u>	<u>33.06</u>

The higher participation rates in the rural areas in the age groups 0 - 14 and 15 - 34 can be attributed to the fact that smaller proportion of the population in these age-groups

in the rural areas attend schools than in urban areas. Such data would provide indicators regarding the spread and utilisation of educational facilities in the rural areas and consequently influence educational policy.

The classification of census data on the basis of industry and occupation are an invaluable inventory of manpower. The distribution of working force by industrial category, occupation and status would provide indicators regarding the type of employment opportunities to be created and the nature of investment in growth centres. However, one important aspect of the relationship between the growth of the labour force and the creation of jobs that has to be remembered is that the number of jobs to be created cannot always be equated with the increase in the labour force since, with increasing economic activity some of those who were self-employed or unpaid family workers or even non-workers enter the labour force in a more active sense and become wage-earners. An analysis of the data for 21 developed countries indicates that while the labour force in these countries in the decade 1950-61 by 29.7 million, the number of employees increased by 34 million, which is a 14% excess increase in the number of employees over the labour force increase indicating that more jobs had to be created than the actual increase in the labour force. Such aspects of the labour force require deeper examination.

The rural-urban distribution of the population influence employment policies. For example, the rural-urban distribution in India by industrial categories is indicated below (Based on Census Data);

PERCENTAGE DISTRIBUTION OF WORKERS IN
BROAD INDUSTRIAL CATEGORIES - RURAL
AND URBAN - INDIA

<u>Rural</u>	<u>Agriculture</u>	<u>Manufacturing</u>	<u>Services</u>
1951	82.3	6.7	11.0
1961	82.8	6.8	10.4
<u>Urban</u>			
1951	13.8	25.8	60.4
1961	12.1	29.3	58.6

The major proportion of the workers are in the rural sector. In view of the social and economic implications of urban growth not being commensurate with industrialization, employment policy would have to be deliberately oriented to creation of employment opportunities in the rural area itself. Thus, a considerable proportion of the additional employment must occur in agriculture, small scale industry, construction and the "services" sector in the villages. The development of modern large scale industry is unlikely to make any significant contribution to employment creation under these circumstances. The data would, in conjunction with the fact that migration from the rural to the urban areas only tends to inflate the urban unemployed, indicate that employment and investment policies must deliberately seek to reverse this trend.

The formulation of a manpower or employment policy is subject to many constraints. One of the more difficult constraints is often likely to be the problem of availability of the type of demographic data necessary. The census is the principal source of information. It provides data relating to the composition of the population by age, sex and occupation, its distribution, educational levels, the labour force characteristics etc. The regional demographic characteristics are available from the census results. When, however, the type of data considered necessary is not available, other sources have to be depended upon, such as labour force sample surveys, employment exchange records, etc. But the more important constraint is that such policies cannot be considered in isolation. They have to recognise and take into account the socio-economic setting in which they operate.

An employment policy cannot be formulated in isolation, ignoring the economic, social or political constraints involved. To the extent that it is necessarily influenced by these constraints, non-demographic factors come into play. Most of the developing countries are characterised by rapid population growth, a surplus of unskilled labour except in a few "pockets of development", a shortage of skilled labour, a young age distribution and high juvenile dependency rate. Declining birth rates would no doubt help to change dependency rates will not reduce the need for investment in the younger sections of the population if full advantage is to be taken of the large potential supply of skilled labour which is available from past high birth rates.

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The size of the economically active population while no doubt the principal factor is not always a complete measure of

the labour supply, since it takes no account of the efficiency of workers or the differing amounts of time workers are willing to contribute to economic activities. The amount of working time offered per member of the economically active population is influenced by demographic factors, since women young people who may still be attending school, and older workers are, on the average, less likely than other workers to work full time. Likewise the sex and age composition of the work force may affect its efficiency.

In the formulation of an employment policy social or other factors that effect the inclination to engage in economic activities, the availability of opportunity to engaged in such activities and their influence on the participation rates cannot be ignored. The participation rates themselves provide indicators of the influence of such factors. Difference in these rates in various parts of the country when analysed in relation to local characteristics of the economy, principal type of economic activity, extent of unemployment, rural or agricultural population density and other such factors, would provide the constraints within which policy has to be formulated.

Certain basic aspects of the inter-relation between demographic, economic and social factors and their influence on manpower and employment policies must be noted. The growth of population and of the labour force is not always accompanied by a commensurate increase in the other factors of production. Low productivity is aggravated by a low level of skills and shortages of persons in key categories such as managers, technologists and others. There is a high level of unemployment in urban areas and widespread underemployment in rural areas. These factors emphasise the urgency of raising the level of investment, but since resources available for investment are limited, programmes have to be carefully allocated. Economic development, under these circumstances, would call attention to the need for a manpower and employment plan. In this connection, it is useful to remember that the concepts and definitions developed for industrialized Western economies can only be generally adopted by the developing countries. Basic structural differences often necessitate modification. Standardisation or extreme refinement of criteria or definitions used in the Census or in the other surveys for demographic data may not be very rewarding in a case where the reporting is largely dependent on the unskilled Enumerator's notion of the terms or definitions. Indian Experience indicates that broad dimensions of the manpower picture can be established on the basis of the census or other surveys even if the criteria for the determination of the economic status are only broadly specified. However, supplementing this data through more refined surveys and investigations would provide a stronger statistical base for the manpower and employment plans.

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SUMMARY

Of the various resource factors that matter for economic development, the human resource is the most important and, consequently, one of the important facets of economic planning is to identify and develop manpower. The formulation of a manpower policy depends on the systematic assessment of the current and future manpower situation. Such an assessment has to take into consideration the demographic characteristics of the population of which the main ones relate to the size and composition of the population, the size and composition of the labour force and the employment and unemployment patterns. Manpower policy has to recognise and take into consideration regional demographic characteristics.

Manpower policy is most intimately connected with educational policy. One of its objectives has to be the evaluation of the present stock of literate and skilled persons in the country, the determination of the future skills necessary, based on which educational policy would have to be formulated.

Migration, both internal and international, influence manpower policy. Internal migration in association with local factors, such as rates of natural increase, resources of an area, etc. would provide indicators for regional manpower and investment policies.

An important part of economic and social policy is a commitment to an active employment policy. The content and scope of an employment policy depend on various demographic and social facets of population, particularly of the labour force. The number of workers, the age-sex participation rates, the accretion to the labour force overtime, the availability of skills, the rural-urban composition, etc., are all components that influence employment policy. Employment policy cannot ignore the fact that some formerly classified as family workers or self-employed are likely to move into the labour market, thus increasing the demand on the number of employment opportunities to be provided. The rural-urban composition of the labour force in India would appear to call for special policies of employment and investment designed to reverse the trend of rural to urban migration which now only adds to the urban unemployed.

Employment policies are subject to many constraints, including deficiencies in data. The major constraints are the economic and social setting which cannot be ignored.

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X. 07

Industrialisation and Occupation Structure in India

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INDUSTRIALISATION AND OCCUPATION STRUCTURE IN INDIA

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How and to what extent the growth of modern industries in India, is reflected in the occupation structure? Here occupation structure includes the ratio of various occupations by type and level; the values and attitude associated with them and their relative position in prestige scale. An attempt to answer the question posed here would require a preliminary appraisal of the history of growth of modern industries in India.

HISTORY OF GROWTH OF MODERN INDUSTRIES:

Gadgil has noticed three stage in the industrial progress of India. From 1860 to 1875 was a period, which witnessed the beginnings of the factories and plantations, but in 1875, the progress achieved was insignificant. In the same period took place a rapid decline of the handicrafts in India. This latter movement continued throughout the next period, till about the late nineties. It was only after the late nineties that industrial progress all over the country began; and in the first decade of the twentieth century, many mineral industries and some small miscellaneous industries came into prominence. Growth of larger industries has taken place, particularly after the first world war.

An idea of the growth of manufacturing industries in India, from the middle of the 19th century to the second decade of the present century can be obtained from the following statement.

Year	Companies at Work	Paid up Capital in Crore Rs.
1884 - 85	694	20.63
1899 - 1900	1340	35.43
1903 - 04	1489	38.71
1913 - 14	2744	76.60
1922 - 23	5211	265.30

It is however in the post-independence period, that industrial progress has taken place in India on a massive scale. The index of industrial production (base 1956 = 100) has increased to 174.6 in 1964 from 73.5 in 1951.

WORKING FORCE ENGAGED IN MANUFACTURING SECTOR:

One would expect that the rapid industrial growth would be reflected in progressively increasing proportion of workers in the manufacturing sector. But this is not the case in India. A statement giving the distribution of the working force by broad industrial categories during 1911-1961 is furnished in appendix -1.

The statement shows that in 1911, 9.48% of the total workers were engaged in manufacture including household industry. After that, during 1921 and 1931, there was a slightly downward trend in the ratio of workers engaged in this industrial category. In 1951, a slightly upward trend was registered. It was continued in 1961 also. As a result of these ups and downs, the position in 1961 remained more or less at the same level as in 1911.

The position can be looked upon in a slightly different way as well. The activities connected with exploitation and extraction of natural resources may be considered as primary sector, those connected with manufacture and constructions as secondary sector and those connected with transport, trade and commerce and services as tertiary sector.

If the secondary sector as a whole is examined, taking into consideration construction along with manufacture, compared to 10.42 % in 1911, - in 1961, 10.58 % of the total workers were found in this sector. Thus only a nominal rise in the ratio of the working force in the secondary sector to the total working force, has taken place. But simultaneously a slight rise has taken place, in the primary sector as well, - from 72.61 % in 1911, to 73.42 % in 1961 - Interestingly enough, the ratio of the working force in the tertiary sector has slightly gone down.

CORRELATES OF STAGNATION IN INDUSTRIAL WORKING FORCE:

The stagnation, and in some cases, decrease in the numerical strength of the industrial labour force, has been examined by several authorities.

The 1911 census, reported a 6 % decline in the number of textile workers during the preceding decade, despite the gradual extension by that time of textile manufacturing in India. This decrease was attributed to the almost complete extinction of cotton spinning by hand. In the hide, skin and metal trades also, the 1911 census recorded a decrease in the number of workers by 6 percent, although at the same time the number of metal dealers increased six times. It was considered to be largely due to the substitution of indigenous brass and copper utensils, by enameled ware and aluminium articles imported from Europe.

Data has drawn attention to the declining number of workers in principal industries during 1911 to 1931.

	1911	1921	1931
Textiles	4449449	4030674	4102136
Industries of dress and toilet	3747755	3463842	3380824
Wood	1730920	1581006	1631723
Food industries	2134045	1653464	1476995
Ceramics	1150168	1085335	1024830

He explains this by the failure of modern industry to compensate for the decline of old handicraft industry. "The advance of factory industry had not overtaken the decay of handicraft. The process of decay characteristic of the nineteenth century was being carried forward in the twentieth century and in the post 1918 period".

In a recent paper Maitra has examined the question in some detail. He has referred to the fact that in India, modern methods of production that were introduced since the middle of the 19th century, were not the result of a process of local economic growth. Industrialisation in India was confined at the beginning to plantation and textile industries, machineries for which were imported. Thus the limited modern industrial sector that grew was following capital intensive methods with the help of imported machineries and technical know-how. This process of development has got very little backward linkage effects and thus the diffusion of growth effects of development of modern sector did not take place.

From the foregoing data, and the interpretation of the same, it is obvious that growth of industries by themselves, may not be able to generate proportionate employment opportunities in the secondary sector. The context of growth of industries-whether they are endogenous or exogenous, the type of industry, level of technology, the total economy of the country and the industrial relations, are important contributory factors to the growth of industrial labour force.

Sinha has examined the question of industrial employment from a different angle. He has categorized industries as "modern" or "organised" and other than modern with reference to dual criteria as follows (i) 75 per cent or more workers must belong to the non-household industry and (ii) 50 per cent of all workers must be employees. He has observed that though in several states has proportion of workers in mining and manufacture has gone down during 1951-61, the proportion in the organised sector shows a different trend.

For instance in Andhra Pradesh, the proportion of workers in mining and manufacture has gone down from 11.75 % in 1951 to 11.44 % in 1961. During the same period the proportion of workers in organised mining and manufacture sector has gone up from 2.30 % to 2.56 %. Sinha suggests that de-industrialisation, as reflected in the decline of the ratio of non-agricultural labour force, is in most cases not a sign of retro-gression. It implies gain in organised employment at the expense of unorganised groups, and therefore an improvement in the quality of non-agricultural employment.

The inter-pretation given by Sinha, does not however contradict the position taken by Dutta- in fact it supplements the same, though there is apparent difference in social valuation of the shift in the relative importance of the "organised" and unorganised sectors of industry.

LEVELS OF DEVELOPMENT AND RELATION BETWEEN SECONDARY AND PRIMARY SECTORS:

The ratio of workers in the secondary sector to that in the primary sector gives a rough index of the liberation of the rural economy from its agricultural base. It may be examined how it is related to the level of development of the various regions. For this purpose Mitra's scheme of classification of the districts of India, in terms of their levels of development would be adopted here.

Mitra has classified the 327 district of India, as they existed in 1961, as follows.

Level of development	Number of districts
First or lowest level	79
Second level	88
Third level	76
Fourth or top level	84

A statement giving the distribution of districts in India with reference to the percentage of workers in the secondary sector to those in the primary sector and the

levels of development is furnished below.

Percentage of workers in secondary to primary workers	Total number of districts	Number of districts where the level development is			
		Lowest	Second	Third	Highest
1	2	3	4	5	6
5 and below	70	29	21	11	9
6 - 10	139	35	45	31	28
11- 20	77	9	18	19	31
21- 40	26	3	4	9	10
41 & above	11	2	-	6	3

(This table does not include information in respect of L.M.&A., Dadra & Nagar Haveli, Goa, Daman & Diu and Pondicehrry and three entirely urban districts.)

The statement shows that there are 70 districts where the workers in the secondary sector constitute 5 % or less of the worker in the primary sector. When the position with reference to the levels of development is considered, it is the lowest level of development which constitutes the mode. (29 districts) There are 139 districts where the workers in the secondary sector constitute 6-10 % of the workers in the primary sector. It is the second level of development which constitutes the mode in case of these districts. There are 77 districts where the workers in the secondary sector constitute 11- to 22 % of the workers in the primary sector. In this case, the highest level of development constitutes the mode (31 districts). There are 26 districts in which the workers in the secondary sector constitute 21 to 40 % of the workers in the primary sector. In this case also, it is the highest level of development which constitute the mode (10 districts). There are 11 districts where the workers in the secondary sector constitute 41 % and above of the workers in the primary sector. In this case the third level of development constitutes the mode (6 districts). The foregoing data, with a solitary exception, very neatly brings out the relation between the level of development and the ratio of workers in the secondary sector to those in the primary sector.

RATIO BETWEEN SECONDARY AND TERTIARY SECTORS AND LEVEL OF DEVELOPMENT:

It is assumed that with the growth of industries, needs for new types of services also grow up and as a result there is a corresponding rise in the tertiary sector. But earlier it has been seen that at the national level, though there has been some nominal increase in the working force in the industrial categories of manufacture and construction during 1911 - 1961, there has not been a corresponding rise in the working force in the tertiary sector.

The position may be examined in a different way by relating the ratio of secondary and tertiary sector working force to the level of development. A statement giving the particulars is furnished below:-

Size group of workers: I:(in tertiary sector as percentage to those in secondary sector	Total number of districts	Number of districts where the level of development is			
		Lowest	Second	Third	High- est
1	2	3	4	5	6
Below 60	27	14	6	3	4
61 - 120	156	33	40	43	40
121- 240	120	24	39	37	30
241- 480	8	4	-	-	4

The statement shows that there are 27 districts where the workers in the tertiary sector constitute less than 60 % of the workers in the secondary sector. In case of these district, it is the lowest level of development, which constitutes the mode. There are 150 districts where percentage varies from 61 to 120. In their case the third level of development provides the mode (43 districts). There are also 120 district where the percentage varies from 121-240. In their case, the second level of development constitutes the mode (39 districts). There are 12 districts where the percentage varies from 241-480. These 12 districts are equally distributed in all the four level of development. There are 8 districts where the percentage is more than 481. Out of these 8 districts, four are at the lowest level of development and the remaining four are at the highest level. The foregoing data show that there is no direct relation between the level of development and the ratio of the working force in the secondary and tertiary sectors.

It is quite possible that the tertiary sector in rural India, frequently contains within it, the vestiges of a feudal social structure, where a large number of village servants and family servants render traditional services to the farmers. They are the most vulnerable section of rural economy; and often with the availability of employment opportunities in organised industries, they switch over to the same. Thus at the initial stage of industrial development, a shrinkage of the tertiary sector is quite on the card. This however marks only a transitional stage and with the intensive growth of the secondary sector, a tertiary sector, with a qualitative change, has to come up, to cater to the new types of needs of the industrial civilization.

OCCUPATIONAL PATTERN IN INDUSTRIES OF DIFFERENT CATEGORIES:

On the basis of occupational returns collected from 28433 larger establishments employing 25 or more persons and 39978 smaller establishments employing 10 to 24 person, throughout the country in 1967, the Directorate General of Employment and Training, Ministry of Labour Employment and Rehabilitation has published some interesting sets of data. The same would be briefly discussed here.

(a) (i) OCCUPATIONAL DISTRIBUTION-LARGER ESTABLISHMENT:

Unskilled workers constituted the largest group (37.6 per cent) followed closely by craftsmen and production process workers (34.7 per cent). On the other hand, clerical and related workers, Professional and technical Workers and miners, quarrymen and related workers accounted for 8.0 %, 7.6 % and 5.0 %, respectively. The remaining 7.1 % were primary and middle school teachers, administrative, executive and managerial workers, sales workers farmers fishermen and related workers, workers in transport and communications and service, sports and recreation workers.

(ii) OCCUPATIONAL DISTRIBUTION-SMALL ESTABLISHMENTS:

Unskilled workers constituted the single largest group (26.1 per cent), followed by craftsmen and production process workers (23.1 per cent), professional and technical workers including primary and middle school teachers (22.2 per cent); clerical and related workers (9.2 per cent); service, sports and recreation workers (7.9 per cent); administrative, executive and managerial workers (4.0 per cent). The remaining 7.5 per cent were sales workers, farmers, fishermen and related workers, miners, quarrymen and related workers and workers in transport and communication occupations.

(b) TRENDS IN OCCUPATION PATTERN DURING 1961, 1963, 1965

There has been

(1) an increase in the proportion of professional and technical workers from 4.5 in 1961 to 7.6 in 1967.

(ii) Some increases in respect of clerical and sales workers, farmers and fishermen and service, sports and recreation workers.

(iii) a decrease in the proportion of other unskilled workers from 36.2 during 1963 to 34.8 during 1967 which is a consequence of growth in industrialisation.

(iv) a sudden drop in the craftsmen and production process workers during 1967 due to a fall in the rate of response under the enquiry and recessionary tendencies prevalent during the year.

(v) no marked change in the occupation pattern of other categories of workers.

(c) OCCUPATIONAL PATTERN IN PRIVATE AND PUBLIC SECTORS:

A comparison of the occupational pattern of the employees in the public sector, 1966 and private sector 1967 (large and small establishments) reveals that.

(i) The proportion of craftsmen and production process workers, miners and quarrymen, as well as other unskilled workers was higher in the private sector.

(ii) The proportion of primary and middle school teachers, administrative, executive and managerial workers, clerical and related workers, service, sports and recreation workers, transport and communication workers and unskilled office workers was significantly higher in the public sector.

(iii) The proportion of other unskilled workers, both in private and public sectors constituted the largest group.

(d) WOMEN EMPLOYEES AND OCCUPATION PATTERN:

(i) Women employees in 1967 18.2 per cent of the total in larger establishments and 17.6 per cent of the total in smaller establishment, as against 16.4 per cent and 20.5 per cent respectively in 1965. The proportion of women and non-employees to their respective totals in certain selected occupational groups was as follows:

Occupational groups	Larger	Smaller
Unskilled worker		
Female	55.9	40.2
Male	33.5	23.1
Craftsmen, production process worker		
Female	26.3	14.3
Male	36.4	24.9

(ii) OCCUPATION PATTERN OF WOMEN DURING 1961-67:

A comparison of the occupation pattern of women employees between 1961-67 larger establishment reveals that the percentage of women in professional and technical groups went up from 3.4 in 1963 to 9.8 in 1967. Between 1963-1967, the proportion of women primary and middle school teachers alone increased from 0.2 to 3.0. A slight increase has also been recorded in the clerical group where the proportion improved from 1.5 in 1961 to 2.0 in 1967. On the other hand, significant decline among unskilled office women workers is noticeable, where the proportion fall from 6.7 in 1961 to 0.6 in 1967.

(iii) OCCUPATION PATTERN OF WOMEN IN PRIVATE AND PUBLIC SECTOR

The proportion of craftsmen and production process workers as well as unskilled workers other than office worker, was higher in private sector. In the case of professional and technical workers, primary and middle school teachers as well as clerical workers, however the proportion was higher in the public sector.

It is found from the foregoing of data, that a rapid change is taking place in the occupation mix in the industries. The proportion of unskilled labour is going down, and that of professional and technical process workers, administrative executive personnel etc. is going up. It is also found that the proportion of unskilled workers is smaller in public sector undertaking than in the private sector undertakings. The employment opportunity for women in socially valuable occupations like teaching, professional and technical work is also relatively higher in the public sector.

OCCUPATIONAL PATTERN IN SELECTED MANUFACTURING INDUSTRIES:

The data published by D.G.E & T provide information about the occupation mix in a number of selected industries. It is found from the same that in 1967.

(a) professional, technical and related workers (6.4%) as well as clerical and related workers (11%) was highest in chemical and related products.

(b) craftsmen and production process workers were the highest (74%) in textile mill products and apparel.

(c) unskilled workers comprised the maximum proportion (51.8%) in the manufacture of stone clay and glass product.

SOCIAL IMPLICATION OF PATTERN OF OCCUPATION MIX IN INDUSTRIES:

The social implication of the pattern of occupation mix in various industries has been discussed by Burman, in an earlier paper, with reference to West Bengal.

The major industries in West Bengal are jute, textile, tea-plantation, mining, engineering, and chemicals. Because of competition with synthetic products as well as with the growing jute industry of East Pakistan, the importance of the traditional jute products like hessian is dwindling very rapidly. The scope of modernization in this industry is very limited. The scope of mechanization in plantation and mining industries is also limited in the given economic structure of the country. All these have important social consequences. Modernization of industries changes the ratio of various classes in the total labour force of the society. For instance, where modernization has been possible in jute industry, the ratio of unskilled workers to semi-skilled, skilled and supervisory administrative and other personnel has gone down considerably. This change in the occupational structure in the industry provides better scope for the satisfaction of the aspirations of the urban middle class, as well as the children of the rich and middle peasantry and enterprising working class, who try to emulate the way of life of the educated middle class.

"In the 1960's and early 1960's engineering industry grew up in West Bengal at a rapid rate. Here the ratio of unskilled labour is comparatively low and those of skilled, semi-skilled, administrative and other personnel are comparatively high. For sometime, the growth of engineering industry could attract a good number of young persons from the Bengali middle class. But during the last few years, the engineering industry is also facing some problems." It is held that the failure of industries in West Bengal to effect structural changes is considerably responsible for the present unrest in the State.

INFLUENCE OF THE TRADITIONAL SOCIAL STRUCTURE ON THE OCCUPATION STRUCTURE IN INDUSTRY:

(a) Ethnic correlates of occupations.

In many industries, the various occupations are found to be virtual monopoly of different castes and religious groups, Burman has discussed the same, and its ramification in inter-community relations, with reference to Ahmedabad. He has quoted from a report of Ahmedabad Mill Owners' Association 1970, according to which, with the gradual evolution of the textile mill industry in this centre, there has arisen a certain monopolistic tendency among workers, with the result that certain departments and / or sections of department in the mills have been manned more or less wholly by workers belonging to particular caste or community. Such a development tends to create a caste or

that when the industry was first started in this centre, the recruits at the initial stage were drawn from the caste or community already working in similar occupations e.g. the spinners were recruited from Harijan inhabitants of North Gujarat who were hereditary handloom weavers. Gradually this process took the form of a rigid monopoly. Today there is no bar to any worker to secure employment in any department of a mill; but there is always some reluctance, on the part of, say a harijan, to join as a weaver when offered such a job.

Though the position of monopoly has tended to be slackened to some extent, there are still a few departments in addition to those mentioned above, where the various castes and communities have virtual monopoly. For instance, in dyeing and printing, the Muslims have the dominant control.

In weaving, though there are good number of harijan workers, their skill is more limited to coarse weaving.

This pattern of ethnic correlation of various operations has complicated the industrial relations. For some time the textile industry has been switching over to the production of finer variety of cloth in greater proportion. This has on the one hand augmented the demand for Muslim labourers, who have specialised in finer count weaving, and on the other, posed a threat to the continued employment of Harijan labourers, - leading to the intensification of communal tension.

(b) The ethnic correlation of various occupations, has been noticed in the coal mines of Raniganj belt. Here, the tribal labourers are considered to be experts in mining coal with pick-axe, from a coal gallery. With the introduction of the machine, the demand for pick-miners has greatly decreased. Now, coal is mined either by machines or by blasting; and there is more demand for loaders to load coal in the tubs. But the tribal labourers are reluctant to turn into loaders, as in the mines this operation is associated with lower castes. The tribal labourers are therefore being replaced by others.

(c) The role of caste in determining the worker's choice of occupation in industries in Calcutta and Bombay has been studied by the UNESCO Research Centre on Social and Economic Development in Southern Asia. In Calcutta, Monins and Tantis who were originally handloom weavers, see work in weaving and spinning departments of textile mills, Muslims from Ferozabad (U.P.) come to work in Calcutta's glass factories. Mochis and Chamars, -castes having traditional connection with leather, take up work in leather factories or occupations connected with leather, like sewing and repairing belts, in other industries.

Oriyas take up work in humid conditions like beaming departments in jute mills. Biharis take up heavy jobs like lifting bales in mills; low menial jobs are generally done by persons belonging to sweeper castes.

In Bombay, the Julhai Muslims tend to concentrate in weaving departments, and their womenfolk in the colour-winding branch of the reeling department; the worker from U.P. has a predilection for carding; the Deccan Maratha prefers lascar's work in lifting heavy weights; and the Konkani Maratha prefers work which requires skill and intelligence and avoids employment in the engine, boiler or mixing rooms. Chamars tend to be concentrated in small tanneries in Bombay and Lohars in foundries. In Bombay textile mills, Muslims still have a hold in mixing, speed frame, winding and reeling departments; and U.P. workers are employed in mixing and speed frame departments and in the weaving shed.

The UNESCO Report further mentions that the particular predilection displayed by labourers in their job selection is influenced by caste-occupation or caste-sanction, and was fostered by the system of recruitment through foremen-jobbers; the existence of relatives or co-villagers might also have helped to bring about such selection. Concentration of particular communities and castes in particular occupation helps to maintain caste-ties, provides a worker with social contacts with his own people in the new city environment, and tends to stabilize the labour force, reducing dissatisfaction with work and co-workers.

(d) Cultural factors inhabiting the ethnic groups from taking advantage of industrial employment opportunity also require to be studied. In Jalpaiguri district of West Bengal, plantation industry grew up very quickly towards the last part of the last century. Beautiful roads were constructed health conditions improved spectacularly, schools grew up even in most outlying areas, but the price of progress had to be paid by the Mech tribe, who were the original inhabitants of the district. They were at that time carrying on shifting cultivation on the hill sides in the district. With spread of the tea industry, all these hills were covered with tea plants and hardly any land was left for carrying on shifting cultivation. Hence the Mech people saw in the industry, menace to their survival. They turned their face against it. It is understood that at the initial stage, a few of them took employment in the plantations, but soon they had to quit. They did not have much tradition of work even as agricultural labourers under direction of others. They were also not accustomed to the regularity of work, day in and day out, irrespective of the rhythm of seasons and social moods. The monopolistic and paternalistic control exercised by the management in the plantations also definitely went against their grain.

VALUES AND ATTITUDES ASSOCIATED WITH INDUSTRIAL OCCUPATIONS:

(a) Attitude to factory work.

The responses obtained by the UNESCO Research Centre, from 192 Bengali, 178 U.P. factory workers in Calcutta and 150 U.P. and 200 Maharashtra factory workers in Bombay, are indicated in the statement below.

Item	Calcutta Bengali	U.P.	(Percentage)	
			U.P.	Bombay Maharash- train
1. Accepted factory work because liked some aspect of it	11	7	11	19
2. Would like children to work in factory	31	22	10	13
3. Present job in relation to previous job.				
(a) Less strenuous	20	32	25	14
(b) Prefer	59	68	58	75
(c) Higher or equal in status	66	67	43	80
4. Attitude to first factory job				
(a) Expected to like very much or on the whole	69	69	60	58
(b) Enthusiastic or excited	81	83	31	50
(c) Expected to like technical or mechanical aspect or mill job as such	56	86	43	61
(d) Turned our well or grew to like it	28	13	78	82

Item	Calcutta Bengalee	U.P.	(Percentage)	
			U.P.	Bombay Maharash- train
5. Given a choice prefer factory job	53	60	39	63
6. Can do more work in same time	32	19	15	22
7. Workers work as much as they should	83	89	57	82
8. Discipline is proper	29	24	87	67
9. Have aspiration about higher status in factory	25	23	57	54
10. Hope that aspiration about status will be fulfilled	33	88	41	35
11. Know about working of machine employed on	71	56	71	67
12. Prefer job involving skill and dexterity	70	25	61	61

It is obvious that there are considerable differences in the attitudes to different aspects of factory work of the workers of Calcutta as a whole and Bombay as a whole. Though there are differences among the Bengali and U.P. workers of the two industrial centres. It appears that in addition to the cultural orientations of the ethnic groups to which the workers belong, the differences in the socio-cultural climate associated with the industries and the industrial centres under study, have important contributory role in this matter.

(b) General outlook.

The UNESCO Research Centre's study of the general outlook of the workers in Bombay and Calcutta, -has brought

out the following aspects.

Item	Percentage of workers responding positively.	
	Calcutta	Bombay
1. Prefer city life	28	34
2. Life has improved in the industrial age	78	81
3. Changes brought about in life are desirable	8	24
4. We are better off than our forefathers	8	50
5. Advance of mechanization will bring prosperity	82	93
6. Advance of mechanization will bring happiness	79	87
7. Socialistic pattern is coming	62	69

As observed in the UNESCO report, it appears from the foregoing data, that the workers in Bombay are more attuned to change in general conditions than those in Calcutta.

(c) Views about the method of improving the quality of work in respective occupations.

In a study in the steel plant at Rourkela, out of 21 persons who stated that there was scope for improving the quality of work, 14 stated that it depended on sincere efforts on the part of the workers themselves. The suggestion, next in frequency is the necessity of monetary incentive. 13 persons out of 21, have mentioned the same. The suggestion, third in frequency, is the necessity of removal of undesirable persons from the work groups. Nine persons stated that some of the officers and supervisors were not the right type of persons. Their presence affected the morale of the workers. Necessity of giving training to workers had been mentioned by eight persons. Other suggestions are (i) improving the condition of the workshops and (ii) introducing improved tools and equipments. It is to be noted that some of the persons suggested more than one condition.

The Rourkela study also brought out the fact that the persons in different industrial occupations were involving themselves in non-traditional interaction situations, like commensal and visiting relations with fellow workers belonging to different castes. Such change in behaviour pattern of individual workers is expected to promote social change in the long run.

MOBILITY IN INDUSTRIAL OCCUPATIONS:

A study of the occupation structure in the wake of industrialisation, would be incomplete without a study of occupational mobility.

(a) mobility of individuals.

In the light of the experiences in developed countries Erickson has observed that social mobility more frequently takes place within manual and non-manual occupations rather than between them.

In India Nijawan has found that the extent of out-mobility of sons of fathers belonging to white-collar, professional and business occupations is higher than those from skilled and unskilled occupations.

In Poona, Sobhani and Pradhan have observed that one quarter of those whose fathers were in non-manual positions had become manual workers, while 27 % of those of manual origin had risen to middle classes.

(b) Mobility resulting from structural adjustment.

On the basis of his study in Poona, Sobhani has observed that in the present generation, the tempo of change seems to have quickened and this is reflected in declining proportion of those engaged in unskilled manual work and increasing proportions among skilled and highly skilled and among clerks and shop assistants in the total occupational pattern.

POSITION OF INDUSTRIAL WORKERS IN THE POWER SET UP AND IMPACT ON OCCUPATION PATTERN:

In addition to technological and economic factors the employment pattern in modern industry depends considerably on the balance of pressures generated by various conflicting interests. A study of the conflict relating to labour land ratio in plantation industry would illustrate the point. In the early sixties, some of the trade unions of the workers engaged in plantation industry were agitated on an alleged plan of the employers to deliberately reduce the working strength gradually and systematically. They further alleged that with the enforcement of the minimum wages Act in 1952 and the plantations labour Act in 1954, shrinkage in

employment had started, because under these Acts labourers in continuous employment were entitled to various benefits. To obviate the responsibility of giving to the labourers the benefits, required by these measures, the following devices were resorted to,

(a) vacancies created by dismissal, death, resignation or retirement etc. were not filled up.

(b) vacancies created by the marriage of a young girl to a boy of another garden were not filled up.

(c) Any shrinkage of labourers made up by casual labourers or other surplus labourers who were not offered continuous employment.

As a result of the agitation carried out by the trade unions, a one member committee was appointed by the Ministry of Labour Government of India in 1964, to look into these allegations. According to the committee, in North East India most of the associations of the employers agreed that there had been a slight decline in employment in plantations and that the proportion of temporary casual labour etc., to the permanent working posts might have gone up in few gardens. The employers however, did not agree that there could be a fixed land labour ratio. According to them progressive use of mechanical appliances and equipment like tractors, bulldozers etc. and decrease in the extent of absenteeism had brought about a new adjustment of man-power recruitment in tea-industry. In South India, the United Planters' Association conceded that there had been fall in employment in tea plantations. This however, was represented by the association to be an outcome of stabilisation of employment.

It appears that technically the controversy, can be stated to be that of rationalisation in industry; but in sociological parlance it is to be looked upon as a power-struggle. In the present case, the employers had ultimately to accept the point of view of the workers, only when they were confronted by a massive movement of the workers.

SUMMARY AND CONCLUSION:

The present rapid survey of the occupations structure, prevailing in the country, in the wake of spread of modern industries, suggests that, while the growth and composition of industrial labour is determined considerably by the growth history of the industry, type of industry, level of technology and social organisation, the industrial occupations in their turn reinforce, if not generate attitude orientations, values, and modes of behaviour which have lasting effect on the society.

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WORKING FORCE IN INDIA BY BROAD INDUSTRIAL
CATEGORIES FROM 1911 - 1961.

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INDIA⁺

Year		Total population	Total Workers	I	II
				Cultivators	Agricultural labourers
1		2	3	4	5
1911	P	251273414	121189376 (48.23)	58344338 (48.14)	24115723 (19.90)
	M	127991486	79392949	41082701	11853954
	F	123281928	41796427	17261637	12261769
1921	P	250531468	117864584 (47.05)	61682693 (52.33)	19684734 (16.70)
	M	128168449	77728316	42444384	10200029
	F	122363019	40136268	19238309	9484705
1931	P	278122600	121149668 (43.36)	57460843 (47.43)	22019657 (18.18)
	M	142642246	82659075	42006076	12517746
	F	135480354	38490593	15454767	9501911
1951 ^{**}	P	356879394	139983750 (39.22)	69938981 (49.96)	27326159 (19.52)
	M	183333874	99537035	51457508	14759346
	F	173545520	40446715	18481473	12566813
1961	P	437844504	188218034 (42.99)	99461958 (52.84)	31438539 (16.71)
	M	225600116	128871475	66375936	17287555
	F	212244388	593465559	33086022	14150874

+ Excludes Dadra and Nagar Haveli; Goa, Daman and Diu, North East Frontier Agency; Pondicherry.

** Excludes Jammu and Kashmir

Source:- Paper No. 1 of 1967

		III(A)	III(B)	IV & V	VI
Year		:Plantations :Forestry, Fishing :Livestock :and Hunting	:Mining and :Quarrying	:Manufacturing :including :household In- :dustry	:Construction
	1.	6	7	8	9
1911	P	5260431 (4.34)	283668 (0.23)	11484918 (9.48)	1140085 (0.94)
	M	3979383	189714	7311505	855944
	F	1281048	93954	4173413	284141
1921	P	4743623 (4.02)	307749 (0.26)	10253531 (8.70)	976496 (0.83)
	M	3508250	199401	6789976	703483
	F	1235373	108348	3463555	273013
1931	P	5515863 (4.55)	298791 (0.25)	9888752 (8.16)	1149426 (0.95)
	M	4171143	216558	6894070	884613
	F	1344725	82233	2994682	264784
	++				
1951	P	3438649 (2.46)	581314 (0.42)	13086306 (9.35)	1252820 (0.89)
	M	2449965	473427	10005579	1058842
	F	988684	107887	3080727	193978
1961	P	6383409 (3.39)	896116 (0.48)	17862451 (9.49)	2049769 (1.09)
	M	4763321	731505	13012701	1807426
	F	1620088	164611	4849750	242343

CHAWLA

	VII	VIII	IX	X
Year :	Trade & Commerce	Transport & Communications	storage: Other Services	Unclassified and general labour
	10	11	12	13
1911 P	6393956 (5.28)	1279260 (1.06)	8548922 (7.05)	4338075 (3.58)
M	4226291	1204204	6249207	2440046
F	2167665	75056	2299715	1898029
1921 P	6324856 (5.37)	1013789 (0.86)	7717830 (6.55)	5154283 (4.38)
M	4266751	943305	5686977	2980760
F	2063105	65494	2030853	2173523
1931 P	6174732 (6.10)	1143152 (0.94)	10327094 (8.52)	7171353 (5.92)
M	4428007	1100657	6319739	4120437
F	1746725	42495	4007355	3050916
++				
1951 P	7313517 (5.22)	2137029 (1.53)	10059525 (7.19)	4849450 (3.48)
M	6156586	2016509	7754945	3404323
F	1156931	120520	2304580	1445122
1961 P	7626060 (4.05)	2998931 (1.59)	11746223 (6.24)	7754578 (4.12)
M	6814067	2934197	9789779	5354873
F	811993	64734	1956444	2399700

CHAWLA

-10-

SYNOPSIS OF THE PAPER ON INDUSTRIALISATION AND
CHANGES IN THE OCCUPATIONAL STRUCTURE

The Socio-political and the technological context of the growth of modern industries has been briefly examined. It is noted that the enclaved industrialisation in India in the context of low level of agricultural technology has failed to have significant multiplier effect on the occupational structure and the percentage of the population in the secondary sector has remained more or less stagnant since the beginning of the century. But at the same time a structural change is taking place among the industrial workers. Ratio of unskilled workers and artisans is progressively coming down. There is a significant difference between the small scale and the large scale industries and also between the private and the public sectors in the ratio of different categories of occupations. The continuity of the tradition of household industry has also significant bearing on the organisation and occupational structure of the industries in the non-household sector. The shifts in the importance of various operations in consequence of technological modernization and change in the production schedule results in the generation of considerable strain and conflict. This seems to have implications for the larger society. Values, attitudes and world views associated with different categories of industrial occupations have also been briefly examined.

INDIAN CENSUS CENTENARY SEMINAR

October 23-29, 1972

SESSION :
Paper Code :

**X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT**

X. 03

Employment of Women Power

By

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Employment of Women Power

M. F. SRIVASTAVA*

Introduction:

Participation of women in economic activity is common in all countries, developed and developing. The extent of their participation depends upon factors too well known. While in the developed countries, many of which are now characterised by full employment, the debate on the extent of employment of women is not keen, and in fact, there is room for more women in the working force, in countries which are marked by labour surpluses, the need for providing employment for women when many men are available for work raises questions which cannot admit of categorical answers. The causes of the present employment situation can be broadly explained for a comprehensive study and analysis of the problem as below:

2. Women workers constituted 59.4 millions or 31.5 percent of the total workers in the country in 1961, according to the census data. During the last 60 years, their proportion to the total working force has fluctuated between 23.30 percent and 33.70 percent. (Table 1). These fluctuations, in the main, are due to, differences in the concept of 'worker' from census to census rather than participation of women in economic activity. The apparent increase in this category was more than 200 percent in the states of Andhra Pradesh, Madras, Mysore and Madhya Pradesh and more than 100 percent in in Orissa and Bombay. The obvious reason for this large increase was the definition of workers adopted in the 1961 Census. In case of seasonal work like cultivation a worker was defined as one who "had some regular work of more than one hour a day throughout the greater part of the working season."

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- 2 -
Table 1

Female Workers 1901-61.

Year	Women population	Cultivators Women workers in total	Agricultural Labourers	Mining Plantation etc.	Household Industry	Manufacturing other than household	Construction	Trade & Commerce	Transport storage and communications	Other services
	2	3	4	5	6	7	8	9	10	11
1901	31.70	14.44	5.17	1.02	=	3.95	0.21	1.87	1.03	1.96
1911	33.73	14.73	10.34	1.17	=	3.54	0.24	1.33	0.06	1.96
1921	32.67	16.52	3.15	1.17	=	3.01	0.24	1.78	0.05	1.75
1931	27.63	8.95	11.02	1.16	=	2.41	0.21	1.41	0.04	2.43
1951	23.30	10.59	7.31	0.78	=	1.62	0.17	0.66	0.07	2.10
1961	27.96	15.59	6.67	0.56	2.20	0.37	0.11	0.38	0.03	2.06

Note:- Workers here cover all categories of workers viz., employers, employees, independent workers, and family workers except in 1961, Household industry was included in Manufacture and Mining etc.

Source: Census of India, 1961 Paper No. 1(p.396).

It is obvious that this definition has wide coverage and is capable of being somewhat variously interpreted in practice.^{1*}

3. During the period relevant for our study and for which Census data are available i.e. the years 1951 and 1961, the percentage of women in the total working force changed from 23.30 in 1951 to 27.96 in 1961. The increase is somewhat higher than in the case of men, but for reasons stated, the limitations of such comparisons have to be understood. This increase in women employment is mainly marked in the cultivator category, while in all others there has been a drop as compared to 1951. The rural surveys portray the main characteristics of women workers in cultivator families. The most striking characteristic is the extremely large variation in the proportion of such women from state to state, region to region and community to community. A good indicator of this variation is the difference in proportion of female workers to male workers in cultivator families in different areas. The range of variation in the states is from about 85 female to 100

1* This type of possibilities could be indicated in this direction by reference to results of a farm business survey. As a part of the survey intended to assess the benefits of the Cauvery-Mettur Project, Prof. Sonachalam conducted a farm business survey in two contiguous areas - one irrigated and the other non-irrigated - in the region. He divided numbers of farm families in both areas according to economic status in four classes, viz. earners, earning dependents, family helpers and non-earning dependents. The percentage division of adult female members of farm families for the two groups as indicated in the published report of the survey (Sonachalam, Benefit-Cost Evaluation of Cauvery-Mettur Project, 1963 p.29) as follows. C.M.P. group: earners 7.0, earning dependents 16.9, family helpers 37.2, non-earning dependents 38.9. Control group: earners 19.0, earning dependents 3.1, family helpers 49.7 non-earning dependents 28.2. This shows that among adult female earners in both groups the largest category by far is what as a result of a detailed survey was termed as "family helper". This could be considered to be the rough measure of the range with in which, in a cultivator farm family, the decision whether a person is worker or not has scope for variation.

male workers in cultivator families in Maharashtra to less than 15 in West Bengal. Moreover district figures indicate that there is little uniformity as with-in the state. The proportions vary widely as between the Ambala Division and the rest of the Punjab or as between the hill districts of U.P. In this connection the most important consideration appears to be that of social convention relating to outdoor or field work by women.

4. In the non-agricultural sector, the proportion of women in employment has shown a decline. The 1961 census also reveals that in the non-agricultural sector women are employed in what is broadly called the 'services' group, which includes public services, education, medical and health, and the larger chunk of miscellaneous service categories. House-hold and small scale industries employed a large number of women than factories; in the former, women work more as helpers than as wage earners. Information regarding women employed as traditional artisans is however not available for the country as a whole. A recent survey of handicrafts and rural industry in Mysore state however, bring out the pattern. As expected, the proportion of women in such skilled occupations is higher in relatively less arduous tasks like mat making, pottery and manufacture of combs than in brass and copper-ware and sculpture, whether in same or metal. A survey in a town of Uttar Pradesh also reveals the same feature. Bidi industries in the small scale groups, is reported to be the most 'female intensive'.

5. The present situation of employment has aggravated due to increase in the participation of women and children in economic activities. It is said that agriculture engaged the large number of children. In India, the 1956-57 activity rates in the age-group 7 to 15 years were 19.13 percent in rural areas as against 7.05 percent in the urban areas. The second Agricultural Labour Enquiries revealed that the employment of children below 15 years of age was found 'to have increased from 4.9 percent of 'the total agrarian labour force in 1950-51 to 7.6 percent during 1956-57. In India in 1956-57, about 15 percent of the unemployed were under 17 years of age and more than 14 percent were aged 13-21 years in the rural areas. An author has calculated that if the 27 million young people aged less than 17 years now working in India left employment, at least 15 million adult unemployed would find work² account being taken of the differences in working capacities².

2. Ramesh Chandra: "Efforts of low income on the size of labour force and employment in India", Indian Labour Journal, December, 1961, p.1. 164.

Therefore, if children get educational facilities properly for the development of their skill and capabilities at the age which is not suitable for their employment, the employment situation naturally will not take serious form on the one hand and on the other, nation will be benefited of the grown ups' capacities and skills

6. The another cause for the increasing pressure on employment opportunities is the rise in participation of women in economic activities. The most significant development in the women's participation in economic life in the world is that "in many of the developing countries, while agriculture sector remains the most important from the stand-point of women's participation in economic life and their employment opportunities, there is never the less a movement, howsoever, slight it may appear from the available statistics, towards the non-agricultural sector of economic life, particularly towards the service sector and to a far more limited extent the manufacturing sector."³

7. In India, there were 59.4 million female workers out their population of 213 million in 1961. Thus 28 out of every hundred women were economically active and they formed 30.5 percent of total labour force of 188 million. India is one of the developing countries where women's activity is at a medium high level and they form 32 percent of the total industrial labour force. The proportion of females in the working force has registered a sizeable decline their percentage to the total coming down from 33.0 in 1901 to 29.3 in 1951 and 31.5 in 1961. In the world as a whole 27 out of every hundred women are economically active which shows a favourable trend in India regarding their participation rate in economic activity. In absolute terms, females in agricultural occupations increased by about 6 million during 1901-51. But as a percentage of total working force, the females in agricultural sector remained almost at the same level as in 1961 but in the non-agricultural sector, on the other hand, there has been a net fall in the case of females. Table 2 reveals the employment position of women in India⁴.

3. I.L.O. "Women Workers in a changing world", 1963, p.11

4. H.K. Advanathaya: "Women's Employment in India", International Labour Review, Volume LXX, July, 1954', p.441 and Planning Commission Occupational pattern of Indian Union from 1901 to 1951, Table No. X, p.13

Table 2

Employment Situation of Women in India

(Cols. 1 to 7)

Year	Total Classified Population	Total Working Force	Percentage	Agriculture		Percentage
				Males	Females	
1	2	3	4	5	6	7
1901	2,36,054	1,17,281	49.68	47,882	25,436	10.8
1911	2,49,554	1,24,276	49.80	53,850	29,710	11.9
1921	2,48,713	1,21,282	48.80	31,861	29,287	11.8
1931	2,75,915	1,29,623	46.98	35,881	25,588	9.3
1941	3,14,873	1,22,445	38.87	"	16,922	5.4
1951	3,55,642	1,42,337	39.91	66,244	31,244	8.7

Table 2(Contd.).....7.....

Table 2(Contd.)(Cols.8 to 12)

Year	Non-Agriculture			Total Males	Total Females
	Males	Females	Percentage		
1	8	9	10	11	12
1901	29,714	14,249	6.0	77,596	39635
1911	27,790	12,926	5.2	81,640	42636
1921	26,229	12,004	4.8	80,090	41292
1931	29,136	12,218	4.4	85,017	37806
1941	"	15,230	4.8	"	32152
1951	33,225	9,913	2.8	100,594	41743

8. The overall picture presented a relative increase in the number of women working in agricultural occupations while work opportunities outside agriculture had decreased. The Second Agricultural Labour Enquiry also reveals that the average employment of women workers for wages had increased for all India from 134 in 1950-51 to 144 days in 1956-57. The tentative and broad conclusions emerge from the analysis of last 50 years data are that (a) available work opportunities for women have decreased; relatively, (b) there has been a greater loss of opportunities in non-agricultural sectors, with the result that women's dependence, on agriculture for livelihood has increased.

9. The proportion of women population remained more or less constant round about 49 percent throughout the period 60 years 1901 to 1961 and there has been a continuous downward trend in the proportion of female workers from 1911 to 1951. But the proportion of female workers shows a definite increase in 1961. It is likely that in the pre-planned period, the increase in the opportunities of employment of women did not match with the increase in their number. The upward trend in the employment of women is noticed from 1951 onwards which may be due to wider employment opportunities as a result of development planning. The proportion of women in the labour force in relation to the total female population which had been decreasing steadily during the first half of the century rose again from 23 to 28 percent between 1951 to 1961. Though the percentage of women workers to the total female population declined however, from 31.7 in 1901 to 28 in 1961. The above analysis is obvious from the following table.

Table 3

Percentage of Women population to total population			
Year	% of Women population (total population = 100)	% of Women Workers to total women population (total population = 100)	% of Women to total workers (Men and Women = 100)
1	2	3	4
1901	49.3	31.7	33.5
1911	49.1	33.7	34.5
1921	48.9	32.7	34.0
1931	48.9	27.6	31.2
1951	48.6	23.3	29.0
1961	48.5	28.0	31.5

Source: Census of India, 1961 Paper No. 1, pp.395-401

5. H.K. Adyanthaya: "Women's Employment in India", op.cit.p.441.

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10. In industrially more advanced countries, women have been steadily abandoning agriculture, partly as a result of technical change reducing manpower requirements and partly as a result of an increase in more attractive employment openings in other sectors of economy. "The most significant overall change during the last of the half century has been not the increase in women's rate of participation in economic life and, particularly the growth in the number and proportion of women engaged in non-agricultural activities and the relative decline in the number of proportion of women engaged in agriculture and related activities.⁶ But the census figures in India reveal that the general trend in overall employment is reflected mostly in the primary sector of the economy. The increase in the employment opportunities noticed during 1951-61 which is reflected in the primary and secondary sectors is not reflected in the tertiary sector. It may mean that the impact of development plans in so far as employment opportunities for women are concerned has not been felt on the tertiary sector. In the secondary sector, there is significant increase in the proportion of women workers during 1951-61 as compared to primary sector. The details are given in table 4 below:

Table 4

Percentage distribution of Female Workers.

(Total Female Population=100)

Year	'Primary 'Sector I, 'II & III 'categories	'Secondary 'Sector IV, 'V, VI Cate- 'gories	'Tertiary Sector' 'VII, VIII and IX' 'Categories	Total
1901	23.59	4.20	3.91	31.70
1911	26.02	3.86	3.35	33.73
1921	25.74	3.35	3.53	32.67
1931	21.06	2.69	3.88	27.63
1951	13.54	1.93	2.93	23.30
1961	22.82	2.63	2.46	27.96

6. I.L.O. "Women Workers in a changing world", 1963, p.10

11. Thus the employment opportunities for women workers will increase in the non-agricultural sectors of the economy more than at present in future and the number and proportion of women engaged in agricultural related activities will decline relatively. But the present situation in India is that the proportion of women getting employment in agricultural sector has increased during the last decade 1951-61 instead of development of the economy in diverse spheres. Though of late, it is argued, that development itself increases unemployment. As the changes introduced by the economic progress take shape in reality, traditional social organisations break down and hidden under employment comes out into the open. The village economy and finally solidarity begin to disintegrate and more and more persons have out of the villages in search of jobs. Though, the growth of population is one of the contributing factors for the rate of pressure on employment opportunities in India but "the number of those _____ previously sheltered within the older social and economic frame-work----who were thus compelled to seek new avenues of employment has, perhaps, contributed in even much large measure to the pressure in the labour market than the growth in population as such".⁷

Conclusion:

Thus, in form and content, employment problem in India is complex. Number of factors, discussed above, are responsible for the complexity of this problem. The rapid growth in population numbers, the nature and pattern of employment in agriculture, the growth and development of the economy during the last sixty years and its effect on the technological and institutional basis of the economy, the increased proportion of women workers in the agricultural sector for getting employment and lastly the predominance of households as unit of production are the factors responsible mostly for the present increased complexity of employment problem in India.

7. K.N.Raj: "Employment and Unemployment in the Indian Economy: Problems of Classification. Measurement Policy Economic Development and Cultural Change, Vol.VII No.3, Part I, 1959, pp.270

Summary

1. The number of women cultivator families depends on regional economic norms. No general factors in these norms appear to operate, the number of women workers should, therefore, change in total numbers.
2. The number of women workers in cultivator families should also depend on socio-economic pressure. If both these are comparatively stable, changes in record of women agricultural labour families would also be related to broad population movement.
3. The size of the labour force in agriculture (cultivator and agricultural labour) indicates not the volume of employment opportunities but the volume of employment opportunities required.
4. The effect of economic development programmes on those employment in agriculture must be judged in relation to information regarding extent of employment. No tangible widespread improvement in either of these could be inferred from the Second Agricultural Labour Enquiry.
5. Social sentiments appears to be very powerful in determining the proportion of women seeking work specially outdoor manual work even in urban areas. This is shown by the proportion of women workers to total female population in the cities distributed over various regions of India.
6. The employment opportunities for women seem to be expanding only in non-manual, clerical, administrative and professional work.
7. The relatively simple and non-progressive pattern of employment of women, their being confined largely to unskilled and technically backward processes and their unsure hold on modern industrial employment all appear to result from the chronic redundancy of labour in India. No strategy of economic development is likely to succeed which does not make a frontal attack on this basic problem.

INDIAN CENSUS CENTENARY SEMINAR

October 23-29, 1972

SESSION :
Paper Code :

X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT

X 09

Growth of Population and Labour Force in Uttar Pradesh

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GROWTH OF POPULATION AND LABOUR FORCE IN U.P.

**ANAND SWARUP & L.N. SINHA

INTRODUCTION

This paper attempts to study the growth of population and labour force in Uttar Pradesh during the period 1901-70 based on the data available in various decennial censuses of India. The population and labour force of a country have an important bearing on the cultural and economic progress of its people. Many social and economic problems are connected with the size and composition of population and the manpower. Manpower is an important factor of production and its distribution among various economic sectors has an impact on the economic growth of the nation.

The State of Uttar Pradesh claims about 16.14 percent of the country's population with only 9.2 percent of its total land area. According to the Census of India, the total population in the State in 1951 was slightly more than 63 millions which increased to 74 millions in 1961 and with a growth rate of 1.9 percent it mounted to 88 million in 1971 and is expected to be of the order of 113 millions by March 1981*. The working force is also expected to grow proportionately with the increase in population. The continuous increase in the rate of growth of the total and working population specially after independence has posed the problem of food shortage and unemployment. Thus from the point of view of State Planners, a study of the growth of population and labour force is essential for setting employment and production targets, framing development programmes and allocation of investments and funds etc.

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GROWTH OF POPULATION

The following table depicts the distribution of state population into rural and urban since 1901:

Census Year	Total Population	Percent- age Vari- ation	Rural	Percen- tage :Varia- :tion	Urban	Per- :cen- :tage :Vari- :ation
1901	48625310	-	43234699	-	5390611	-
1911	48152273	0.77	43245600	0.03	4906673	8.98
1921	40669865	3.08	41733449	3.50	4936416	0.61
1931	49776754	6.66	44207965	5.93	5568789	12.81
1941	56531843	13.57	49515358	12.01	7016490	25.00
1951	63215742	11.82	54590043	10.25	8625699	22.93
1961	73746401	16.66	64266506	17.73	9479895	9.90

(Source: Census of India, 1961 page 8. Census of India 1961, Uttar Pradesh Part II-A pages 145 & 205.)

As per latest estimates, released by the Census Commissioner, Government of India, released by the Census State in 1971 is 83 million with a decennial growth rate of 19.82 per cent. It is, thus, obvious that the year 1921 marks a distinct dividing line in the trend of population growth of the State. The decades prior to 1921 show a loss in the population. The population in the State during the period 1901-20, covering two decades decreased by 4.02 percent, the corresponding decreases in rural and urban areas being 3.47 percent and 8.43 percent. The decrease

in the population may be attributed to World War I, and natural catastrophes like droughts, famines and epidemics which took a heavy toll of life. There was, however, a significant increase in the population in the next decade, the growth in the urban areas being more than double the growth observed in rural areas. Improvement in public health during the last few decades has caused a marked decline in mortality in the country. The growth of population in both the rural and urban areas during the period 1931-40 was unprecedented, being double the growth observed in the preceding decade. The decade 1941-50, though free from epidemic and famine conditions, was a troubled period. It witnessed the ravage of Second World War, and there was a political unrest, communal disturbances and migration of population due to partition of the country. Thus the rate of growth of population declined to some extent during the period 1941-50. The next two decades 1951-70 were comparatively a peaceful period. The growth of population during 1951-60 was 16.66 percent in the State and 21.64 percent in the country which were higher than the rates observed in any of the previous decades. The increase in the State population during the last decade (1961-70) has been 19.73 percent as against 24.57 percent in the country. Although, the rate of growth of population in the state during the period 1961-70 was the lowest among all the States, the acceleration in the rate of growth of population during this period as compared to the previous decade has been higher being 18.43 percent in the states as against 13.53 percent in the country. During the period of seventy years (1901-70) the State encountered with a net increase of 397 lakhs of population indicating an increase of 81.59 percent in the total population.

The State continues to be predominantly a rural one with agriculture as the mainstay of the people. The urban proportion of total population increased from 10 percent in 1911 to 14 percent in 1951 and the same level was maintained during the decade 1951-60. The growth of urban population had been quite slow till the year 1931 after which it was quite high due to decreased in the mortality rate, and increasing tempo of urbanisation on account of industrialization and over all economic development.

The Directorate of Economics and Statistics, Uttar Pradesh conducted Sample Census Surveys in 1961, 1963 and 1966 to estimate the growth of population of the State along with some other important characteristics like birth rate, death rate etc. for the inter censal years. The population estimates as thrown up by these population sample surveys are given below:

Year (Sample census)	Total Population	Percen- tage : varia- : tion	Rural	Percen- tage : Varia- : tion	Urban	Percen- tage : Varia- : tion
1.	2.	3.	4.	5.	6.	7.
1961	74372913	17.65*	64117425	17.45*	10255488	18.89*
1963	77517079	5.11+	67203000	4.57+	10314076	8.80+
1966	83528774	13.26+	72459576	12.75+	11069198	16.74+

*Increase over 1951 Census

+Increase over 1961 Census

According to sample estimates for 1961 and 1966, the growth rate during five years ending 1966 was 2.3 per cent as compared to 1.8 percent according to the census figures for 1961 and 1971. It is difficult to explain the large difference in the growth rate exhibited by the sample count and the one obtained from 1971 Census.

DENSITY OF POPULATION

Density of population is one of the important factors governing the economic condition of the people. Although State of Uttar Pradesh is at the top in respect of population

in the country, yet it ranks fourth in area; the three states larger than Uttar Pradesh in size are Madhya Pradesh, Rajasthan and Maharashtra. It's average density of population in 1971 is 300 per square K.M. as compared to the average density of 182 per Sq. K.M. in the country. Among the States Uttar Pradesh stands fifth, the first four States being Kerala(548), West Bengal (507), Bihar (324) and Madras (316). The following table presents a comparative picture of the density of population in Uttar Pradesh and India at various census points.

Census Year	Density of population per sq. K.m.	
	Uttar Pradesh	India
1901	165	72
1911	164	77
1921	159	77
1931	169	85
1941	192	93
1951	214	111
1961	250	133
1971	300	132

(Source: Census Atlas of Uttar Pradesh - 1961 & Paper I of 1971 - Provisional Populations Total)

It would be observed from the above table that there has been a continuous increase in the density of population in the/as well as in the States since 1901. The average density of population in Uttar Pradesh has been almost double of the average density of population for the country as a whole. It is also revealed from the Census data that

as a result of the unprecedented population increase during the period 1961-70, the density of population per square k.m. for the State as a whole increased from 250 in 1961 to 300 in 1971, while the corresponding increase at the country level was from 138 to 132. It is thus obvious that within a decade when the State faced the problem of accommodating 50 persons more in one square k.m. the country was to accommodate 44 additional persons in the same space.

It may also be interesting to study the rural urban break-up of density of population in the State. The State population break-up into rural and urban areas in 1971 is not yet available. However as per previous censuses the density in the rural areas in 1941, 1951 and 1961 was 171, 183 and 220 respectively, while the corresponding figures for the urban areas were 1930, 2295 and 3323. This indicates that even in the rural areas of the State 32 more persons had to be accommodated in the decade 1951-60 in comparison of the country's average (rural plus urban) of 27.

SEX RATIO

Sex is one of the basic biological characteristics of population. The sex-wise distribution of State population and sex-ratio, alongwith the rural and urban break-up since 1901 is given in the table below:-

Census Year	POPULATION			Male as percentage of total	Sex Ratio (No. of females per 1000 of male)			
	Male (000)	Female (000)	Total (000)		Rural	Urban	UTTAR PRADESH State	India
1901	25093	23527	48625	51.6	939	917	937	972
1911	25143	23009	48152	52.2	922	853	915	964
1921	24451	22219	46670	52.4	919	825	909	955
1931	26147	23630	49777	52.5	917	807	904	950
1941	29639	26893	56532	52.4	923	804	907	945
1951	33099	30117	63216	52.4	924	820	910	946
1961	33634	35112	73746	52.4	924	812	909	941
1971	46396	41403	88299	53.1	N.A.	N.A.	883	932

(Source: Census of India, 1961 Uttar Pradesh Part II - A pages 133, 143 and 437)

The above table clearly reveals that the male population has always out-numbered the female population. There was a steady increase in the male proportion from 51.6 percent in 1901 to 53.1 percent in 1970. The increase in the male proportion during the period 1961-70 is also revealed from the data thrown up by the Sample Census Surveys. The sex ratio in the state was 937 in 1901 and it came down to 883 in 1971. This decline in the sex-ratio overtime may be because of a high mortality rate among females due to strain of child bearing, and supposed neglect of female children as well as of adults.

The number of females per 1000 males in the state has always been lower than the sex-ratio observed at the national level. Further the sex-ratio in the rural areas upto 1961 has been distinctly higher than that in urban areas and this fact was also noticed in Sample Census Surveys conducted in 1961, 1963 and 1966. Moreover, there was a decline in the sex ratios in the urban areas during the decade 1951-60, which was, perhaps, chiefly due to migration of a large number of males to urban areas in search of employment, leaving their better half at home.

AGE STRUCTURE

The State has an age structure which is typical of the under developed countries, with a very broad base and tapering top i.e. pyramidal. In other words, there is a gradual decrease of population from younger age to older age for both males and females.

The study of age composition gives valuable information as to whether the population is expanding or contracting and also about the number of persons in working age group. The following table gives the percentage distribution of State population by age and sex for 1961.

Age Group in complete (years)	Rural		Urban		State	
	Male	Female	Male	Female	Male	Female
0 - 4	7.6	7.4	7.5	7.1	7.5	7.3
5 - 14	13.7	11.8	13.9	12.1	13.3	11.9
15-34	15.7	15.4	13.7	14.2	16.1	15.3
35-59	11.6	10.4	12.2	8.5	11.7	10.1
60+	3.3	3.1	2.9	2.3	3.3	3.0
Total	51.9	43.1	55.2	44.8	52.4	47.6

(Source - Census of India 1961 Uttar Pradesh Part I-A(I)
page 430, Census Atlas of Uttar Pradesh, Map No.30)

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MARITAL STATUS

Data on marital status are also of primary importance in various types of economic analysis and has a profound effect on the birth rate. The following table gives the distribution per 1000 of each sex by marital status with rural and urban break-ups in the years 1961.

Marital Status	Total	Male		Female		
		Rural	Urban	Total	Rural	Urban
1. Never Married	492	436	529	388	378	463
2. Married	450	454	425	515	522	453
3. Widowed	54	56	42	95	93	76
4. Divorced or separated	3	4	3	1	1	2
5. Unspecified	1	N	1	1	1	1
Total Persons	1000	1000	1000	1000	1000	1000

N = Nil

(Source: Census of India 1961 Uttar Pradesh Part I A (I) page 517)

The above table reveals that in 1961, out of 1000 males in the State, 450 were married as against 492 bachelors. On the other hand, the proportion of married females was much higher being 515 out of 1000 females, as compared to 388 unmarried females. It is also noticed that the percentage of married persons in the rural areas was higher than the urban areas.

Noticeable changes have come to force during the past few decades. The following table shows that the proportions of married males and females are declining gradually since 1931 and same is the position in case of widowed, divorced or separated males and females.

Marital Status	1961		1951		1941		1931		1921	
	M	F	M	F	M	F	M	F	M	F
1. Never Married	492	333	463	359	457	342	438	317	452	317
2. Married	450	515	466	521	467	522	483	532	457	509
3. Widowed Divorced or separated	57	96	71	120	76	136	79	151	91	174
4. Unspecified	1	1	-	-	-	-	-	-	-	-

M = Male F = Female

(Source - Census of India 1961 Uttar Pradesh Part I -
A(I) page 517)

The following table shows the distribution of
1000 married persons by sex and broad age groups in Uttar
Pradesh:

Census year	Males				Females			
	0-14	15-34	35-54	55+	0-14	15-34	35-54	55+
1961	39	471	367	123	63	573	295	64
1951	62	470	362	106	101	557	288	54
1941	67	495	348	90	109	536	263	37

(Source - Census of India 1961 Uttar Pradesh Part I C
(III) - Page 20)

The sharp decline in the number of married persons
in the age group of 0-14 years and to some extent in the age
group of 15-34 years also give ample indication of a shift
towards later marriages.

The conclusion that there has been a shift
towards later marriage can also be drawn from the data
on marital status of females in the reproductive age
group 10-49 years. As per 1961 census nearly 53 percent
of the total female population and 39 percent of the
married females come under above age group. The results
of the Sample Census 1966 alongwith 1961 Census in respect
of females in the reproductive age group are shown in the
following table:-

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Marital Status	1961			Total
	10-14	15-44	45-49	
URBAN				
1. Married	2.3	90.8	6.4	100.0
2. Others	60.0	35.7	4.3	100.0
RURAL				
1. Married	7.6	35.4	7.0	100.0
2. Others	61.8	29.9	3.3	100.0
STATE				
1. Married	7.1	36.0	6.9	100.0
2. Others	61.5	30.9	7.6	100.0

Marital Status	1966			Total
	10-14	15-44	45-49	
URBAN				
1. Married	2.0	90.5	7.5	100.0
2. Others	62.5	34.6	2.9	100.0
RURAL				
1. Married	5.9	36.1	3.0	100.0
2. Others	63.1	26.1	5.3	100.0
STATE				
1. Married	5.4	36.6	3.0	100.0
2. Others	67.0	27.7	5.3	100.0

(Others include never married, widow, separated and divorced)

(Source: Census of India Uttar Pradesh, 1961 Part I(A) Sample Census Report 1966)

It is clear from the above table that the proportion of married women in age group 10-14 years was quite low in 1961 (about 3 percent in urban and 3 percent in rural areas) and it further decreased to nearly 2 percent and 6 percent respectively in 1966.

VITAL STATISTICS

Births and deaths are among the most important events in human life and they have got direct impact on the growth of population. The Uttar Pradesh growth rate as derived from birth and death rates tallied more or less with the decennial growth rate obtained from Census data. The following table gives the computed birth and death rates and decennial natural increase rate for 1000 persons in Uttar Pradesh during the last fifty years.

DECADE	UTTAR PRADESH			ALL INDIA		
	Birth rate	Death rate	Decennial natural increase rate	Birth rate	Death rate	Decennial natural increase rate
1901-10	41.7	42.7	-1.0	49.2	42.6	6.6
1911-20	44.0	47.1	-3.1	40.1	47.2	0.9
1921-30	39.9	33.5	6.4	46.4	36.3	10.1
1931-40	33.8	26.1	12.7	45.2	31.2	14.0
1941-50	33.6	27.2	11.4	39.9	27.4	12.5
1951-60	41.5	24.9	16.6	41.7	22.3	13.9

(Source: Census of India 1961 Uttar Pradesh Report on Vital Statistics - page 9. Vital Statistics of India for 1961, Table 22 - A)

As stated earlier, population growth in the State prior to 1921 was erratic, but since then it assumed a definite trend. During the period 1911-20 both the birth and death rates were quite high, the later being higher than the former but since then the death rates have been constantly lower than the birth rates. The above data also reveal that there was a sudden fall in 1931 in the birth and death rates. The birth rate decreased from 44.0 in 1921 to 39.9 in 1931 and it continued declining during the two subsequent decades. The period 1951-60, however, showed an upward trend in the birth rate as it increased from 33.6 in 1951 to 41.5 in 1961. The death rate which was the highest in 1921 being 47.1, came down suddenly to 33.5 in 1931 and reduced further to 26.1 in 1941. During the decade 1941-50 a slight increase in death rate was observed, but it again touched the lowest level (24.9 per 1000 population) in the subsequent decade (1951-60). The declining trend in the death rate has been due to better living conditions, advancement in the field of medical research and availability of better medical and public health facilities to the people.

death rates in the rural. The figures are not available for various census reports. But some efforts were made to estimate them through sample surveys. The figures of birth and death rates and also of natural increase in the State with rural urban break-up as revealed by the sample census surveys and population surveys under N. S. S. are given in the table below:-

Year	Rural			Urban			State		
	Birth rate	Death rate	Natural increase	Birth rate	Death rate	Natural increase	Birth rate	Death rate	Natural increase
Sample Census									
1931	37.2	19.2	32.6	10.1	22.5	39.3	13.7		
1953	36.0	14.3	32.0	5.2	22.8	34.1	9.7	24.5	
1966	39.0	25.0	33.1	9.0	23.5	32.7	13.2	25.5	
Population Survey under N. S. S.									
1966-67	32.6	9.8	22.3	25.3	4.6	20.7	31.6	9.1	22.5
1967-68	35.2	12.0	23.2	26.5	7.5	19.0	31.1	13.7	22.4
1968-69	44.0	12.0	31.0	23.0	6.0	22.0	42.0	12.2	29.8

The estimates thrown up by the Sample Counts and National Sample Surveys do not appear to be much reliable. The National Sample Surveys data indicate an increasing trend both in the birth and death rates, and it is not in conformity with the trend depicted by the census figures, which show a decreasing trend in birth rates and death rates, the decrease in the later case being more definite than the former. Further according to National Sample Surveys the natural increase in the population of the State was expected to be about 3 percent in 1968-69, which is much higher than the average natural increase of 2 percent observed during the period 1961-70. As regards Sample Censuses, they did not give any definite trend in birth or death rates. It appears that the method of collection of birth and death figures through

household inquiries is not suitable. Even so, the above table is indicative of lower birth and death rates in the urban areas as compared to the rural areas. The rural-urban birth rate differential can be explained by better educational and medical facilities, late marriages and better knowledge of family planning methods in urban areas. Similarly availability of better medical and health services and improved sanitary conditions in cities and towns have an effect in bringing down the death rates in the urban areas as compared to rural areas.

The following table shows the birth and death rates for the decades 1941-50 and 1951-60 of some of the States:-

	Birth rate		Death rate	
	1941-50	1951-60	1941-50	1951-60
1. Assam	46.7	49.3	31.3	26.9
2. Bihar	39.0	43.4	26.6	26.1
3. Maharashtra	41.0	41.2	24.9	19.8
4. Madhya Pradesh	46.1	43.2	30.5	23.2
5. Andhra Pradesh	43.1	39.7	29.5	25.2
6. Madras	35.7	34.9	22.3	22.5
7. Uttar Pradesh	38.6	41.5	27.2	24.9
8. Gujarat	42.2	45.7	24.9	23.5
9. Orissa	37.2	40.4	29.9	22.9
10. Kerala	37.4	33.9	18.0	16.1
11. Rajasthan	42.5	42.7	27.2	19.4
12. Mysore	36.9	41.6	18.9	22.2
13. Punjab	41.2	44.7	26.3	13.9
14. West Bengal	35.4	42.9	23.6	20.5
<u>India</u>	39.9	41.7	27.4	22.8

(Source - Census of India, 1961 Uttar Pradesh Report on Vital Statistics, page 37)

State-wise comparison of birth and death rates for 1951 and 1961 as given in the table above shows that during the period 1951-60, there was an increase in the birth rates in all States excepting Andhra Pradesh, Madhya Pradesh and Madras while the death rates declined in all but one State namely Mysore, resulting into a wider gap between the birth and death rates. It has been further observed that although the birth rates of the State and the country in the last decade (1951-60)

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were of the same order but the death rate in the State was higher than the death rate observed at the All India level. It is mainly due to the fact that the infant death rate in Uttar Pradesh was 136 in 1961 which was higher than the All India figure(139).

GROWTH OF LABOUR FORCE

Labour force plays an important role in the process of industrialisation and urbanization. The employed and unemployed persons together constitute the total labour force and the rest of the population is considered to be inactive. The study of the trend of labour force is essential for understanding the factors affecting the growth of working population and also the employment of youth. In case of India and her constituent States, it is not possible to study growth of labour force owing to the lack of comparability in the data of various censuses. The urban labour force estimates available from National Sample surveys data for the years 1963-64, 1964-65 and 1965-66 reveal that the proportion of urban/force to total population is decreasing because of a continuous higher growth of population in both the sexes particularly in the younger age group. It has, however, been estimated that new entrants to the State labour force during the period of Fourth and Fifth five year plans would be around 37 lakhs and 45 lakhs respectively.

WORKING FORCE

The figures of age composition of workers in various industry groups are not available over different census points. It is observed from 1961 data that nearly 85 percent of the total workers were in the age group 15-59 years. In the age group of 0-14 years females workers were proportionately higher than the males, while male workers outnumbered females in the age group 60 years and above. Further the participation rates for each sex were distinctly higher in the rural areas as compared to that of urban areas. The contrast was greater in the case of females, whose participation in the urban areas was quite low(5.3 percent) because of the fact that most of the females were engaged in household activities which have not been treated as gainful.

An attempt was also made by the Registrar General, Government of India, to estimate the working force in the various industry groups since 1901 excepting 1941 following the concept of workers* as set forth in 1961 Census Report. Unfortunately no economic data exist for 1941 census. Sexwise estimates of workers and their percentage distribution by industrial categories since 1901 as prepared by Registrar General, Government of India are given in the table on next page:

***Definition of worker:-**

A person was treated as worker in a seasonal industry like cultivation, livestock, dairying, household industry etc, if he has had some regular work of more than one hour a day through-out the greater part of the working season. In case of regular employment in any trade, profession, service business or commerce, a person was regarded as a worker, if he was employed during any of the fifteen days preceding the day on which the enumerator visited the household.

A person who is working but was absent from his work during the 15 days preceding the day on which the enumeration took place or even exceeding the period of fifteen days due to illness or other causes was treated as worker. Further the persons unemployed but seeking work including those doing so for the first time, were enumerated in the category of non-worker.

(Source - Census of India 1961, paper I, page XIX)

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FEMALES

Table 14 (Contd.)

Broad Industrial Categories	1901	1911	1921	1931	1951	1961
1. Cultivators	45.8	52.1	64.2	54.9	71.0	64.8
2. Agricultural Labourers	17.2	17.8	12.8	18.7	10.8	19.2
3. Plantations, Forestry, Fishing, Livestock, Hunting and Mining & Quarrying	1.1	1.9	1.9	2.1	1.1	1.8
4. Manufacturing including Household Industry	12.2	11.9	9.4	9.0	5.1	6.6
5. Construction	0.1	0.1	0.0	0.1	0.2	0.1
6. Trade & Commerce	3.5	4.3	3.6	4.9	1.9	1.1
7. Transport, Storage & Communications	0.1	0.1	0.1	0.1	0.1	0.0
8. Other Services	20.0	11.8	8.0	10.2	9.8	6.4
Workers (000)	(100.0) 6789 (28.9)	(100.0) 7664 (33.3)	(100.0) 8288 (37.3)	(100.0) 7045 (29.8)	(100.0) 7119 (23.6)	(100.0) 6370 (18.1)
Non Workers (000)	16738 (71.1)	15345 (66.7)	13931 (62.7)	16585 (70.2)	22998 (76.4)	28742 (81.9)
Total Population (000)	23527 (100.0)	23009 (100.0)	22219 (100.0)	23630 (100.0)	30117 (100.0)	35112 (100.0)

PERSONS

Table 14 Contd.

Broad Industrial categories	1901	1911	1921	1931	1951	1961
1. Cultivators	51.4	58.4	65.4	60.0	66.8	63.9
2. Agricultural Labourers	12.0	12.4	10.3	13.4	7.5	11.3
3. Plantations, Forestry Fishing, Livestock, Hunting & Mining & Quarrying	1.9	3.0	2.7	2.7	1.4	1.8
4. Manufacturing including Household Industry	11.2	9.7	8.3	8.3	8.6	7.8
5. Construction	0.2	0.4	0.2	0.3	0.5	0.7
6. Trade & Commerce	4.5	4.2	4.1	4.8	4.0	3.7
7. Transport, Storage and Communications	1.1	0.7	0.6	0.8	1.1	1.4
8. Other Services	17.7	11.2	8.4	9.7	10.1	9.4
Workers (000)	(100.0) 21943 (45.1)	(100.0) 24024 (49.9)	(100.0) 24324 (52.1)	(100.0) 23551 (47.3)	(100.0) 26864 (42.5)	(100.0) 28850 (39.1)
Non Workers (000)	26682 (54.9)	24128 (50.1)	22344 (47.9)	26226 (52.7)	35352 (57.5)	44896 (60.9)
Total Population(000)	48625 (100.0)	48152 (100.0)	46670 (100.0)	49777 (100.0)	63216 (100.0)	73746 (100.0)

Source: Census of India 1961, Paper No.I of 1967 Page 32.

As would be revealed from the above table, while the total number of workers increased by 31 percent during the period of 60 years(1901-60) the proportion of workers to the total population decreased from 45 percent in 1901 to 39 percent in 1961. The decrease in the participation rates of workers was observed both for males and females, but it was comparatively of a higher order in case of females. The age composition of population over different census points shows that the decrease in the participation rates of workers may be due to rapid growth of population, decline in mortality till the age of 15 years combined with increase in the school going children. Further there was a increase of 48 percent in the numerical strength of male workers during the period 1901-60, while the number of female workers decreased by 6 percent during the same period. It is also noticed that agriculture is the main industry of the State, engaging about 77 percent of the workers, while 3 percent are engaged in manufacturing activities and the rest 15 percent in other activities. Although, there had been some diversification in employment since 1921 from agriculture to non-agriculture activities but it was almost nominal.

As estimated by the Working Group on Employment, appointed by the Uttar Pradesh Government, the total number of workers in the State in 1971 is about 35.73 millions, and during the next decade(1971-80) the increase in the number of workers would be about 11 millions. In other words it represents an average addition to the working force of about a million each year.

UNEMPLOYMENT

Statistics on the volume of unemployment in the State are available mainly from three sources, viz., (a) the decennial censuses, (b) various rounds of National Sample Surveys, (c) Employment Market Information data collected and compiled by Directorate General of Employment and Training. The data available by various sources are not comparable because of difference in the definitions and concepts of unemployment adopted by them.

(a) As per 1961 census a person who has not been employed before, but seeking employment for the first time and the persons employed before but now out of employment and seeking work was classified as an unemployed. Unlike labour force surveys, the non-workers who were not ~~as~~ work but available for it, were not treated as seek-unemployed in 1961 census. Thus the number of unemployed

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enumerated by 1961 census particularly in rural areas was under estimate. Besides it is also true that in rural areas few persons remained unemployed during the main agriculture season. One, therefore, cannot reject 1961 census count of the unemployed as very low. Moreover, the census data provide the estimates even for a very small regional unit, to some extent for every village. Thus the census data are very widely used to study the trends over a fairly long time. The following table gives the proportion of unemployed persons by sex in 1961.

Sector	Total unemployed			Persons seeking employment for the first time			Persons employed before but now out of employment and seeking work		
	M	F	T	M	F	T	M	F	T
State	100.0	100.0	100.0	63.4	69.2	64.6	35.6	30.8	35.4
Rural	100.0	100.0	100.0	70.9	73.8	71.1	29.1	26.2	28.9
	(43.5)	(75.0)	(44.9)						
Urban	100.0	100.0	100.0	59.3	55.5	59.2	40.7	44.5	40.8
	(56.5)	(25.0)	(55.1)						

M = Male F = Female T = Total
 (Source: Census of India 1961 - Uttar Pradesh,
 Part IIB(V) Page 424)

It is revealed from the above table that in the year 1961 the proportion of persons seeking employment for the first time was much higher than those employed before but now out of employment and seeking work. Further, there were comparatively more unemployed males in the urban areas (57 percent) than the rural areas (43 percent), whereas 75 percent unemployed females were in the rural areas and only 25 percent in the urban areas. It has also been observed that unemployed persons in 1961 formed only 0.1 percent of the total population. Among unemployed persons only 7.9 percent were below 14 years of age. The position of unemployed persons aged 15 years and above and their distribution by educational level and sex is as follows:

Educational Level	URBAN			RURAL		
	Persons	Males	Females	Persons	Males	Females
Total unemployed aged 15 years and above	47037 (1000)	46077 (1000)	960 (1000)	37435 (1000)	34952 (1000)	2483 (1000)
1. Illiterate	12749 (271)	12314 (267)	435 (453)	12156 (325)	10020 (287)	2136 (860)
2. Total literate and educated persons	34288 (729)	33763 (733)	525 (547)	25279 (675)	24932 (713)	347 (140)
Literate (without educational level)	12652 (269)	12505 (271)	147 (153)	6574 (179)	6366 (182)	208 (34)
Primary or junior basic	10151 (216)	10014 (213)	107 (111)	3584 (229)	3502 (243)	82 (33)
Matriculates and above	11435 (244)	11214 (244)	271 (283)	10121 (270)	10064 (238)	57 (23)

(Source - Census of India - Uttar Pradesh, Part II B(V) page 347 and 415)

Literacy proportion in the unemployed persons of ages 15 years and above was 729 in urban areas and 675 in rural areas in 1961 census, which revealed that unemployment among the educated class was considerably higher than among the illiterates. The proportion of unemployed literate males was higher (733) than literate females (547). In the urban areas, the largest proportion (269) was of those who were literate but have not acquired any educational level, followed by Matriculates and above (244).

In the rural areas, out of 1000 unemployed males, 182 were literate (without educational level), 243 educated upto primary or Junior basic level and 238 upto Matriculation and above. The corresponding figures for females were 84, 33 and 23. The Matriculates and above formed the highest proportion of the unemployed in the rural areas.

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(b) Unlike census, the National Sample Survey normally follow a labour force approach with a reference period of one week. Under this approach persons, without gainful work throughout the reference period and seeking work or not seeking but available for work on any one of the seven days of the reference week, have been taken as unemployed. The position of employment and unemployment in the urban areas as revealed from data of National Sample Surveys is given in the table below:

Year	Gainfully employed			Unemployed			Total labour force		
	M	F	T	M	F	T	M	F	T
1961-62	98.2	98.1	98.2	1.8	1.9	1.9	100.0	100.0	100.0
1962-64	99.3	99.7	99.3	0.7	0.3	0.7	100.0	100.0	100.0
1964-65	99.2	99.1	99.2	0.8	0.9	0.8	100.0	100.0	100.0
1965-66	99.7	99.6	99.7	0.3	0.4	0.3	100.0	100.0	100.0

M = Male F = Female T = Total

Although the above table does not indicate any definite trend in the growth of employment, but it seems that during the third plan period, the employment opportunities increased at some faster rate than that observed in the growth of labour force. It may be added here that the estimates thrown up by National Sample Surveys in respect of unemployment for females are somewhat on higher side as compared to census estimates. As per 1961 census, 1.72 percent of the male and 0.44 percent of the female labour force were in the category of unemployed, while the corresponding figures as obtained from National Sample Survey results for 1961-62 were 1.8 and 1.9 respectively.

(c) The volume of unemployment, particularly in the urban areas can also be estimated to some extent by a direct method based on employment exchange data. The data relating to the persons on the live register of Employment Exchange has certain limitations. All the unemployed persons in the urban areas do not register themselves in the employment exchanges and it is also not necessary that all registered in the exchange are unemployed. Some of them are full time students who are classified as out of labour force by Census and National Sample Survey. Moreover, some persons

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register themselves at more than one exchange and no estimate is available for this multi-registration. The data are also a mixture of both rural and urban job seekers, the proportion of which is not known with any precision. In spite of these limitations in employment exchange data, the Employment Market Information data are very useful, being able to provide some quick estimates of the employments situation particularly in the urban areas, where employment exchanges are located.

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Summary of the Paper on 'Growth of Population and
Labour Force in Uttar Pradesh

SUMMARY

The population and labour force of a country play a significant role in the social and economic development of its people. Since many social and economic problems such as food shortage, unemployment etc. are connected with the size and composition of population and man-power, a study of the growth of population and labour force is essential for administrators and planners for setting employment and production target and framing up other development programmes.

POPULATION

TOTAL POPULATION

According to Census of India, the State total population decreased by 4.02 per cent (3.47 percent in rural and 8.43 per cent in the urban areas) during the first two decades (1901-20) due to ravage of World War I, droughts famines and epidemics, but it showed an increasing trend thereafter because of decline in mortality rate due to improvement in public health conditions. During the last seventy years (1901-70) the State population increased by 82 percent and the urban proportion to total population increased from 10 per cent in 1911 to 14 percent in 1961 because of urbanization on account of industrialisation. Although the increase in the State population during the last decade (1961-70) has been 19.73 per cent against 24.57 per cent in the country this rate of growth is lowest among all the States, but the acceleration in the rate of growth of population during this period has been higher, being 18.43 percent in the State as against 13.53 percent in the country. The Sample Census Surveys 1961 and 1966 indicated a higher rate of growth in the State Population in the inter censal Years (1961-70) as compared to the growth worked out from the figures of 1961 and 1971 Censuses.

Density of
Population

It is revealed from various census data that the pressure on land has been continuously increased and the average density of population for the State increased by about 82 percent during the last seventy years (1901-70). The rate of increase in the density of population in urban areas is much more than that observed in the rural areas. Its present density of population is 300 per sq. km. which is almost double the density for the country as a whole, and among the States, Uttar Pradesh stands fifth in respect of the density of population.

Sex Ratio The various census data and also the Sample Census Survey data conducted in 1961, 1963 and 1966 revealed

that the male population has always^{out} numbered the female population in the State. The sex ratio in the rural areas has been distinctly higher than that in the Urban areas. Further there has been a continuous decline in the female proportion because of high mortality rate among females due to strain of child bearing and neglect of female children as well as adults.

Age Structure

In 1961, the males exceeded females in all age groups. A study of the change in age composition of population of the State since 1921 reveals that there has been a gradual decrease of population from younger age to older age for both the sexes. The age group 0-9 Years registered an all time high record in 1961 for both males and females which may be due to high birth rate and decline in the child mortality. The rest of the decennial age groups showed a decreasing trend. The proportion of population in the Younger age group 0-14 Years was 20 percent which was more than six times of the size of the older age group (above 60 Years) both in respect of males and females.

Marital Status

The proportion of married females in 1961 was higher than that of males being 52 percent and 45 percent respectively and it was so in the rural as well as urban areas for both the sexes. The census data since 1931 indicate a declining trend in the proportion of both the married males and females. There has been also a shift towards later marriages as the proportion of married persons declined sharply in the age group of 0-14 Years and also to some extent in the age group of 15-34 Years. It is also confirmed from a decreasing trend in the proportion of married women in the age group 10-14 years.

Births and Deaths

Birth and death rates are the most important factors affecting the growth of population during the decade(1911-20),

when both the birth and death rates in the States were quite high, the later being higher than the former, but since then the death rates have been consistently lower than the birth rates. Moreover, the birth rates per 1000 population decreased from 44 in 1921 to 41.5 in 1961 and the corresponding decrease in the death rates was from 47 to 25. Although reliable data of birth and death rates in rural and urban areas separately are not available from any source but the data of births and deaths collected through Sample Census Surveys and National Sample Surveys indicate a lower birth and death rates in the Urban areas as compared to the rural areas. The heavy decline in the death rates and relatively lower birth death rates in urban areas have been due to better knowledge of family planning methods. It has also been observed that although the birth rates of the State and the country in the decade (1951-60) were of the same order death rate in the State was higher than the death rates observed at the All India level, because of relatively higher infant mortality rate in 1961, being 186 in the State and 139 in the country.

LABOUR FORCE

Total Labour Force

Although a study of growth of labour force is essential for understanding the factors affecting the growth of working population and employment of youth, such study is not possible owing to lack of comparability in the data of various censuses. The data regarding National Sample Survey for the years 1963-64, 1964-65 and 1965-66 however, reveal that the proportion of Urban labour force is decreasing because of continuous higher growth of population in both the sexes particularly in the younger age group. Further, in addition to the state labour force during the period of Fourth and Fifth Five Year Plans is estimated to be of the order of 37 lakhs and 45 lakhs respectively.

Working Force

As per 1961 Census, 85 per cent of the total workers were in the age group 15-59 years. In the age group 0-14

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/living conditions, better educational and medical facilities, late marriages and better

years, female workers were proportionately higher than the male workers, while the proportion was otherwise in the age group 60 years and above. Further the participation rates for each sex, particularly, in case of females, were higher in the rural areas as compared to that of urban areas, the reason being that most of the females in the Urban areas were engaged in the domestic activities, which were considered as ungainfull.

The working force data available from various census record are also not comparable. The industry-wise comparable working force estimates as prepared by the Registrar General, Government of India, reveal that the number of male workers increased by 48 percent during the period 1901-60, while the number of female workers decreased by 6 percent during the same period, with a net increase of 31 percent in the total number of workers. Although there was a increase in the numerical strength of workers yet the proportion of workers to total population decreased from 45 percent in 1901 to 39 percent in 1961. The decrease in the participation rate was observed in both the sexes because of rapid growth of population and decline in mortality rate till age of 15 years.

Unemployment

The figures of unemployment, available from three sources viz. (a) the decennial censuses (b) National Sample Surveys (c) Employment Market Information (D.T.E.), are not comparable because of difference in the definitions and concepts of unemployment adopted by them. The estimates thrown up by the National Sample Surveys in respect of unemployment for females are some what on higher side as compared to census estimates. As per 1961 census, 1.72 percent of the male and 0.44 percent of the female labour force were in the category of unemployment, while the corresponding N.S.S. estimates for 1961-62 were 1.8 and 1.9.

The N.S.S. results also indicate that during third plan period, the employment opportunities increased at some faster rate than the growth in the labour force. The 1961 Census results show comparatively more unemployed males in the urban areas (57 percent) than the rural areas (43 percent), where-as 75 percent in the urban areas. Among unemployed persons only 7.9 percent were below 14 years

unemployed females were in the rural areas and only 25 percent ...p/5...

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of age and the unemployment among educated class was considerably higher than among the illiterates. As regards the data obtained from live register of employment exchange offices, the data are very useful in spite of many limitations as it provides some quick estimates of the employment situations particularly in the Urban areas.

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X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT

X. 10

Aspects of Labour Force Estimation in India

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ASPECTS OF LABOUR FORCE ESTIMATION IN INDIA

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INTRODUCTION

1. In a welfare state, full utilization of the available manpower resources for the production of goods and services is one of the basic objectives of economic and developmental planning. To plan for fulfilment of this objective, quantification of total man-power resources in the country is a primary need. The knowledge of this quantity alone is not, however, enough for the purpose in view; fairly reliable estimates of the nature and extent of its utilizability and actual utilization are also essential. Obviously, the labour utilization cannot be measured only by the number of persons in labour force. This number provides no measure of the efficiency of the workers nor does it indicate the amount of working time they are capable and willing to contribute in economic activities. Influence of demographic factors on the working time offered by a member of the economically active population is quite significant.¹ These demographic factors apart, in seasonal occupations like agriculture there is employment deficiency in slack seasons. Whereas a group employed in the peak season may voluntarily withdraw themselves in other seasons from economic activity, there are others who continue their gainful work, more or less part time, under a condition of deficient employment opportunities available. Measurement of such visible underemployment also calls for a different unit like man-day, man-week, or man-year that is, some person-into-time unit for the purpose of measurement.²

o The views expressed in the paper are wholly personal.

1. United Nations, The Determinants and Consequences of Population Trends, ST/SoA/Series/A/17, 1953, p.194.
2. The adoption of such a procedure for quantification of employment as well as lack of it has been emphasised in the Eleventh International Conference of Labour Statisticians, Geneva, 1966; and also amongst others by Kailas C. Doctor: "Recent Progress in Underemployment, Statistics and Analysis", Proceedings of the World Population Conference, Vol. IV, New York (1967), p.350; Rupert J. Harewood: "Some Views on the Collection, Analysis and Utilization of Current Employment Statistics in an Economically Less Developed Country", ibid p.357; United Nations, Methods of Analysing Census Data on Economic Activities of the Population. ST/SoA/Series A/43 (1969), p.8; Report of the Committee of Experts on Employment and Unemployment Estimates, Planning Commission, Government of India (1970), para 5.7.

2. Source of material: With conceptual limitations, population census provides the number of economically active population by breakdowns of sex, age, region and other relevant demographic and economic characteristics. The conceptual limitations are, however, inherent in the brevity of time within which the census operation has to be completed. In the last two Indian censuses of 1961 and 1971, the 'gainful work' concept with some modifications was adopted for enumerating economically active population. The labour force approach could not be adopted for obvious reasons. That approach with a short reference period would have provided only the number of economically active population with respect to the particular seasons in which the censuses were conducted and such data at intervals of ten years would have been of very little value for any practical purpose. In Indian censuses, where a large population has to be enumerated with limited resources (cost as well as adequately trained personnel) and the whole operation has to be completed within a short span of time, there is little scope of collecting detailed information about the activity of individuals. Data thrown up by the censuses under such constraints can not provide information on the extent of utilization of the population in economic activity. Thus from the census one may have the number of participants in economic activity along with some qualitative characteristics like industry, occupation and status of employed persons but will have no idea about the extent of their participation.

3. The Indian National Sample Survey (NSS) has been conducting employment and unemployment enquiries since 1955.³ Data are being collected since then in great details to provide information which is not available from censuses. Apart from collecting general types of information like sex, age, marital status and educational level of each individual in the population, information about the labour force status that is, whether employed, unemployed or outside labour force with details of occupation, industry and status (employee, employer, own account worker and unpaid helpers) for employed population is also collected in the NSS. Labour time disposition is also recorded for employed persons to measure the nature and extent of participation in economic activity of different groups of persons during the week preceeding the day of enquiry. Thus the NSS not only throws up the estimates of labour force at regular intervals but also gives valuable data on utilisation of labour time by tracing the daily activity of a person over the reference week.

3. The results of these surveys have been published in a number of NSS Reports issued by the Cabinet Secretariat, Government of India. Even in earlier surveys of NSS some broad information on employment and unemployment were collected and these were presented in The National Sample Survey, Report No.14, "Some Characteristics of Economically Active Population" (1958).

Results of the NSS Labour Force Surveys ^{have} been critically reviewed in the Report of the Committee of Experts on Unemployment Estimates, op.cit.

II THE PROBLEM OF CLASSIFICATION .

4. For the usual classification, primarily, the 'economically active' group has to be isolated from the total population and that group has to be further split into employed and unemployed categories. Thus having given some suitable definitions the total population is to be subdivided into three mutually exclusive basic categories - the 'employed', the 'unemployed' and the 'not in labour force' groups.

5. Now, the entire range, from full employment to absolute non-participation in economic activity may be considered to be a continuous scale of measurement: extent of participation in gainful activity declining continuous, from whole time to nominal work to reach the cut-off point between the employed and the unemployed categories and thereafter it continuously changes from full availability to marginal/conditional availability for gainful work where the line of distinction between 'employed' and 'not in labour force' population may be drawn. To explain, the continuum ranges from full employment from the point of view of individual's working time, that is from full utilization of an individual at one end to no employment at the other with transitional stages through underemployment to unemployment and to the group having no activity.

6. Keeping in view the idea of this continuum the definitions are to be so explicit as to facilitate dividing it by two distinct cut-off points, leaving practically no scope for overlapping among the three basic categories of these cut-off points. In reality, however, there will be many categories who do not belong purely in either of these categories. Persons having working in household enterprise as well as doing domestic chores, students participating in economic activities, unemployed persons occasionally doing nominal work are examples of frequently observed groups of persons for whose classification some special judgement is necessary, the judgement in such cases is becoming more difficult with the lengthening of the reference period.

7. With a short reference period of one week preceding the date of survey the NSS completes one round of survey within one full year. The Census on the other hand have to carry out the work of complete enumeration within as short a time as possible (usually two to three weeks) and have good reasons to adopt a longer reference period of one year in the last census for the purpose of classifying population under the categories of 'worker' and 'non-worker'.

8. Adoption of either a long reference or survey period is associated with the problem of mobility. In the calibrated activity scale having three different sections representing the categories of employed, unemployed and outside labour force, a person does not remain static in only one of the sections. Inter-sectional mobility, like the movements from the 'employed' section to the unemployed or 'not in labour force' section as well as similar movements in opposite directions, is frequently witnessed events. The longer the reference period the higher

will be the expectation of the number of movements per person and also the number of persons involved in such movements. Taking into account the movements performed during the course of a year it is often difficult on the part of the informant to determine the section which he primarily belongs to. Secondly, in such a procedure a considerable amount of information is lost, because persons having multiple status at different periods of a year once put in either of the categories, information of his association with other status categories is lost and thirdly recall factors and the amount of subjectivity introduced in the judgement vitiate the accuracy of results in such cases.

9. A longer survey period on the other hand involves geographical mobility. There is a possibility of the same person being enumerated more than once at different places. A person enumerated in the rural areas as a cultivator in agricultural season might be pursuing some other occupation in an adjacent town in another season and so enumerated there also. From the statistical point of view, of course, such repeated enumerations are not necessarily to be considered as events of duplication, but such commuting type of spatial movements on economic reasons by itself is an useful item of information for locating, age, sex, skill and economic status of the underemployed⁴ required for man-power planning. Besides its primary objective to measure seasonal variations, the choice of the procedure of repeated visits in sample households affords additional advantage in making direct assessment of the nature and extent of the commuting type of seasonal movement made by the enumerated persons.

10. Usually, an individual is labelled as employed, unemployed or as being outside labour force on the basis of his performance during a short or long reference period. Even when a 'gainful work' approach is used to determine the 'stable functional role'⁵ of an individual, the judgement rests on the performance during a period which may not, however, be very clearly stated always.⁶ For unique categorisation of individuals a sort of thumb rule .

4. Measurement of Underemployment: Concepts and Methods, International Labour Organisation, Report IV.(1966), p.33.

5. United Nations, Application of International Standards to Census Data on the Economically Active Population, ST/SOA/Series A/9 (1951), p.5.

6. The United Nations recommended: "The time reference for the census data on economically active population should be selected in a way so that the census results represent a general view of the size and composition of the economically active population and do not reflect an atypical temporary situation", Principles and Recommendations for National Population Censuses, ST/STAT/SER M/27, United Nations (1958), para 413.

or priority has necessarily to be adopted to facilitate placement of those who have mixed type of activities during the reference period. For that purpose, the process of accounting the labour time under different activity categories during a short reference period is somewhat simpler.⁷ In recording such factual statements made by informants, there is little or no need for discretion. Only the list of activities has to be very carefully drawn so as to make it reflect all facets of the pattern of activity. To that end a few supplementary questions may have to be asked because there are certain important items of information which are not readily covered by any type of activity.

11. The main problem of categorising on the basis of activity during a short reference period arises for unemployed persons. The state of remaining unemployed cannot be considered as constituting an activity. An unemployed person may not completely sit idle and declare that he was either seeking work or available for work during the reference period. The concern individual might have been engaged in some household work and consequently the primary reporting on time disposition might be on that score alone. Barring the days on which the individual made some positive efforts in search of a job, practically little or no time was utilised on any type of activity from which it might be recognised that the person was unemployed. Data on weekly time disposition clearly present the number of man-days utilised in gainful work as well as indicate the number spent on activities other than economic. From the time disposition data it is not known what portion of the latter group would be utilised in gainful work had sufficient work been available. For quantification of this part further questions have to be asked. Similar difficulty arises also in measuring the number of unutilisable man-days in respect of those persons who had jobs or enterprise from which they temporarily absented. A single question on time disposition, therefore, may not bring out the actual employment and unemployment situation. It should be supplemented by such other questions as would quantify unemployment, visible underemployment and voluntary abstention in terms of labour time units.

7. It has been suggested by the Committee of Experts on Unemployment Estimates that "the practice of presenting the estimates simply in terms of 'employed' and 'unemployed' persons should be abandoned and attempts should be made to obtain some measure of the level or rate of unemployment in the economy by reference to the daily recorded data on employment and unemployment. Essentially this amounts to the collection of data about labour time disposition of each individual during a week", Op. cit. para 3.14.

III LABOUR-TIME UNIT OF MEASUREMENT

12. An economically active person (in the usual sense) need not necessarily remain so throughout the year. There is a considerable section amongst such persons who work in particular season only and are not available for any gainful activity in other seasons. A large number among the female working force participate in gainful activity as unpaid household labour. While they participate with full intensity in the peak agricultural season or when there is pressure of work in other types of household enterprises, they may participate nominally in or even completely withdraw themselves from economic activity during the remaining portion of the year.⁸ Thus, expressed in terms of man years, the quantum of labour input will be less than the number of gainfully employed persons (in the usual sense) or 'worker' the term adopted in the last two Indian censuses. In a situation where only seasonal participation is more frequent, the divergence between the two estimates will be wider.

13. In the USSR, there exists a large number of seasonal workers. For the purpose of planning and evaluation of plan project, data concerning the number of persons having employment and duration (in a year) of employment are derived from returns submitted by enterprises, institutions and organisations, while the number of collective farmers is estimated from the annual returns of collective farms. The 1959 census, on the other hand, collected the statistics on economically active population of the USSR using the usual status concept. It was found that the average annual given by establishment reporting was 94 per cent for the 63 million workers and office employees counted by the census but it was only 75 per cent of the 32.3 million collective farmers counted by the census.⁹

9. V.V. Rodzyalovskaya "The range and limitations of the standard definition of active and non-active population and of partial employment in Soviet statistics", Proceedings of the World Population Conference, Vol.IV. (New York 1967, p.325. Some generalised statement as : "the longer the time reference period, the more people will be reported economically active" has been made in the Handbook of Population Census Methods, Series F, No.5, Vol.II, United Nations (1958), p.24 and the discussion continued by quoting the following example from the labour force statistics of the United States to substantiate the statement: "During 1956 the average civilian labour force numbered 67,530,000; this number is derived from the 12 month surveys using one week as the reference period. During the entire year of 1956, however, an estimated total 75,252,000 persons had worked, either continuously or at some time during the year."

-8 Sudhir Bhattacharyya and Suranjan Sen Gupta, "Some characteristics of Indian labour force, its projection upto 1981 and the problems of measurement of its components", papers presented at the Seminar on Employment and Income Distribution, New Delhi, March 1970 (Mimeographed).

14. From the example quoted above it is clear that there exists a big gap between the total number of workers and the number of man-years of work in agricultural activities. With the introduction of sample surveys the scope of collecting information has enormously increased in India. Employment and Unemployment enquiries with the reference period of a week, conducted over a whole year and the samples uniformly distributed over time and space, provide estimates not only of the average annual number of economically active persons but also of the extent of utilisation of utilisability of them in different seasons.¹⁰ As labour time disposition data for the reference week are collected with respect to each person to ascertain who amongst them are gainfully employed and also the status of unemployed is determined on the basis of his availability during the reference week, the number of economically active persons estimated over different seasons is not expected to remain constant.

15. The subject may be studied in a different manner.¹¹ Firstly, it is to be ascertained who amongst the total population are economically active by adopting the gainful worker concept. This number should remain invariant over seasons. The current time disposition data for the group of economically active persons in a particular season will give the account of the number of labour time units: (i) utilised in gainful work, (ii) available for gainful work but could not be utilised for non-availability of work and (iii) the residual part which was not available for gainful work for that season only. For any other season the distribution in the three categories will change while their aggregate will remain the same. Thus an enquiry of this kind will put up to view the complete spectrum of employment, under-employment and unemployment of the labour force to help formulation of an

10. "The Ninth International Conference of Labour Statisticians recommended the measurement of seasonal employment, especially in agriculture and the Meeting of Experts on Under-employment suggested the survey procedures by which this may be accomplished. A labour force sample survey can provide comprehensive and reliable data on seasonal changes if the survey is designed to provide for observation of labour force characteristics on a current basis over a full year. This can be done, for instance, if the week is chosen as a reference period and the survey spread uniformly over a whole years by surveying a sub-sample in each week of the year. In practice, monthly or quarterly surveys would often provide sufficient information on the point". Measurement of Underemployment : Concepts and Methods, Op. Cit. p.37.

11. This procedure has been suggested by the Committee of Experts on Unemployment, op. Cit. para 5.6.

effective employment policy.¹²

IV CONCEPTS USED IN CENSUS AND NSS

16. Estimates of the size of the current labour force largely depend on the concepts used for the purpose of estimation. While the divergence between estimates may not be pronounced where the participation in economic activity is of a regular nature (say, for the adult males in big cities), it may be significantly large for other group of persons for example, the number of females engaged in agricultural occupation. A comparison of the concepts used in the census and NSS of India, the two major source agencies of data, and the results obtained from them for different segments of the population will therefore be of considerable interest.

17. Census of India 1961: Indian Census for the first time in 1961 adopted a definition to classify population under the categories worker (gainful) and non-worker replacing the old concept of means of livelihood used in the earlier censuses.¹³ By the census 1961 definition, a person working regularly in seasonal work like cultivation, livestock, household industry etc., for more than one hour a day throughout the greater part of the working season was called a 'worker'. A person working regularly in trade, profession, service, business or commerce would also come within the purview of this definition if he was employed during any of the fifteen days preceding the day of enumeration. The rest were non-workers. Among the non-workers those seeking employment for the first time and those employed before but now out of employment and still seeking work were together reckoned as unemployed.¹⁴

18. A large section of the working population, specially that amongst women, is engaged in seasonal work. Though by the census definition these persons are to be labelled as workers, quite a considerable number of them move into the non-working category in the off season and may not be seeking work at all. The criterion of regular work in working season only will thus put a priority for inclusion of the seasonal workers in the category of worker.

12. The importance of measuring quantity and quality of employment has been point out by Ajit Das Gupta in "An Empirical Approach to Measurement of Underemployment", Bulletin of the International Statistical Ins-titute, Vol.XXXVIII, 2nd part, Tokyo 1961, para 3.5.

13. Asok Mitra : "Indian experience in recording economically active population : 1961 population census", Proceedings of the World Population Conference, Belgrade, 1965, Vol.IV (New York 1967), p.368.

14. Census of India 1961, Vol.I, Part II-B(i), pp.8-10.

19. The National Sample Survey: To meet the requirement of the users and also to study the different facets of employment, unemployment and underemployment situations in India quite a number of concepts have been tried in the NSS, till they were standardised in 1961.¹⁵ The earlier survey rounds of NSS were of varied duration, but; since the fourteenth round (1958-59) the period has been stabilised to a complete year for each round of survey. According to the standardised concept a person who either worked (for however a short period for pay, profit or family gain (employed at work) or had been temporarily absent from work due to illness, leave vacation, rest etc. during the reference period of seven days preceding the day of enquiry (employed - not at work) is considered to be an employed person. Out of the remaining persons, those who had been seeking work during the reference week are considered unemployed persons. In rural areas those who had not been actively seeking work but were available for work during the reference week are also treated as unemployed.

20. One of the major factors considered in the design and time schedule programming of the survey is to make it possible to obtain seasonal estimates.¹⁶ To ensure that, the survey period of one-year for a complete round is sub-divided into a number of sub-rounds of equal duration. From each stratum an independent set of samples is drawn for each of the sub-rounds so that valid estimation for a particular characteristic is possible for each and every sub-round.

21. In the NSS 14th round, for the rural areas, only one set of samples was selected and each of the sampled units was visited six times at an interval of two months between successive visits to help study the activity profile over seasons and repetitive visits of the same set of households provided higher precision for differences between visits.¹⁷

15. Standard for Surveys on Labour Force, Employment and Unemployment, Central Statistical Organisation, Government of India, 1961.

16. Three generally adopted approaches have been outlined by Kailas C. Doctor, op. cit., for measuring seasonal variation in employment. Under the first approach, information is sought on time worked during a relatively long reference period. From the view point of operational feasibility, serious objection to this approach is that "the response to such inquiries are likely to be subject to lapse in recall". Due to this difficulty the first approach has not been tried out in the NSS.

17. The Nation/Sample, No. 100, "Tables with notes on rural employment and unemployment" (1965).

V THE RESULTS

22. To make a readily understandable comparison, the results in this section have been presented in the form of a ratio, usually known as 'Labour Force Participation Rate' (LFPR), 'Activity Rate' or Worker Rate expressed as the percentage ratio of the population in labour force to the total population. Moreover, in a sample survey, for such ratio estimated errors will be less than those for aggregate estimates.

23. The preliminary results of the Indian Census of 1971 are just published.¹⁸ The LFPR for the 1971 Census is found to be lower than that for the 1961 Census for quite a number of states.¹⁹ There is a reason to believe that the decline was mostly due to the adoption of a definition in 1971 Census²⁰ which excluded some persons from the category of workers who would have been considered as such, had the 1961 Census definition of a worker been kept unchanged.²¹ It is worth noting in this connection that there is, perhaps, some merit in continuing the same definition over successive censuses even if it does not appear to be technically very sound at a later date. There is, however, no denying that a major shift like the one made in 1961 by way of classifying population into distinct categories of workers and non-workers, replacing the earlier procedure of dividing population into different livelihood classes may at times be unavoidable. Nevertheless, the advantage of maintaining a uniform set of concepts and definitions lies in that the results are fairly comparable and therefore any change in LFPR will be an indicator of the trend.

18. Census of India 1971, Paper 1 of 1971, "Provisional Population Totals" (April 1971). Under this title, one brochure for each of the states and one for all-India have been published.

19. In West Bengal, for example, the percentage of workers to total population was 54.0 in 1961 and 48.9 in 1971 for males, 9.4 in 1961 and only 5.4 in 1971 for females. Census of India 1971, Series 18, West Bengal, Paper 1 of 1971, "Provisional Population Totals", pp.62-63.

20. In 1971 Census, there was a provision to record low or nominal participation in economic activity for non-workers as secondary work. The total of the workers and those amongst non-workers who have secondary work (gainful) will be a number which may be considered to be the upper bound of the number of workers in the population.

21. A critical review of the preliminary census results and the concepts used in 1971 census has been made by J.N. Sinha in his article: "1971 Census: Economic Data: A Note of Caution", The Statesman, Calcutta (Dated 4th June 1971).

24. Since the detailed results of the 1971 Census are not available just at this moment and since the present analysis is not so much aimed at deriving a precise estimate of the current labour force population as to locate the areas of divergence between the LFPR derived from census counts and the NSS estimates and find out

possible reasons for the existence⁻¹¹⁻ of such divergence, the analysis that follow has been done by using 1961 Census data only.

25. LFPRs from the Census of India 1961 and from the NSS rounds:

The LFPRs from the 1961 census counts and those derived from the data collected in three consecutive NSS rounds conducted during the period of July 1958 to June 1961 for rural and urban²² areas by sex are shown in Table (1). Though there is significant difference between the definitions of a 'worker' in the Census and an 'employed person' in the NSS there is remarkable agreement between the LFPRs derived from the two sources for the urban males. For the urban females the NSS rates are slightly higher. But in the rural areas the Census rates are higher for females as well as for males.

Table (1): LFPRs in rural and urban areas by sex; Census of India 1961 and NSS fourteenth to sixteenth rounds (July 1958 to June 1961)

area/sex	NSS round			Census of India 1961 ^{d/}
	fourteenth ^{a/} July 1958 - June 1959	fifteenth ^{b/} July 1959 - June 1960	sixteenth ^{c/} July 1960 - June 1961	
1	2	3	4	5

all-India rural:

males	56.88	58.74	55.67	58.22
females	26.66	23.58	27.72	31.42
persons	41.86	41.45	41.88	45.07

all-India urban:

males	52.03	52.30	52.30	52.40
females	11.73	12.39	13.55	11.03
persons	32.85	33.36	34.01	33.48

a/ NSS, No.100, pp.47-48 & No.85, pp.49, 53, 57

b/ NSS, No.156, pp.25 & No.157, pp. 19, 21, 23

c/ NSS, No.114, pp.22, 24, 26 & No.103, p. 18

d/ Census of India 1961, Vol. I, Part II-B(i), p.83.

26. In urban areas economic activities are more or less of a regular nature with high proportion of wage paid employment in organised industries. The larger the size class of towns the higher will be the proportion in wage paid employment. Those who are working in such wage paid employment are committed to

22. (i) The rates for the urban areas of sixteenth round are based on the information collected during the first six months of the survey period.

(ii) The urban rates for the NSS rounds are for the areas declared urban in the Census of India, 1951.

render their service for specified working hours. Absence of freedom to work at the worker's convenience and inflexibility of the number of working hours are factors against participation of women belonging to the working age group, particularly the married ones among them who have greater commitment in the fulfilment of their traditional role of housekeeping. The generally low LFPRs of urban females as observed in Table (1) and the decline in female participation with increasing size of towns along with the rising proportion of employees and falling proportion of unpaid helpers in those three size classes of towns, taken in ascending order, as demonstrated in Table (2), corroborate this statement.

27. Seasonality in participation in economic activity: The NSS conducted, at the earliest opportunity, a survey on employment and unemployment which was essentially designed to study the seasonal variation in the LFPRs and other related characteristics of the population in the rural areas. Seasonal fluctuations are in general more marked in the case of females. It is observed from the results, presented in Table (3), that the seasonal variation in participation of women in economic activity is significantly large. Areas of observed large seasonal variation are in the overall LFPR, the percentage of population and labour force engaged in agriculture and the percentage of employees within the labour force. The variations are always larger for females than those for males. Both males and females and participate in larger numbers in craft and production process work in the lean agricultural season and in such lean season there is also a similar rise in the proportion of females engaged in domestic work. Participation of male helpers does not exhibit any variation whereas the corresponding proportion for females declines perceptibly in off-seasons for agriculture.

28. Visible underemployment: In the NSS, for assessment of visible underemployment, the employed population is cross classified by hours worked and additional hours available for work. The principal findings of these studies are: (i) compared to males, the female proportion of underemployed population is higher; (ii) underemployment is more frequent in rural areas; (iii) in urban areas, the proportion underemployed increases from big cities to large towns and from large towns to small towns. Visible underemployment is highly marked (26% of employed males and 36% of employed females) amongst the agricultural labourers in rural areas, whereas amongst cultivators (including unpaid family workers in cultivation) and other agricultural and animal husbandry workers the proportion of underemployed is much less. The proportion underemployed is also higher amongst males in 'processing of food' and amongst females working as 'paid house workers'.

Table (4): Percentage of employed population reporting availability for additional work.

Item 1	percentage under employed		
	Males 2	Females 3	Persons 4
<u>a/ Urban</u>			
1.big cities	4.95	6.71	5.10
2.large towns	8.78	9.86	9.91
3.small towns	11.66	17.93	12.93
4.all-India urban	10.28	16.31	11.38
5.all-India rural	13.66	16.15	14.41
<u>b/ Rural</u>			
6.cultivators and family workers in cultivation	9.29	8.75	9.14
7.agricultural labour	26.54	36.24	29.90
8.other agricultural and animal husbandry workers	8.83	9.03	8.89
9.workers in food processing	21.90	21.78	21.88
10.paid house workers	6.23	26.80	19.94
<u>a/ NSS, No.63, pp. 188-197</u>			
<u>b/ NSS, No.100, pp. 175-177.</u>			

29. What has been stated about the seasonal variations and underemployment is only by way of illustrations. It only points out how the seasonal and fractional components of underemployment can be identified and emphasises the importance of an elaborate analysis of these factors in economic activity, but for which a major objective of labour force statistics - which is to get a real picture of the labour force utilisation - will not be fulfilled. It is likely that extent of the seasonal variation cannot be precisely gauged from the result presented in Table 3. These results, for each couple of calendar months, are all-India averages. There is therefore a possibility of overlapping of a peak season for one region with the lean season of another which might have rendered a sort of smoothing effect on seasonal variability. Hence a more useful purpose would be served with results presented by breakdowns of geographically contiguous regions having similar agricultural seasons.

30. The mean of the results of the six sub-rounds may be considered as the annual average. Usually the NSS estimates for a complete round of survey are nothing but annual averages. That being so, the remarkably close correspondence between the six sub-rounds mean LFPRs of the NSS fourteenth round and those of the NSS sixteenth round is by no means unexpected.

VI CONCLUSION

31. Labour force statistics are to be evaluated and interpreted within the limits of the conceptual framework. Whereas the standard definitions are by and large applicable to developed economy which is mainly characterised by organised economic activities ensuring almost uninterrupted employment for each worker, their unqualified adoption in Indian condition remain open to question.

32. The difficulty may, to a large extent, be obviated by considering a worker along with the work done. This will enable us to grade the total work force according to the quantum of participation in economic activity, from nominal association to full engagement. It is hardly plausible to decide in advance who should be considered as being in labour force and to load the definition accordingly. After detailed information on participation in economic activity for each individual, irrespective of his level of participation, is collected for different seasons, the information should be so presented as to enable the users to draw, if necessary, the line of demarcation between economically active and non-active persons.

33. The procedure suggested cannot, however, be adopted in the censuses. Nevertheless, the census remains the only source of information on working population for the smallest administrative units of the country. It also provides benchmark data at long intervals on working force and, if tabulated suitably, would help the understanding of inter-relationship between trend of population growth and labour force participation rate. But to realise that aim, censuses are to be conducted with uniform concepts. Even if the census questionnaire has to be altered, the basic layout should be so maintained as not to affect comparability of broad results of successive censuses.

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ASPECTS OF LABOUR FORCE PARTICIPATION IN INDIA

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S U M M A R Y

Participation in economic activity in India is predominantly in household own account sector. There is however, a large variation in the extent of participation from individual to individual. On a scale of participation ranging from full work to no activity, the population is spread over the continuous range and there is usually a sizable number in any small segment of it. The line of demarcation between 'employed' and 'unemployed' and also that between 'unemployed' and 'not in labour force' is difficult to draw in this continuum. In such a situation, whatever be the definition, the number of persons engaged in economic activity does not depict the real employment situation and for that the total quantum of labour input, expressed in labour time units, is needed in addition.

To meet the requirement, resorting to sample surveys is essential. The results of the National Sample Survey (NSS) of India on Employment and Unemployment have been presented in a number of reports. In these reports various aspects of employment, underemployment, unemployment and seasonal variations in labour force participation rates (LFPR) have been studied.

Indian census, conducted at ten yearly intervals, is also a very important source of information on labour force and employment. Census enumerations done with uniform concepts would facilitate analysis of the trend of participation in economic activity and also the association between demographic and economic characteristics of the population.

Neither of the two approaches - usual status and current status - can provide adequate data for the purpose of employment planning. Keeping in view the major objectives of an employment and unemployment enquiry, a modified procedure has been suggested in which both the approaches need be considered.

Table (2) : Percentage of employees and unpaid helpers among gainfully employed persons and LFPR by size class of town and sex for NSS thirteenth to fifteenth rounds (September 1957 - May 1958, July 1958 - June 1959)

sex	item	size class of towns			all-India urban
		c/	b/	a/	
(1)	(2)	(3)	(4)	(5)	(6)
NSS thirteenth round ^{d/} (September 1957 - May 1958)					
males	% of employees	49.97	61.77	72.79	54.93
	% of helpers	8.50	4.36	3.27	7.12
	LFPR	51.36	52.90	59.44	52.61
females	% of employees	41.70	51.09	73.73	44.84
	% of helpers	26.41	20.26	5.22	24.38
	LFPR	14.41	9.85	7.34	12.86
NSS fourteenth round ^{e/} (July 1958 - June 1959)					
males	% of employees	51.09	63.22	73.46	55.79
	% of helpers	8.47	4.48	3.95	7.24
	LFPR	50.97	51.99	58.83	52.05
females	% of employees	40.81	62.16	71.58	44.35
	% of helpers	29.27	17.07	8.74	27.11
	LFPR	13.14	8.22	5.87	11.73
NSS fifteenth round ^{f/} (July 1959 - June 1960)					
males	% of employees	48.73	60.30	69.07	53.10
	% of helpers	9.43	5.10	4.90	8.20
	LFPR	51.27	51.48	59.93	52.30
females	% of employees	40.53	48.70	72.00	43.30
	% of helpers	27.86	19.03	12.80	26.01
	LFPR	13.70	9.07	7.11	12.19

a/ All cities (Calcutta, Madras, Bombay and Delhi)

b/ Capital of states

c/ Cities with population 5 lakhs & above

d/ Remaining urban areas

e/ NSS, No. 63, pp. 10 & 12

f/ NSS, No. 85, pp. 10 & 13

g/ NSS, No. 157, pp. 17, 63-64, 112-114, 181-186.

Table (3) Percentage of population/employed population engaged in some selected occupations and belonging to some selected status categories in different seasons by sex (1958 fourteenth round July 1958 - June 1959)

ALL-INDIA TOTAL

sex	SEASON (by calendar months)						average of the six seasons
	July - Aug. '58	Sept. - Oct. '58	Nov. - Dec. '58	Jan. - Feb. '59	March - April '59	May - June '59	
(2)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. percentage of total population engaged in agricultural occupations							
males	45.74	46.22	45.83	43.05	41.97	41.21	43.99
females	22.04	22.01	22.38	19.13	17.51	15.13	19.87
2. percentage of employed population engaged in agricultural occupations^{a/}							
males	81.60	82.60	82.42	79.33	76.09	77.37	80.26
females	84.70	85.23	84.63	82.59	79.89	77.07	82.64
3. percentage of employed population in crafts and production process work^{a/}							
males	5.21	7.65	9.07	10.37	10.76	11.64	9.40
females	7.61	8.13	8.06	9.65	11.44	12.17	9.34
4. percentage of employed population in services and professions^{a/}							
males	4.40	4.50	4.47	4.70	5.13	4.98	4.69
females	4.05	4.11	4.46	4.69	5.15	5.97	4.67
5. percentage of population in labour force^{a/}							
males	57.53	57.74	57.22	56.67	56.20	55.95	56.83
females	29.02	27.99	28.15	25.80	25.33	23.81	26.66
6. percentage of employed population to total population^{a/}							
males	56.05	55.96	55.60	54.28	53.74	53.26	54.81
females	27.08	26.07	26.44	23.16	22.05	19.63	24.04
7. percentage of employers to total employed population^{a/}							
males	27.53	27.36	28.88	28.15	28.62	26.93	27.92
females	28.62	28.05	31.11	27.66	25.77	22.20	27.53
8. percentage of unaid helpers to total employed population^{a/}							
males	20.35	21.08	20.77	20.19	20.39	20.27	20.51
females	53.17	52.52	49.43	50.11	48.39	46.69	50.24

a/ NSS, No. 100, pp. 115-121

b/ *Ibid*, pp. 77-82, 86

c/ *Ibid*, pp. 93-98, 102

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X 11

Analysis of Change in the Industrial Structure of the
Work Force : A Case Study

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ANALYSIS OF CHANGE IN THE INDUSTRIAL STRUCTURE
OF THE WORK FORCE: A CASE STUDY

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INTRODUCTION

A study of the change in the industrial structure of the work force in relation to population growth and economic development is important in the context of manpower planning. The modern economic theorists contend that the continuum of economic development and the continuum of agriculture' share in the workforce are reversely correlated while the distribution within the non-agricultural sectors remains almost unaffected. A recent study by Sabolo has confirmed this to some extent¹. He found that within reasonable limits of per capita income there is a clearcut pattern of activity suggesting the possibility of a "normal activity pattern" for different stages of economic development.

2. Population growth influences employment structure in two ways. On the one hand, birth and death rates, and consequently the natural increase being different in different segments of the population lead to a more rapid growth of labour force in the agricultural sector. On the other hand, migration especially rural-urban leads to occupational mobility and a consequent shift from agricultural to the non agricultural sectors. Migration takes place mainly in response to economic processes. Economic growth manifests itself in "the revolutionizing of agriculture with sharply increasing labour productivity and concomitant narrowing of economic opportunity for the residents of the countryside in general and the expansion of the capital and the movement of labour into the newly growing sectors - manufacturing, construction, transportation, communication, trade and service branches - which unlike agriculture are not tied to land but tend to concentrate their operation:

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The Opinion expressed in the paper are not necessarily those of the United Nations.

in what has become the urban agglomerates of modern society" 2

3. These two processes, population growth and economic change are not taking place in isolation from each other. They interact upon each other and their effects are felt selectively on different segments of the population and on different areas of the country. For instance, industries and jobs tend to concentrate in areas where conditions favourable to their growth exist, and demand certain kind of skills, enterprise and education of the work force. These processes are of course complex, and analysis is necessarily restricted to a few of these complex processes. This study examines the relationship between the structural shifts in the workforce and a few economic and demographic characteristics, taking the experience of India during 1951-61 decade.

ANALYTICAL FRAMEWORK OF THE STUDY

4. The usual approach to such a study is the establishment of the relationship between the percentage of the work force in a specified sector (say agriculture, industry or services) by geographic area and given economic and demographic measures such as productivity, per capita consumption, migration etc. through the application of multivariate procedures³. In a developing country which has limited data or data suffering from several limitations such procedures not only give an impression of false accuracy, but also sometimes lead to spurious relationships. In this paper, an alternative approach is indicated whereby the shifts in the work force classified as positive or negative according to certain criteria, is associated with changes in demographic or economic measures classified as positive or negative. Such a contingency approach, although not providing a quantification of the relationships, are useful in indicating the presence or absence of an association, and its direction.

5. The structural shifts in work force has two dimensions one is the differential growth of the different sectors in the different geographical areas, and secondly the compositional differences between the different areas. These two dimensions may or may not act in different directions in shifting the work force shares in each area.

Therefore if we define a net shift in work force as the change in the percentage of the total work force located in a geographic area (hereafter/referred to as "state"), then the net shift may be regarded as composed of two components, namely, structure or composition effects and intra sector growth effects or simply growth effects (See Appendix). The intra-sector growth effect among the states is the growth in the individual sectors of the states as compared with the corresponding growth rate at the national level. The composition or structure effect, on the other hand, is the result of the states' sectoral composition. The states that have positive composition effects are those that are favourably placed with the rapidly expanding sectors relative to the country as a whole. Any attempt to correlate the total or net shift in work force with economic and demographic measures might camouflage the relationship that exist between these component elements of the net shift and the variables under study. For example, if the growth effect is negatively associated with technological change and the composition effect is positively associated with it, one might end up having a weak positive or negative association between the total shift and technological change. Therefore it is important to examine the association of each of these component elements with other relevant variables. This approach is tested out in this study in the Indian context.

6. Specifically this study examines the inter-relationships between changes in the industrial structure of the workforce as measured by the percentage of the total workforce in the primary, secondary and tertiary sectors and the following:

- i) Population shifts as measured by the changes in the percentage of total population of the country residing in the different states, which is the net outcome of differential natural increase as well as migration.
- ii) Level as well as shifts in the proportion of total workers in organized employment.
- iii) Differential economic growth, as measured by change in the proportion of the national income in different states.

7. The basic data for the present analysis are the economic data from the 1951 and 1961 censuses, the former⁴ adjusted in accordance with the 1961 census classification. Despite the conceptual differences between the two censuses, these data are useful in giving a broad picture of the changes in/labour force. Further, only the data for the male work force is utilized in this analysis in order to avoid the ticklish problems of classification of female workers in and out of the labour force. The data used in the study are shown in Table 1 and 2.

8. The net shift in the work force for each state and its two components, namely growth and composition effects are shown in Table 3. The states with positive and negative net shifts are indicated below:

STATES HAVING POSITIVE NET SHIFTS	STATES HAVING NEGATIVE NET SHIFTS
1. Rajasthan	1. Punjab-Himachal Pradesh
2. Delhi	2. Jammu & Kashmir
3. Madhya-Pradesh	3. Uttar Pradesh
4. Bihar	4. Andhra Pradesh
5. Orissa	5. Mysore
6. Greater West Bengal	6. Madras
7. Greater Assam	
8. Gujarat	
9. Maharashtra	
10. Kerala	

9. Given below are the frequency distribution of states classified by the direction of the growth and composition effects and (i) direction of change in shares of the population, (ii) migration gains and losses (iii) the level as well as change in the percentage of organized employment and (iv) shift in shares of national income originating in each state:

NO. OF STATES HAVING POSITIVE OR NEGATIVE SHIFTS IN WORK FORCE AND RELATED MEASURES.

	:Popula-: Net Mig- : Percent : Shift in :Shift in									
	:tion : ration. : in orga- : percent Or- :share of	:shifts.: : zed em- : ganized :National								
	: : : ployment :employment :Income									
	1 : 2 : 3 : 4 : 5 : 6									
	+ - + - + - + - + -									
Net shift										
in work-										
force	+ 8	2 7	3 5	5 6	4 5	5				
	- 2	4 2	4 4	2 1	5 2	4				

		1	2	3	4	5	6
Composition	+	6	2	6	2	8	0
Effect	-	4	4	3	5	1	7
Growth	+	8	2	7	3	5	5
Effect	-	2	4	2	4	4	2

10. The net workforce shifts bear a close resemblance to the net population shifts and migration for the same period. In all but four states the shifts in work force and population are in the same direction, and in all but five states the shifts in work force and migration are in the same direction. While the level of organized employment itself has no association with net shifts in workforce, the change in organized employment bears a positive association with net shifts in workforce. The growth effects have a greater influence on the net shifts as apparent from the same kind of association between the growth effects and the factors considered. On the other hand there is no association between composition effects and shifts in population. Both growth & composition effects have a clearcut positive association with migration but the growth effects have a stronger association. Naturally, while the growth effects are influenced by demographic factors, composition effects are more influenced by economic factors. Evidence in support of the latter is found in the high positive association between composition effects and the level of organized employment. It is somewhat surprising that the relative change in the percentage of organized employment bears no association with composition effects. From the definition of the measure of composition effect, a positive association between the shift in the primary sector and composition effect cannot go together with the association between the shift in the non primary sectors and composition effect. As the shift in organized employment is showing no association with composition effect and tertiary sector being of a smaller order we may speculate that the compositional shift is taking place in a favour of the primary sector. Any way a decade is too short/period of analysis to indicate the influences of the compositional effects, when we consider the stage of development at which India was in 1951.

11. It may incidentally be noticed that the two components of net shift are not operating in the same direction in all the states. The states may be grouped as follows according to the direction of the growth and composition effects:

GROWTH AND COMPOSITION
EFFECTS BOTH POSITIVE

GRWOTH EFFECTS POSITIVE
COMPOSITION EFFECTS NEGATIVE

Delhi	Rajasthan
Greater West Bengal	Madhya Pradesh
Gujarat	Bihar
Maharashtra	Orissa
Kerala	Greater Assam

GROWTH AND COMPOSITION
EFFECTS BOTH NEGATIVE

GROWTH EFFECTS NEGATIVE
COMPOSITION EFFECTS POSITIVE

Punjab-Himachal Pradesh	Andhra Pradesh
Jammu - Kashmir	Mysore
Uttar Pradesh	Madras

12. Two broad generalizations can be made. First, there is a geographical pattern in these shifts. For instance, the positive composition effects have occurred in the entire southern and western regions, and positive growth effects occurred in a wide contiguous geographic area covering the entire Eastern and Western regions. Secondly, barring a few exceptions, the states that were industrially more advanced at the beginning of the decade tend to have positive growth and composition effects and the states that were industrially less developed at the beginning of the decade and had made considerable progress during the decade tend to have positive growth effects and negative composition effects.

13. It was pointed out that growth effects are due to the fact that individual sectors are growing more rapidly in some states than in others. It is therefore of interest to compare the growth effects of individual sectors for the different states (See Table 4). The states are grouped below according to the direction of the growth effects in the different sectors.

- i) Positive growth effects for all the three sectors Bihar, Greater Assam, Madhya Pradesh.
- ii) Positive growth effects for any two sectors Greater West Bengal, Gujarat, Delhi.
- iii) Negative growth effects for all three sectors Jammu & Kashmir, Uttar Pradesh, Andhra Pradesh, Madras.
- iv) Negative growth effects for any two sectors Rajasthan, Maharashtra, Mysore, Punjab-H.P. and Kerala.

14. It should be pointed out that an expansion of the work force in the secondary sector does not imply a corresponding growth in the tertiary sector. In five out of the sixteen states the shifts in the secondary and tertiary sectors are not in conformity with each other. The states in the first two categories listed above are generally the states that have been substantial growth of organized employment and these are also generally the states that have migration gains during the decade. On the other hand the states in the third category are all states that have experienced out migration during the decade, and also below average gains in organised employment. It can therefore be concluded that migration gains are associated with a faster growth in a given state in the secondary sector than in the rest of the country along with an above average expansion in the primary sector, or tertiary sector or both. The expansion of the workforce in the secondary sector itself seems to be associated with the expansion of organised employment. These are indicated by the following contingency Table which shows the number of states having positive or negative shifts in the Primary, Secondary and Tertiary sectors in association with the demographic and economic measures considered:

Growth effects	:Population shifts		:Net Migration		:Percent Organized employment		:Shift in percent in Organized employment		:Shift in share of national income	
	+	-	+	-	+	-	+	-	+	-
<u>Primary Sector</u> +	7	2	7	2	4	5	5	4	4	5
<u>Secondary Sector</u> -	3	4	2	5	5	2	2	5	5	4
<u>Tertiary Sector</u> +	6	1	5	2	4	3	6	1	5	2
<u>Primary Sector</u> -	4	5	4	5	5	4	1	8	2	7
<u>Secondary Sector</u> +	4	2	4	2	2	4	4	1	3	3
<u>Tertiary Sector</u> -	6	4	5	5	7	3	4	7	4	6

15. One will notice that the growth in the primary sector has positive association with population shifts, net migration gains, as well as relative growth of organized employment but bears no association with relative growth of income. On the other hand the growth of the secondary workforce seems to bear a positive association with both the relative growth of organised sector as well as the relative growth of income.

SUMMARY AND CONCLUSION

This study examines the relationship between structural shifts in the work force and a few economic and demographic characteristics, taking the case of India for the decade 1951-61. The analytical frame work is one of relating the shift in shares of work-force by state to similar shifts in the factors considered and associating the two by means of contingency Table showing the direction of the shifts. Also we have regarded the structural shifts as composed of two components, the growth effects and composition effects and each of these components are related to the measures considered.

The study shows that employment shifts follow a parallel course as population shifts. Decomposing the net shifts into growth and composition effects, it was found that growth effects are influenced by demographic factors, whereas composition effects are influenced by economic factors, such as change in organized employment. Analysing the growth effects for each sector separately, one finds a strong positive association between relative income growth and relative growth of secondary sector, but little or no positive association exists between the income growth and the growth effects in the remaining sectors. A necessary condition for migration gains for a state seems to be a relative rapid growth of the secondary sector, but this does not seem to be sufficient, it should be accompanied by a relatively rapid growth of one of the remaining sectors, Primary or Tertiary, as well.

A P P E N D I X

The growth and structural effects may be computed as follows:

Let W_{ij} = working force in the i-th industry in the j-th state in the initial period.

W_{ij}^1 = the corresponding figures for the terminal period.

W_i = The national working force in the i-th industry = $\sum_j W_{ij}$

$W_{..}$ = total national working force in all industries = $\sum_j W_{.j}$

then the total shift for a state is:

$$S_t = \sum_j W_{.j}^1 - (W_{..}^1 / W_{..}) W_{.j}$$

The Intra-Sector growth effect for a state is:

$$S_g = \sum_i \left[W_{ij}^1 - (W_i^1 / W_i) W_{ij} \right]$$

The composition or structure effect is given by:

$$S_c = \sum_i \left[(W_{i.}^1 / W_{i.}) - (W_{..}^1 / W_{..}) \right] W_{ij}$$

The total shift (S_t) is seen to be the sum of the growth and composition effects, namely $S_g + S_c$.

TABLE I
 SECTORAL SHARES IN MALE WORKFORCE FOR INDIA BY
 STATES 1951, and 1961

Percent of total labour force

State	1951			1961		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
INDIA	69.7	11.0	19.3	68.0	12.7	19.3
Punjab - Himachal Pradesh	67.0	8.9	24.1	62.5	15.2	22.3
Rajasthan	72.1	9.8	18.1	74.2	10.5	15.3
Delhi	8.4	25.2	66.4	5.9	26.9	67.2
Jammu & Kashmir	76.0	7.6	16.4	76.0	7.5	16.5
Uttar Pradesh	74.2	9.0	16.8	73.3	10.2	16.4
Madhya Pradesh	78.6	8.8	12.6	77.3	9.8	13.0
Bihar	85.0	3.9	11.1	77.5	8.4	14.1
Orissa	76.4	7.0	16.6	76.7	7.3	16.0
Greater West Bengal	55.6	16.1	28.3	57.7	16.8	25.5
Greater Assam	81.0	3.8	15.3	77.0	4.7	18.4
Gujarat	60.3	14.8	24.9	62.8	16.1	21.0
Maharashtra	61.7	15.6	22.7	61.8	16.7	21.5
Kerala	55.8	17.5	26.7	46.1	16.5	37.5

Source: Figures for 1951 are computed from Census of India, 1951 Paper No.1 of 1962 Final Population Totals, Appendix I by B.R. Kalra and those for 1961 are computed from Census of India, 1961. General Economic Tables.

Greater West Bengal includes West Bengal, and Sikkim and Andaman & Nicobar Islands, Greater Assam includes Assam, Manipur, Tripura, Nagaland and NEFA; Madras includes Pondicherry; Maharashtra includes Goa, Diu and Daman.

TABLE 2

DEMOGRAPHIC AND ECONOMIC MEASURES FOR
INDIA USED IN THE STUDY

State	Redistri-	Net Migra-	Employment in Or-	Percent share			
	bution of	tion of	ganized Sector	of National			
	Population	males		Income			
	:1951-61	:1951-61	:1951	1961	Change:		
	(in thou-	(in thou-			1950-51		
	sands)	sands)			1960-61		
	1	2	3	4			
				5			
Punjab-H.P.	687	-166	10.7	14.3	3.6	6.18	6.36
Rajasthan	739	- 87	7.9	9.1	1.2	3.97	3.90
Delhi	540	293	-	-	-	-	-
Jammu & Kashmir	-292	- 17	-	-	-	-	-
Uttar Pradesh	-3115	-616	7.0	8.3	1.3	17.82	16.44
Madhya Pradesh	674	398	7.6	10.1	2.5	6.05	6.92
Bihar	-709	-253	5.1	9.2	4.1	7.55	7.63
Orissa	-260	30	5.3	6.2	0.9	4.00	3.52
Greater West Bengal	2972	315	13.2	19.7	1.5	10.33	9.69
Greater Assam	1691	88	5.2	8.5	3.3	3.27	2.96
Gujarat	866	37	12.5	14.9	2.4	5.39	5.54
Maharashtra	553	259				8.92	11.15
Andhra Pradesh	-1848	29	9.2	9.9	0.7	8.52	6.89
Mysore	1	34	11.6	11.0	0.6	5.68	5.35
Kerala	449	-197	11.0	12.3	1.6	4.36	3.94
Madras	-2948	-131	11.7	12.4	0.7	6.60	7.31

Source: Cols (2) and (3) from K.E. Vaidyanathan: Population Redistri-
bution and Economic Change, India, 1951-61
Op. cit. Cols. (4), (5) and (6) from J.N. Sinha "Industria-
lization and Regional Variations in Employment
Pattern" All India Population Seminar, New Delhi,
March 1963.

Cols. (7) and (8) are the percent shares of Net Material
Product which is the aggregate of the Incomes from in the
commodity producing sectors estimated by NCER in Estimates
of State Income for 1950-51, 1955-56 and 1960-61 at
1960-61 Prices.

-:-:-
TABLE 3

COMPONENTS OF SHIFTS IN MALE WORK-FORCE
BY STATES: INDIA 1951-61

(Figures in thousands)

State	: Total Shift :	: Growth Effect :	: Composition : Effect
Funjab-Himachal Pd.	- 213	- 197	- 16
Rajasthan	37	50	- 13
Delhi	69	53	16
Jammu & Kashmir	- 110	- 103	- 7
Uttar Pradesh	- 1280	- 1200	- 80
Madhya Pradesh	- 114	156	- 42
Bihar	1157	1281	- 124
Orissa	- 295	324	- 29
Greater West Bengal	- 624	558	- 66
Greater Assam	- 460	497	- 37
Gujarat	- 359	333	26
Maharashtra	- 117	52	65
Andhra Pradesh	- 716	- 770	54
Mysore	- 69	- 86	17
Kerala	104	71	33
Madras	- 949	- 1019	70

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TABLE 4

TOTAL GROWTH EFFECTS AND ITS SECTOR COMPONENTS
FOR THE MALE WORKFORCE INDIA AND STATES 1951-61

(Figures in thousands)

States	:Total :Growth :Effect	:Primary :Sector	:Secondary :Sector	:Tertiary :Sector
Punjab-Himachal Pradesh	- 197	- 345	307	- 159
Rajasthan	50	228	18	- 160
Delhi	53	12	11	54
Jammu & Kashmir	- 103	- 67	- 19	- 17
Uttar Pradesh	-1200	- 851	- 68	- 281
Madhya Pradesh	156	91	10	55
Bihar	1281	182	580	519
Orissa	324	303	-	21
Greater West Bengal	558	645	8	- 95
Greater Assam	497	259	39	199
Gujarat	333	415	46	- 128
Maharashtra	52	203	-41	- 110
Andhra Pradesh	- 770	- 343	- 306	- 121
Mysore	- 86	36	111	- 8
Kerala	71	288	96	455
Madras	-1019	- 453	- 341	- 225

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FOOT NOTES

1. M.Y. Sabolo. "Sectoral Employment Growth". The article for 1960" International Labour Review" Vol.100 No.5 Nov. 1969.
2. See the Introduction of Simon Kuznets and Dorothy S. Thomas to the massive three volumes Pennsylvania Study on Population Redistribution and Economic Growth United States, 1870-1950 (Philadelphia, 1957) pp.2-3.
3. An excellent example of the application of such procedure is the study by J.N. Sinha, Planning and Employment in India Institute of Economic Growth, New Delhi.1970.
4. This adjustment has been carried out by the Office of the Registrar General, India. See Census of India 1961 Paper No.1 of 1962. Final Population Totals Appendix I by B.R. Kalra pp. 389-414. The data for the three southern states Andhra Pradesh, Mysore and Madras - have been further adjusted for underenumeration of the labour force in 1951. For details see K.E. Vaidyanathan, Population Redistribution and Economic Change, India 1951-61, University Microfilms, Ann Arbor, 1967.
5. Analysis of this type is attempted in Frank A. Hanna, "Analysis of Interstate Income Differentials: Theory and Practice", in Regional Income, National Bureau of Economic Research, Studies in income and Wealth, Vol.21 (Princeton: University Press, 1957), pp.113-60.

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SESSION :
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X DEMOGRAPHIC ASPECTS OF LABOUR
SUPPLY AND EMPLOYMENT

X. 12

The Level and Nature of Work Participation by Sex,
Age and Marital Status in India 1961

By

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THE LEVEL AND NATURE OF WORK PARTICIPATION BY SEX, AGE AND MARITAL STATUS IN INDIA, 1961.

By

Pravin Visaria*

INTRODUCTION:

1. The objective of this paper is to summarise the results of a collaborative project¹ undertaken by the author and the Office of the Registrar General to compile special tables from the unpublished records of the 1961 Census in order to estimate (i) the worker-population ratios and (ii) the distribution of workers into nine industrial categories by sex, five year age groups and marital status in rural and urban areas of some states of India². The requisite tables have been compiled for Bihar, Himachal Pradesh, Maharashtra, Punjab and West Bengal (according to their 1961 territorial boundaries). These states together covered a population of 142.6 million, about 32 per cent of the total population of the country in 1961. The states³ were selected on grounds of availability and condition of the census records as well as the level of female participation rates reported in the census, which were the focus of attention.

2. The worksheets for the compilation of the 1961 census table on the distribution of population by age and marital status formed the basis of the additional tables. The entire project was tailored to avoid any resorting of census slips for individuals because of cost considerations. It was not possible, therefore, to estimate the number of unemployed by various characteristics. Consequently, the entire discussion below is in terms of worker rates or worker-population ratios rather than the conventional labour force participation rates.

3. The tables of Maharashtra for males do not include marital status as a variable but for other states, for which tables were compiled later, marital status was retained as a variable for both sexes. Whenever the term "four states" is used, Maharashtra is excluded. Further, the discussion is restricted to the situation in the five or four states together and excludes the interstate and intrastate differentials.

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4. The validity of the 1961 census data on the economic activities of the population has become a little controversial following the publication of the provisional 1971 census data on the number of persons with work as their main activity and the broad nature of their work⁴. However, the author views the 1961 census data as providing a fairly good inventory of those who work at some time or the other. In any case, a comparative examination of the 1961 and the 1971 census data will prove useful to judge these issues. The study of the demographic correlates of work participation in 1961 provides a basis for such research and can help to understand the social dynamics of economic activity. It also enables the preparation of labour force projections which distinguish between the entrants into and the withdrawals from economic activity and thereby assist planning of proper manpower utilisation.

Worker Rates by Age and Rural-Urban Residence

5. Table 1 below shows the male worker rates for five states by rural-urban residence and age. The rates for four states by marital status are also shown. Table 2 reports the female worker rates in five states by age, marital status and rural-urban residence. Figure 1 shows graphically the rates by sex, age and rural-urban residence in five states.

6. The age specific worker rates for males, both in rural and urban areas show an inverted U-shaped pattern, with a very flat plateau in the rural rates for ages 20-54. The urban rates are somewhat lower than the rural even in ages of peak level participation in economic activity. This seems to be partly due to the higher level of open unemployment in urban areas than in the rural but the discipline of fixed working hours in urban work opportunities also tends to restrict participation in work. In rural areas, work on the family farm or in household enterprises is more amenable to individual adjustment just as it is not subject to rules of retirement. Up to age 24, the higher proportion of school and college enrollments also depresses the urban worker rates below the rural.

7. The curve depicting the age-specific worker rates for females is not as smooth as that for males, presumably due to errors of age reporting. The ages of non-workers are probably reported with a somewhat higher degree of rounding up or approximation than the ages of workers, so that beginning with age 40, the worker rates for rural women in the five-year age groups including digit '0' seem to be somewhat depressed. The worker rates for urban women are significantly lower than those for rural women, presumably due to the nature of available work opportunities and the lesser feasibility of assistance from elderly relations in the urban family framework. Interestingly, the peak worker

rate for urban women is reached in the age group 40-44 while that for rural workers as well as for urban males is reached in the age group 35-39.

Worker Rates by Marital Status in Rural and Urban Areas

8. The marital status specific worker rates for males, shown in Table 1 cover only four States while those for females, shown in Table 2 refer to the five States.⁴ The data for rural areas are shown also in Figures 2A and 3A and those for urban areas in Figures 2B and 3B.⁵

9. Both among rural and urban males, the worker rates for the never-married are the lowest in all ages. In ages 25 and over, they are the lowest for the never-married, the highest for the currently married and 'in between' for the widowed and divorced, with the widowed generally showing somewhat higher worker rates than the divorced.⁶

10. The corresponding data for females of five States, suggest a somewhat different and mixed pattern. In urban areas, work participation by the currently married females is substantially lower than by women in the other three marital status groups. The divorced women report the highest worker rates while the widowed exceed the work participation by the never-married up to age 34 and then equal or fall below their level. On the whole, the proportion of workers among the never-married as well as widows in urban areas is much higher than among the married but noticeably less than among the divorced. The worker rates for rural women of each marital status are significantly higher than those for their urban counterparts but the differences are the largest for the currently married. The divorced rural women report the highest level of work participation in almost all age groups while the rates for the widows and the currently-married are not significantly different beyond age 45. The alternating peaks and dips in the worker rates of the never-married rural females presumably reflect errors of age reporting as well as the influence of relatively small numbers.

11. The reasons underlying the differentials in male worker rates according to marital status, observed both in rural and urban areas, are not easy to comprehend. One would presume that men who remain unmarried beyond age 30 or 35 might include a significant proportion of the physically or mentally handicapped. Some of them might also be engaged in non-economic pursuits as members of various priestly or mendicant orders and may therefore be classified as nonworkers. However, the lower worker rates for the widowed and divorced males appear rather puzzling and one wonders whether they are forced to give up economic activity in order to look after the children and the household.

12. The marital-status-specific age pattern of worker rates for females appears plausible. The divorced and separated women do not normally receive any alimony and are therefore compelled to find means for their own support. The currently married, on the other hand, are likely to be supported by their spouses while they fulfil their customary role of child-bearing and household management. The higher work participation by the younger widows up to age of 35 probably reflects the absence of any grown up children who can support their mothers. However, the lower work participation by the never-married than by widows or divorced at least up to the age 34 or 39 is contrary to the situation reported for other countries and might sound implausible to those acquainted with the situation in major metropolitan cities of India. This apparently implausible observation is presumably due to the different situation prevailing in non-metropolitan areas which account for a majority of the population.⁸

Sectoral Distribution of Workers by Age:

13. An important objective of this study was to examine the sectoral distribution of workers by age. The data provided a classification of workers of each sex-age group by nine industrial categories which can be combined to obtain a fair approximation to the classification of the working force or the economy into "primary", "secondary" and "tertiary" sectors. In the discussion below, the primary sector is defined as the extractive sector, including mining and quarrying. Workers in the three industrial categories of "cultivation" (I), "agricultural labour" (II) and "mining, quarrying, livestock-raising, forestry, fishing, hunting, plantation work, orchardry and allied activities" (III) are included in the primary sector⁹. The secondary sector includes "household industry" (IV), "non-household manufacturing" (V) and "construction" (VI). The tertiary sector includes "trade and commerce" (VII), "transport, storage and communication" (VIII) and "other services" (IX). It has been noted that some of the workers classified under household industry and included in industrial category IV belonged to industrial division '0', and should normally be placed in the primary sector. However, such misclassified workers formed a very small proportion of the total workers engaged in the secondary sector or the primary sector. Further, workers engaged in the generation, transmission and distribution of electricity, the manufacturing and distribution of gas, and utilities of water supply and sanitary services, which would normally be included in the secondary sector, have been grouped under "other services" (i.e. industrial category IX). The last category also includes workers whose activities were not adequately described to permit their industrial classification or whose activities were unspecified. It was not possible to alter this classification scheme without undertaking a re-sorting of the slips. However, these limitations are of relatively marginal importance and would not vitiate broad inferences from the data.

14. With this background, we can consider the proportionate distribution of workers of each age group by industrial category and ascertain whether these proportions show any relationship with age (measured in five year units). The relevant data for males and females of five states, according to their rural urban residence, are shown below in Tables 3,4,5 and 6. Admittedly, a high proportion of workers of an age group in an industrial category does not necessarily suggest a high number of persons in that industry or occupation. The latter is affected also by the size of population in the age group and its worker rate.

15. Data in Table 3 show an interesting steady increase, associated with age, in the proportion of rural male workers in the primary sector and a decrease in the proportion in the secondary and tertiary sectors. A more important feature of the data presented in these tables is the observation that the proportion of cultivators among male workers varies directly (or rises) with age while the proportion of agricultural labourers varies inversely or is steadily higher among young workers than among the older workers. The young men perhaps work as hired labourers on others' land until they acquire a share in the family holding or save enough to buy land and then become cultivators. However, the more likely explanation is the scarcity of land and the difficulty of extending the area of land under cultivation pari passu with the growth of labour force. As a result, an increasing proportion of those who entered the labour force in more recent years have to work as labourers. The same fact may explain the higher proportion of younger workers in the secondary and tertiary sectors although the availability of skills or educational qualifications to take advantage of the recently expanded opportunities in these sectors is also a likely relevant factor.

16. Rather surprisingly, the proportion of rural female workers engaged in the primary sector or working as cultivators or agricultural labourers does not show any noteworthy variations associated with age. One can notice a very slight tendency for their proportion in the primary sector to fall and that in the secondary and tertiary sectors to rise but the proportions of female workers in the latter two sectors are very low. Within the primary sector, the predominant employer of rural female workers, the proportions of cultivators and agricultural labourers fluctuate in a saw-tooth manner in opposite directions and the differences do not seem to be significant. The virtually constant proportion of female workers in the primary sector probably reflects their response to the pressure to meet the seasonal peaks in the demand for farm labour.

17. In urban areas, the tertiary and secondary sectors are the main employers of both male and female workers. After age 20, the proportions of both male and female workers in the secondary sector decline steadily with age, mainly reflecting

the tendency with respect to workers engaged in non-household manufacturing. Quite probably, the younger workers can adapt more easily to the demand of industry. In the tertiary sector, however, the relation between the proportions of workers engaged in different categories and age group is not quite uniform. The proportion of workers engaged in trade and commerce rises positively with age, both for males and females. This does not, however, indicate lesser attractiveness or absorptive capacity of these activities in recent years because of the higher number of persons in younger ages and their relatively higher worker rates. The proportions of workers engaged in transport and communications tend towards an inverted U-shaped curve both in the case of males and females, although the proportions for females are very small and virtually insignificant. The proportions of female workers engaged in "other services" tend to exceed those for male workers although the quality of employment of the former is likely to be poorer than for male workers. Such differences probably also exist between workers of different age groups.

18. It was hoped that the analysis presented above would help towards a projection of the sectoral composition of the working force. This could be attempted particularly for males in the rural sector among whom the cultivators and the agricultural labourers are the main groups. The proportion of agricultural labourers was, of course, expected to increase over the period 1961-71 but the change indicated by the provisional 1971 census data on the working force mainly reflects the altered conceptual framework of the more recent data.¹⁰ The intercensal changes could be examined more intensively for each cohort when the detailed 1971 census data become available.

The Sectoral Distribution of Workers by Age and Marital Status

19. The space constraint precludes the presentation of tables indicating the industrial category distribution of workers by sex, age, marital status and rural-urban residence. However, the main results can be summarised. The rural male workers of each marital status group are employed mainly in the primary sector as cultivators or agricultural labourers. Interestingly, in each age group above 30, the proportion of cultivators tends to be significantly higher among the never-married male workers than among the divorced or separated. There is hardly any difference in these proportions for the married and the widowed, which lie between the proportions for the never-married and the divorced. The reverse is true with respect to the proportion of agricultural labourers. Among urban males one does not observe clear-cut differences in the sectoral employment pattern according to marital status, although the proportion of the never-married employed in "other services" (Industrial Category IX which includes the industrial division 9 as well as 5) appears to be noticeably higher than that among workers with other marital statuses.

20. The differentials in the sectoral employment patterns of rural female workers according to marital status are similar to and in fact sharper than those for rural male workers. The proportion of cultivators among the never-married and the married females workers is almost the same in all age groups; it is significantly higher than among working widows and the divorced women, who work much more frequently as agricultural labourers than women who presumably find an opportunity to work in the family farms of their parents or spouses. Among urban females also, the differentials in the industrial category distribution of workers according to marital status are quite sharp. In all age groups, a very high proportion of the never-married urban female workers are employed in "other services" (Industrial Category IX). This proportion is much higher than that reported for the married or widowed workers who fall between the never-married and the married. On the other hand, the proportion of those engaged in household industry is significantly higher among the married women workers of urban areas than among the rest; it is the lowest among the never-married. The proportion of workers employed in nonhousehold manufacturing does not show any noticeable differences by marital status.

Needed Further Research

21. The reasons for the observed differences in the worker rates by marital status and particularly for the lower worker rates of the never-married or widowed and divorced than of the married are, of course, not known. Some useful insights into these reasons may be evident if the non workers in each of the marital status groups are tabulated according to their activity. Such analysis may be feasible from the one percent national sample and the 20 percent urban sample of the 1971 census slips which are on computer tape.

22. Subject to the constraint imposed by the conceptual framework and the quality of basic data, such analysis would make possible an evaluation of the hypothesis that those who remain never-married at an advanced age such as 35 or above are likely to include a high proportion of the physically and/or mentally handicapped. Such tabulation would not provide any direct basis to estimate the influence of unemployment on worker rates because the 1971 census has not provided any specific categories to identify those who are unemployed and were therefore not working. It is nevertheless likely that most unemployed would fall in the category of "others" after the students, the retired, the dependents, the beggars, the institutional inmates and those engaged in household duties have been sorted out. The sex-age distribution of persons in the category of "others" and their importance relative to the number of workers with similar characteristics would deserve close examination.

Footnotes

1. The financial support for the project was provided by a generous grant by the Population Council of New York to the University of Bombay for promoting research and training in Demography in its Department of Economics.
2. The published tables of the 1961 Census show the classification of population into workers and non-workers and of workers into nine industrial categories only for the / broad age groups of 0-14, 15-34, 35-59 and 60 and over. Marital status was not used as a variable in the tabulation of data on the economic activities of the population.
3. Himachal Pradesh was a "Union Territory" and not a State until 1966. Yet, in the present paper, it is considered a State.
4. The issues relating to the comparability of the 1961 data with the provisional 1971 data on workers and their broad classification have been discussed in the author's paper on "The Provisional 1971 Census Data on the Working Force", presented at the Seminar on the "First Results of the 1971 Census of India", held at Delhi in November, 1971.
5. Throughout the discussion, the divorced include the separated.
6. In Figures 2A and 2B, the worker rates for persons aged 70 and over are plotted somewhat further to the right than in Figures 1 or 3A or 3B. This is due only to an oversight.
7. In ages below 25, the number of widowed and divorced males tends to be relatively small and, therefore, not much significance can be attached to the worker rates for them.
8. A detailed analysis of the data for Maharashtra indicated that worker rates for the never-married women in Greater Bombay were significantly higher than those for their sisters in the rest of urban Maharashtra over ages 20 to 49 but not in higher ages. Of course, the number of never-married declines steeply with advancing age and, therefore, the age-standardised worker rates for the never-married females in Greater Bombay would also exceed that for the rest of urban Maharashtra.
9. The roman figures in parentheses refer to the number of Industrial Category.
10. The subject is discussed at some length in the paper cited in footnote 4 above.

Table 1

Worker Rates (Workers per 1000 Population) for Males
by Rural/Urban Residence, Marital Status and Age in
Four States (Bihar, Himachal Pradesh, Punjab and West
Bengal Taken Together), and the Worker Rates for
Males in Rural and Urban Areas of Five States (Four
States Plus Maharashtra), 1961 Census.

Age Group	Rural Areas					Urban Areas						
	Five States	ALL	NM	M	W	D	Five States	ALL	NM	M	W	D
All												
Ages 10 and over	559	548	525	937	826	899	540	534	240	888	709	812
5-9	806	796	515	937	826	899	709	700	427	888	709	812
10-14	26	24	25	131	482	-	4	4	4	-	-	-
15-19	303	287	270	507	606	376	85	81	77	225	500	248
20-24	721	699	653	810	938	864	412	416	384	640	627	568
25-29	917	902	847	933	939	943	767	746	687	836	843	890
30-34	969	963	921	970	960	956	917	899	840	927	876	888
35-39	976	971	917	975	957	948	942	927	862	939	874	871
40-44	978	974	913	977	958	940	954	945	870	952	903	890
45-49	974	970	890	975	952	926	949	941	850	948	897	871
50-54	973	969	894	974	951	921	935	925	799	934	877	824
55-59	961	956	854	964	928	905	905	900	768	911	847	814
60-64	945	940	845	951	909	898	829	845	742	856	796	811
65-69	882	881	761	903	826	803	667	656	570	668	617	618
70 and over	828	831	714	861	767	778	554	544	509	552	528	488
	615	619	516	691	519	556	413	414	395	444	360	435

NM: Never-married; M: Married; W: Widowed; D: Divorced.

Note: The non-zero worker rates for the married and widowed in ages 5-9 result from the identification of these marital statuses for the age group in one of the five States. In the published tables of the 1961 Census, all persons in ages 0-9 have been shown as never-married.

Table 2

Worker Rates (Workers per 1000 Population) for Females
by Rural/Urban Residence, Marital Status and Age in
Five States (Bihar, Himachal Pradesh, Maharashtra,
Punjab and West Bengal Taken Together), 1961 Census

Age Group	All Areas					Rural Areas					Urban Areas				
	ALL	NM	M	W	D	ALL	NM	M	W	D	ALL	NM	M	W	D
All															
Ages	246	55	395	349	616	280	62	449	371	642	93	25	135	230	464
10 &															
over	453	182	396	349	617	554	229	449	371	643	131	64	135	230	464
0-9	14	9	13	149	3	14	10	13	149	3	1	1	-	-	-
10-14	189	152	325	449	440	228	191	339	465	445	31	25	119	233	323
15-19	314	232	374	503	616	365	342	413	525	643	84	59	108	310	363
20-24	379	292	380	513	651	442	417	439	541	689	128	192	111	341	419
25-29	411	445	404	540	655	474	588	468	563	685	145	316	127	399	487
30-34	432	435	420	563	664	494	529	485	582	693	171	330	147	457	525
35-39	459	521	442	565	678	515	576	503	587	704	201	438	166	442	554
40-44	453	465	433	516	644	502	513	490	541	670	219	385	171	387	531
45-49	452	461	435	564	623	499	485	489	517	643	212	408	163	317	514
50-54	395	378	389	401	541	435	426	438	430	560	200	298	148	256	443
55-59	353	352	357	348	484	387	505	399	376	514	162	271	127	190	334
60-64	255	281	238	244	391	279	314	313	265	405	128	219	101	138	313
65-69	204	274	236	192	315	225	361	267	210	333	89	144	76	93	204
70 &															
over	107	168	164	96	199	115	217	181	104	206	58	92	64	56	161

NM; Never Married; M: Married; W: Widowed; D: Divorced.

Table 3

The Distribution of 1000 Workers in Rural Areas of Five States (Bihar, Himachal Pradesh, Maharashtra, Punjab and West Bengal Taken Together) in Each Sex-Age Group by Industrial Category and Sector, 1961, Census

Age group	Sector			Industrial Category								
	P	S	T	I	II	III	IV	V	VI	VII	VIII	IX
<u>MALES</u>												
All	811	81	108	571	202	38	49	23	9	27	10	71
ages												
10 & over	812	80	108	574	202	36	48	23	9	27	10	71
0-9	825	140	35	325	188	312	124	5	1	3	-	32
10-14	850	90	60	464	257	129	78	9	3	9	1	50
15-19	834	81	85	545	251	38	51	22	8	20	5	60
20-24	784	90	126	537	216	31	47	31	12	28	11	87
25-29	786	86	128	542	210	34	45	29	12	29	13	86
30-34	790	85	125	547	208	35	45	28	12	31	14	80
35-39	800	80	120	569	199	32	44	26	10	31	14	75
40-44	804	79	117	578	197	29	45	24	10	31	13	73
45-49	818	73	109	612	181	25	44	20	9	30	11	68
50-54	824	71	105	630	172	22	46	17	8	29	9	67
55-59	845	64	91	673	153	19	44	14	6	28	6	57
60-64	854	64	82	691	146	17	48	11	5	27	4	51
65-69	867	58	75	727	125	15	45	9	4	27	3	45
70 & over	872	60	68	747	112	13	49	8	3	24	2	42

P = Primary; S = Secondary; T = Tertiary; I = Cultivation; II = Agricultural Labour; III = Mining, Quarrying, Animal Husbandry, Forestry, Fishing, Hunting, Plantation Work, Orchardry and Allied Activities; IV = Household Industry; V = Manufacturing other than Household Industry; VI = Construction; VII = Trade and Commerce; VIII = Transport, Storage and Communication; IX = Other Services.

Note: Figures for each category and sector have been rounded independently.

Table 4

The Distribution of 1000 Workers in Rural Areas of Five States (Bihar, Himachal Pradesh, Maharashtra, Punjab and West Bengal Taken Together) in Each Sex-Age Group by Industrial Category and Sector, 1961, Census.

Age group	Sector			Industrial Category								
	P	S	T	I	II	III	IV	V	VI	VII	VIII	IX
<u>FEMALES</u>												
All												
ages	895	65	40	589	287	19	56	7	2	8	-	32
10 & over	895	65	40	589	288	18	56	7	2	8	-	32
0-9	827	105	68	456	254	117	98	5	2	2	-	66
10-14	905	66	29	570	309	26	59	5	2	3	-	26
15-19	908	62	30	604	287	17	52	7	3	3	-	27
20-24	904	62	34	588	296	20	52	7	3	4	-	30
25-29	900	64	36	589	291	20	54	7	3	6	-	30
30-34	894	65	41	586	289	19	55	7	3	8	-	33
35-39	893	64	43	592	284	17	55	7	2	9	-	34
40-44	887	66	47	585	287	15	57	7	2	11	-	36
45-49	891	63	46	602	275	14	56	6	1	11	-	35
50-54	884	66	50	595	275	14	58	7	1	13	-	37
55-59	883	68	49	604	267	12	60	7	1	14	-	35
60-64	869	73	58	584	274	11	65	7	1	17	-	41
65-69	869	74	57	588	272	9	65	8	1	17	-	40
70 and over	852	83	65	586	257	9	75	7	1	19	-	46

P = Primary; S = Secondary; T = Tertiary; I = Cultivation; II = Agricultural Labour; III = Mining, Quarrying, Animal Husbandry, Forestry, Fishin, Hunting, Plantation Work, Orchardry and Allied Activities; IV = Household Industry; V = Manufacturing other than Household Industry; VI = Construction; VII = Trade and Commerce; VIII = Transport, Storage and Communication; IX = Other Services.

Note: Figures for each category and sector have been rounded independently.

Table 5

The Distribution of 1000 Workers in Urban Areas of Five States (Bihar, Himachal Pradesh, Maharashtra, Punjab and West Bengal Taken Together) in Each Sex-Age Group by Industrial Category and Sector, 1961
Census

Age Group	Sector			Industrial Category								
	P	S	T	I	II	III	IV	V	VI	VII	VIII	IX
<u>MALES</u>												
All ages 10 & over	73	363	564	37	19	17	38	291	34	186	102	276
0-9	319	288	393	105	58	156	104	149	35	53	56	284
10-14	190	301	509	66	62	62	84	197	20	118	29	362
15-19	92	382	526	41	31	20	52	297	33	174	63	289
20-24	57	392	551	26	16	15	35	321	36	170	92	289
25-29	54	386	561	24	15	15	32	318	36	167	116	278
30-34	57	374	569	25	16	16	32	308	34	179	121	269
35-39	61	363	576	29	16	16	32	299	32	184	124	268
40-44	67	357	576	33	18	16	34	289	34	194	114	268
45-49	78	339	583	42	19	17	37	268	34	207	101	275
50-54	89	326	585	51	21	17	41	248	37	214	98	273
55-59	104	320	576	67	21	16	44	243	33	232	81	263
60-64	152	292	556	102	31	19	61	196	35	254	52	250
65-69	180	257	563	135	27	18	63	165	29	271	38	254
70 & over	227	252	521	178	30	19	79	145	28	255	31	235

P = Primary; S = Secondary; T = Tertiary; I = Cultivation; II = Agricultural Labour; III = Mining, Quarrying, Animal Husbandry, Forestry, Fishing, Hunting, Plantation Work, Orchardry and Allied Activities; IV = Household Industry; V = Manufacturing other than Household Industry; VI = Construction; VII = Trade and Commerce; VIII = Transport, Storage and Communication; IX = Other Services.

Note: Figures for each category and sector have been rounded independently.

Table 6

The Distribution of 1000 Workers in Urban Areas of Five States (Bihar, Himachal Pradesh, Maharashtra, Punjab and West Bengal Taken Together) in Each Sex-Age Group by Industrial Category and Sector, 1961, Census.

Age Group	Sector			Industrial Category								
	P	S	T	I	II	III	IV	V	VI	VII	VIII	IX
<u>FEMALES</u>												
All ages 10 & over	249	291	461	106	122	21	144	127	20	70	24	367
0-9	336	367	297	128	156	52	261	90	16	23	8	266
10-14	343	361	296	118	200	25	231	109	21	30	10	256
15-19	289	370	341	118	149	22	199	140	31	38	17	286
20-24	230	319	451	95	115	20	156	139	24	49	28	374
25-29	238	308	454	99	115	24	149	136	23	57	33	364
30-34	231	294	475	96	112	23	138	135	21	70	31	374
35-39	243	273	484	103	116	24	125	129	19	74	24	386
40-44	235	265	500	101	114	20	122	125	18	83	23	394
45-49	258	255	487	115	123	20	117	122	16	89	20	378
50-54	240	244	516	108	114	18	118	112	14	100	19	397
55-59	270	227	503	136	118	16	115	101	11	103	17	383
60-64	263	237	500	123	123	17	136	90	11	120	15	365
65-69	295	219	486	156	123	16	137	74	8	121	10	355
70 & over	269	242	489	156	99	14	160	76	6	140	9	340

P = Primary; S = Secondary; T = Tertiary; I = Cultivation; II = Agricultural Labour; III = Mining, Quarrying, Animal Husbandry, Forestry, Fishing, Hunting, Plantation Work, Orchardry and Allied Activities; IV = Household Industry; V = Manufacturing other than Household Industry; VI = Construction; VII = Trade and Commerce; VIII = Transport, Storage and Communication; IX = Other Services.

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	P	S	T	I	II	III	IV	V	VI	VII	VIII	IX
<u>MALES</u>												
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15-19	92	382	526	41	31	20	52	297	33	174	63	289
20-24	57	392	551	26	16	15	35	321	36	170	92	289
25-29	54	386	561	24	15	15	32	318	36	167	116	278
30-34	57	374	569	25	16	16	32	308	34	179	121	269
35-39	61	363	576	29	16	16	32	299	32	184	124	268
40-44	67	357	576	33	18	16	34	289	34	194	114	268
45-49	78	339	583	42	19	17	37	268	34	207	101	275
50-54	89	326	585	51	21	17	41	248	37	214	98	273
55-59	104	320	576	67	21	16	44	243	33	232	81	263
60-64	152	292	556	102	31	19	61	196	35	254	52	250
65-69	180	257	563	135	27	18	63	165	29	271	38	254
70 & over	227	252	521	178	30	19	79	145	28	255	31	205

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FEMALES												
All ages 10 & over	249	291	461	106	122	21	144	127	20	70	24	367
0-9	336	367	297	128	156	52	261	90	16	23	8	266
10-14	343	361	296	118	200	25	231	109	21	30	10	256
15-19	289	370	341	118	149	22	199	140	31	38	17	286
20-24	230	319	451	95	115	20	156	139	24	49	28	374
25-29	238	308	454	99	115	24	149	136	23	57	33	364
30-34	231	294	475	96	112	23	138	135	21	70	31	374
35-39	243	273	484	103	116	24	125	129	19	74	24	326
40-44	235	265	500	101	114	20	122	125	18	83	23	394
45-49	258	255	487	115	123	20	117	122	16	89	20	378
50-54	240	244	516	108	114	18	118	112	14	100	19	397
55-59	270	227	503	136	118	16	115	101	11	103	17	383
60-64	263	237	500	123	123	17	136	90	11	120	15	365
65-69	295	219	486	156	123	16	137	74	8	121	10	355
70 & over	269	242	489	156	99	14	160	76	6	140	9	340

P = Primary; S = Secondary; T = Tertiary; I = Cultivation; II = Agricultural Labour; III = Mining, Quarrying, Animal Husbandry, Forestry, Fishing, Hunting, Plantation Work, Orchardry and Allied Activities; IV = Household Industry; V = Manufacturing other than Household Industry; VI = Construction; VII = Trade and Commerce; VIII = Transport, Storage and Communication; IX = Other Services.

Note: Figures for each category and sector have been rounded independently.

THE LEVEL AND NATURE OF WORK PARTICIPATION
BY
SEX, AGE AND MARITAL STATUS IN INDIA, 1961:
A SUMMARY

The paper summarises the results of a research project undertaken to study the worker rates and the industrial category distribution of workers by five-year age groups and marital status, according to the 1961 Census of India. The data relate to five States having a total population of 142.6 million in 1961.

The marital-status-specific age pattern of worker rates is discussed separately for rural and urban areas. The observed differentials in female worker rates by marital status are plausible, while those for males are somewhat difficult to comprehend.

The industrial category distribution of rural male workers shows steadily higher proportions of agricultural labourers and lower proportions of cultivators among younger workers and reflects the difficulty of extending the area of land under cultivation pari passu with the growth of the labour force. Among urban male workers, the proportions engaged in the non-household manufacturing are higher in younger ages.

The sectoral pattern of employment of workers of different marital status groups is discussed. In conclusion a reference is made to the future research needs on the subject covered in the paper.

C.AJBANI

Residence, Five States, 1961 Census

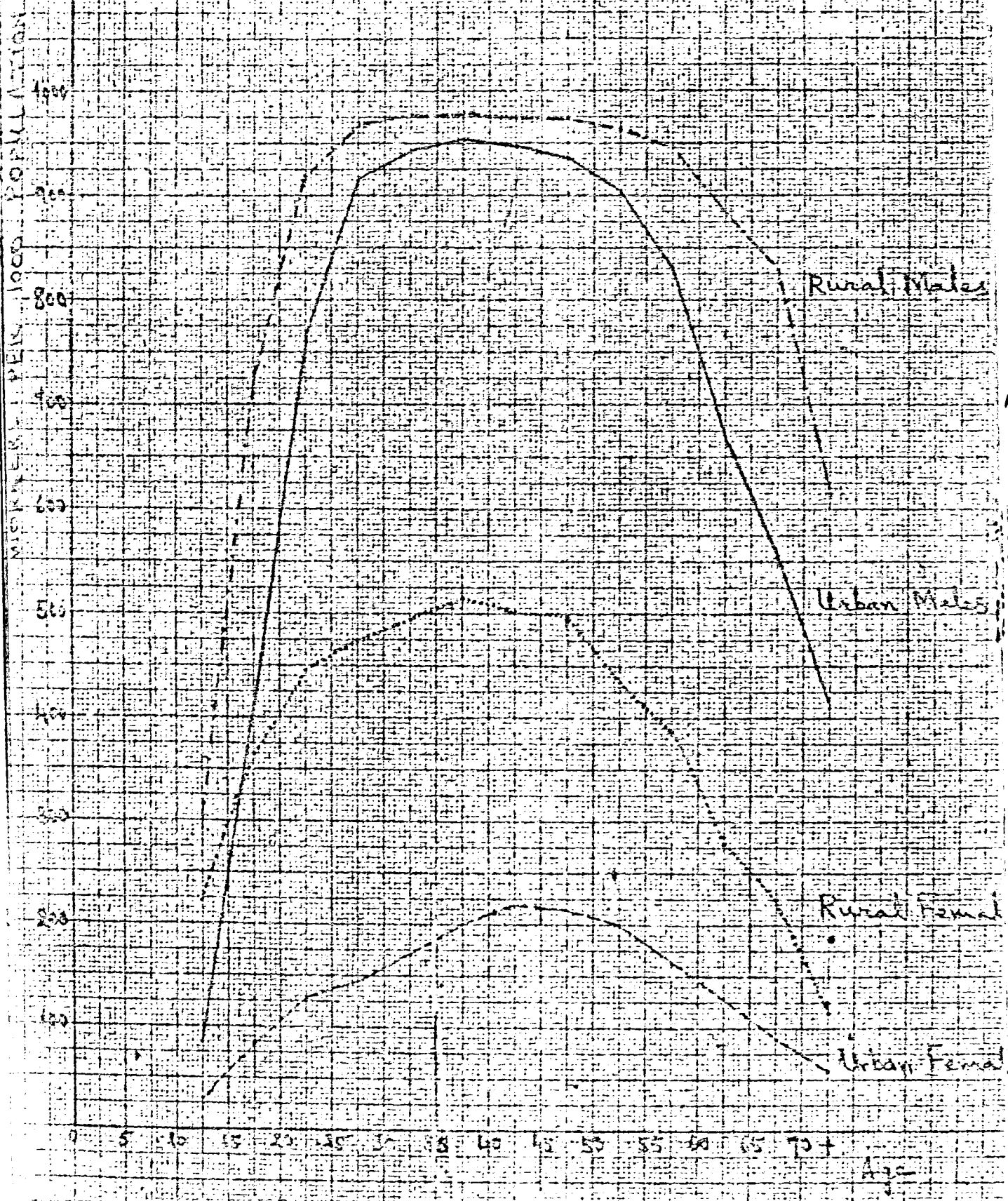


Figure 2A Worker Rates for Males in Rural Areas by Age and Marital Status, Four States

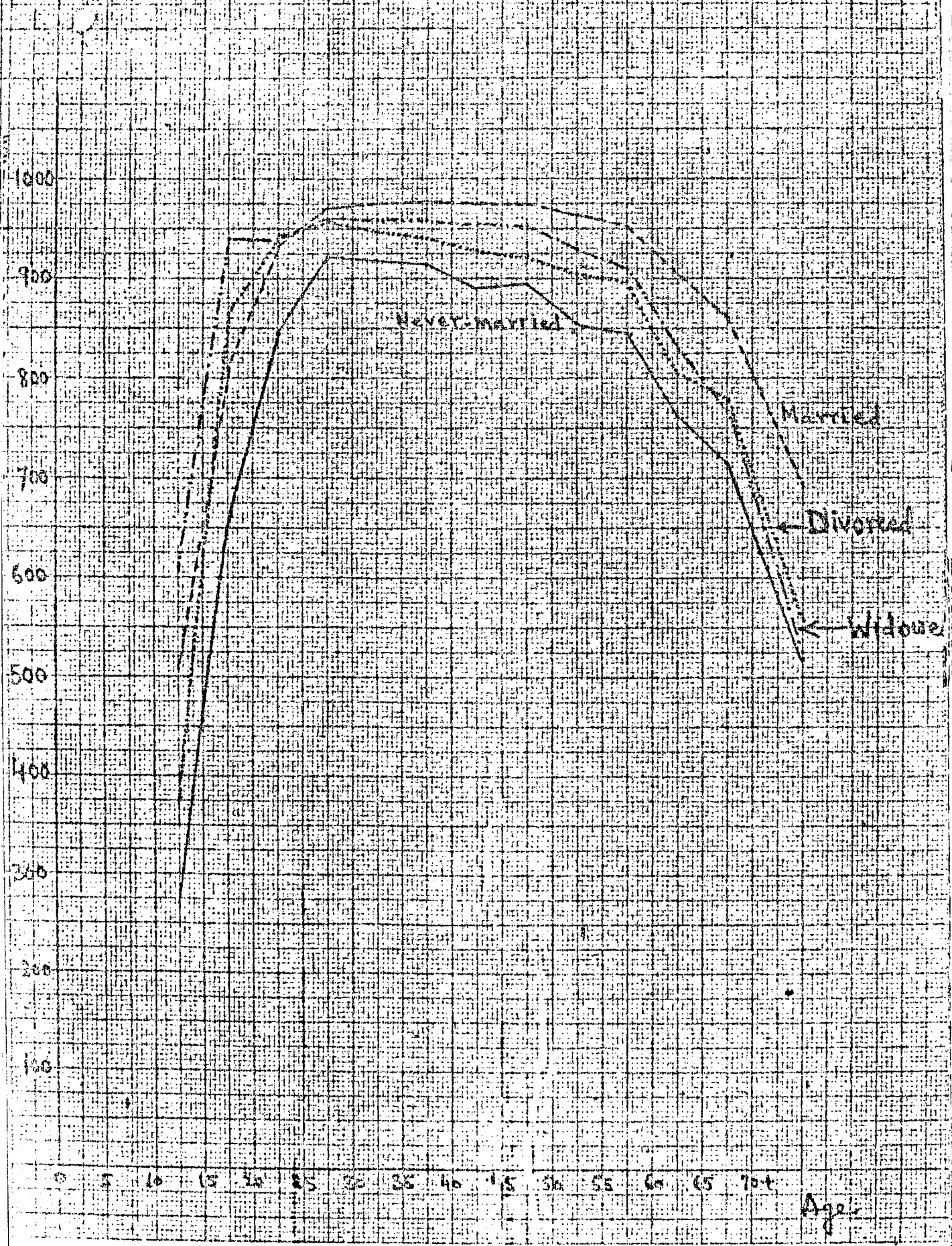
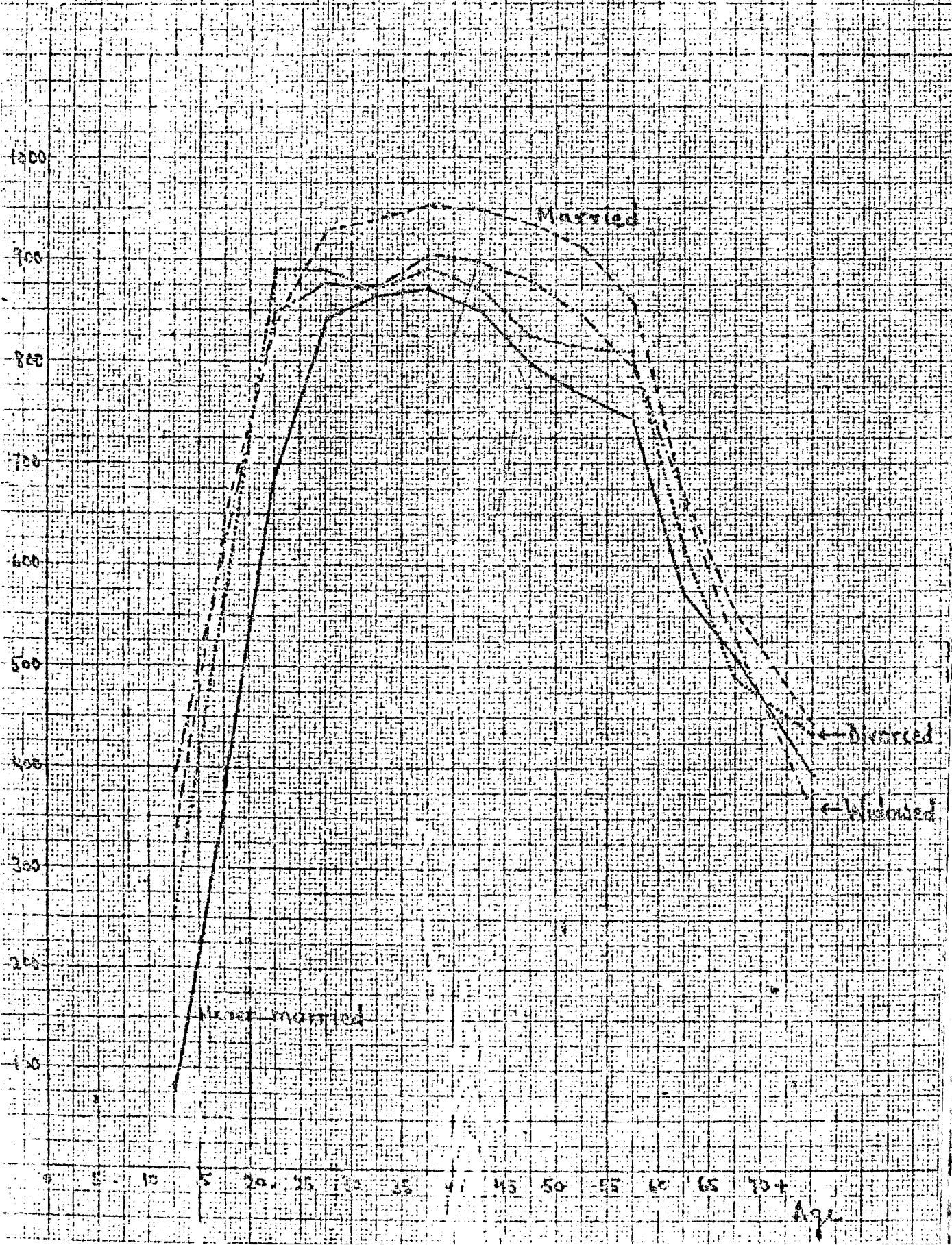


Figure 2B Worker Rates for States by Age and Marital Status, Four States, 1961 Census.



and Marital Status, Five States, 1961 Census

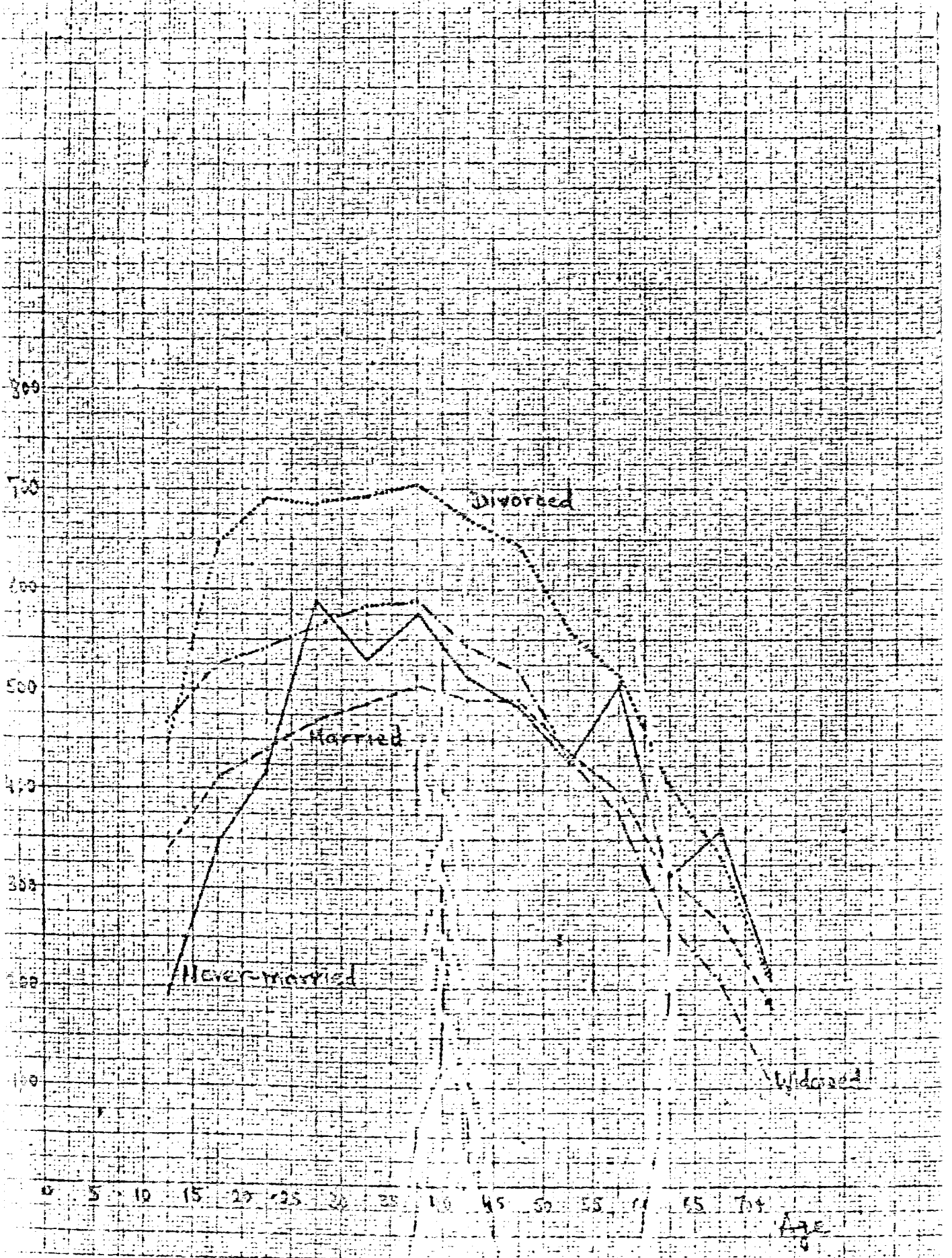
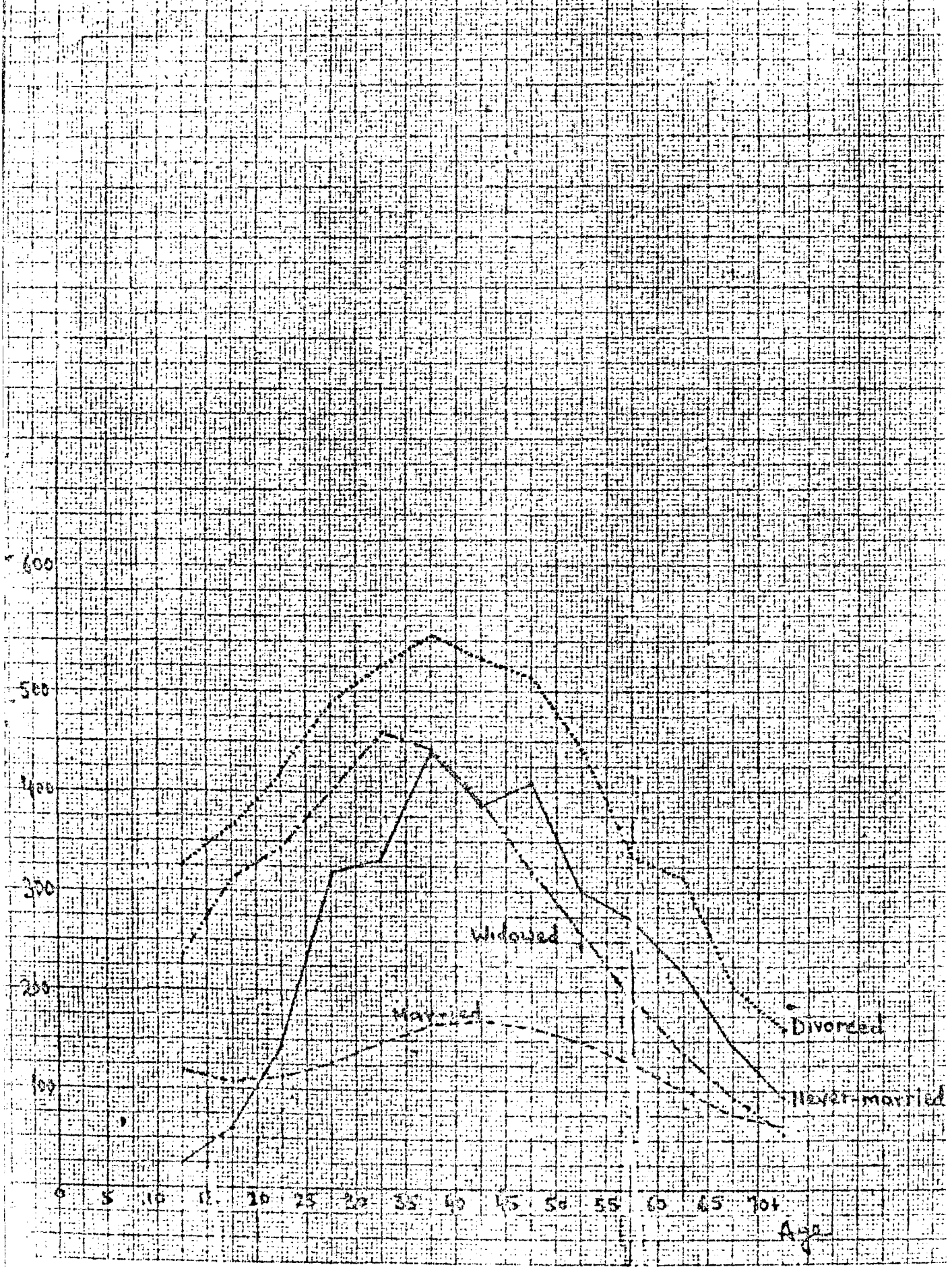


Figure 10 Worker Rates for Females in Urban Areas, by Marital Status, Five States, 1961 Census.



INDIAN CENSUS CENTENARY SEMINAR

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**XI DEMOGRAPHIC ASPECTS OF
EDUCATIONAL DEVELOPMENT**

XI. 01

The Training of Demographers

By

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New Delhi

THE TRAINING OF DEMOGRAPHERS

By B.N.PAL*

This paper discusses the various issues in the education and training of demographers. Education in this context means both formal and informal systems, while training covers pre-service and in-service periods. Apparently, the canvas of educational activity and of training processes should be very wide indeed, but there is in fact a marked lack of these facilities in this important field. Demography ^{is a} multi-disciplinary and inter-disciplinary science, ^{and} draws from several other sciences and applies its conclusions to them. Demographers ~~are~~ ^{come} therefore drawn from several disciplines, but strangely enough, still there is a chronic shortage of professional demographers, demographic technicians, researchers, planners, laboratory workers, teachers, and even training personnel.

Before delving deep into the intricacies of education and training, it would be apt to understand broadly the scope and nature of demography, without entering into the controversy about its correct definition. In commonsense view, it may be right to describe demography as that body of knowledge which

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discusses the human population problems in a particular area, with special reference to the processes of fertility, nuptiality, morbidity, mortality, mobility, etc. Its basic data come from the census and the vital statistics, civil registration systems, and actuarial studies. Hair splitting distinctions have sought to be made between "demographic analysis" and "population studies"-- the former being theoretical-analytical, the latter descriptive-comparative-- so let it be. Demography should deal with both quantitative and qualitative factors with some analysis.

Demographers include the professionals, the technicians, enumerators, laboratory workers, teachers and training personnel. Since the census work is undertaken by governments, most of the demographers are in government service and are drawn from the administrative ranks. Their main function is to provide statistical information to several agencies interpret statistics and make projections and estimates. But this infant has yet to develop scientifically. New analytical methods may be discovered in order to arrive quick at the results. ~~and~~ Spending some time on research, his professional environment (generally) may not be conducive to the growth of the science, or even to his own advancement. There are several distractions; he is asked to give information, when non exists, or to provide fuller data, where collection has been meagre. No wonder, the demographer is not in an enviable situation.

The professional demographer, including the planner and the policy maker, the administrator and the coordinator, has a vast

canvas on which to operate. His assignments should embrace the organisation of the enumerations, and the census-- the designing and improvement, refinement and bringing them up to date, revision and inclusion of new items, and above all placing them in proper perspective so as to point out their limitations and utility. Further, he also chalks out suitable population policies, for the planners and the government, so as to fit into the matrix of economic and social development and growth. And it is for him to prepare inter-censal estimates, and plan out projections from time to time. The pre-censal sample surveys have also to be planned and their actual implementation to be supervised. He helps evaluate the impact of population policies. ^{His} Their professional equipment, therefore, requires not only a deep knowledge of the science of pure demography, but also of its applied aspects and comparative character. He is aware of the latest in the field; ^{and} they should therefore be efficiently served by a good documentation service, and band of researchers. His knowledge of comparative, pure and formal demography is so that he looks objectively at the problems of planning and policy-making. The administrator-demographer may be drawn from the civil services and given a formal ^{"technical"} training. The census-planner may be recruited from the economists who are then be imparted an intensive in-service training in related techniques and theory. This programme has to be supported and fed by efficient documentation.

The demographic technicians makes estimates and projections for specific purposes, processes and tabulates

data according to given needs, compiles reports (pre-censal, inter-censal and others), interprets demographic data, and above all, checks, verifies and corrects various statistics. He must therefore be familiar with the latest statistical and mathematical techniques methods and innovations. He should also be able to work in statistical laboratories operate mechanical equipment, and modern up to date ^{Computers} ~~computers~~. An awareness of related, social, economic and administrative issues is necessary for a clear insight into the demographic problems.

The enumerator is a field worker, on whom the correctness and the reliability of the census returns and other counts depends. He need not have that advanced education as the above two categories still be ^{is} fully aware of the elementary statistical techniques, especially of sampling and interviewing, surveying and asking-questions, and above all of detecting the bias and verifying; this may call for intensive pre-service training, in addition ^{to} a basic degree or diploma in statistics and demography. Most of the forms are out of date and contain much dead word; hence the importance and urgency of revising and updating them. An important element of training is adaptation to field work; e.g. driving for hours and braving weather hazards. Training may also cover the skills of driving and camping, otherwise efficiency may be adversely affected. Since, he may often be required to work in the laboratory; his efficiency depends on his ability to operate computers. Sometimes, the maintenance of the mechanical equipment poses a problem; the enumerator and the technicians should be familiar with this work.

The laboratory work^{er} undertakes the most responsible job of tabulation, classification, verification and cross-check of the crude data. He must know how to work efficiently on mechanical equipment, maintain it, and if need be, repair or at least detect why its break-down. His awareness of the several punchcard systems, and ability to operate the I (calculating equipment), ~~capable of operating~~ adds to efficiency, reliability and responsibility. The elementary statistical techniques', tabulation, classification, verification and recheck are practised by him. Every demographic office develops its own technique and organisation of work with which the staff should be familiar. With the continuous advancement of census technology, frequent refresher courses needed. In the interest of their professional growth, they should be encouraged to pursue further demographic studies, especially in the methods of data collection and tabulation. Some workshops may specifically be held for them where they could learn by means of work experience.

The teachers and the training personnel are the key to the efficiency of demographic work. They may operate at several levels-- in the schools, the colleges, the universities, and the training centres, etc. The school teachers are seldom required to teach demography, ~~selectively~~ through some post-education has been selectively introduced. Seldom do college teachers teach this subject, which has been started in very few institutions. At the university stage, however, some courses are offered in demography and allied subjects (connected with the application of demography to several disciplines. The

elementary school teachers may be proficient, say in population geography, population history, population economics, or biology of population-- they may belong to the main disciplines (e.g. geography, history, economics or biology) and have had an elementary training in demography or what may be more appropriately termed as population education. At the university stage, the teachers of demography should have had a fairly good grounding in the elements of the subject and sufficient teaching experience. Preferably they should have had a multi-disciplinary education, ^{or} engaged in similar work. This holds good for college courses, which, being responsible for initiating the student in the subject need not call for high specialisation from teachers, especially in view of the stress on recency at the university stage. ~~and~~ ^{the} paucity of qualified teachers ^{is acute}. In the university, of course, there is need for specialised research, such as might have invested the teacher with good insight into the intricacies and peculiarities of demography and its research requirements. Preferably, he should have a research degree in demography or some allied branch of knowledge, or the application of demography to academic problems. The training personnel is a little differently situated; they have to deal with mature minds and give condensed courses for a definite purpose. Their Educational background and equipment must ^{obviously} therefore be suited to the objectives of the course. They must be well-versed in the subject of instruction and have wide and deep experience of working on the assignment. They ^{should} ~~must~~ be able to enlighten their wards about the latest advancements in their subject of training. In addition, they ^{will} ~~must~~.

also wear a very pragmatic approach (not merely academic and pedagogical) to the training they impart.

To these five categories, may be added two more: documentalists and reference services, and information and publicity personnel. As pointed out above, documentation is an important vehicle for updating the knowledge of administrative planners, policy-makers, and above all professional demographers. A properly maintained library, with easily available references is another essential and complement to the successful work of any organisation with demographic assignment. In the course of the formulation of some policy measures, or in the process of planning, some references may be immediately required; the reference section should be able to supply them with authentic material and/or give correct direction. Of course, the demographer would be in charge of the reference section, and would himself be a qualified librarian, further trained as a demographic documentalist.

The information and publicity personnel keeps the information ready and processed in the form it is required. A person with a journalistic ^{flair} ~~flair~~, and ability to deal with numbers and other demographic facts is the right man. It is a well-known fact that the census or any other demographic organisation is from time to time required to give information of a specific nature or for a special purpose. Some demographic organisations also require a specialised journalist to handle them issue a journal or a bulletin, which keeps the public and the administration well informed.

By having omitted to mention the researcher has been

deliberate, for research is more a matter of aptitude than training. And then for each of the above categories, there needs to be a research complement. Some researchers could work on the promotion of better administration, better planning and processes, scientific policy-making, and refined coordination and organisation. Similarly, demographic techniques could be improved by research. Better methods could be evaluated by adopting recent developments, improvement and innovations. Also, the procedures and problems of enumeration could be thrashed out not merely at the administrative level, but more effectively in the interest of research and study of parallel problems in other similar or even dissimilar situations. Suitable innovations, both in the mechanical equipment and its use may enhance the utility of the laboratory. Research into the methods of training and teaching, coupled with that into curriculum and pedagogical ^{issues} research may be a fruitful vehicle for streamlining training programmes. Documentation and library services could also benefit from the advice of researchers. And media research is equally useful to the information and publicity personnel. A research call in each unit could on the basis of on-the-spot studies give useful advice. Alternatively, the documentation services could supply to the various units the results of the research done elsewhere. The early experts were content with collection, organisation, publication and interpretation of the various data, but the modern demographer considers data as the basis from which to begin his work. Information has become more comprehensive and detailed, as civil registers and other administrative and organisational sources pour statistics.

The determination and consequences of population trends have been studied at some length, while advances in the biological, sociological, and statistical studies ^{have} made this analysis more precise and predictable. Thus demography is now a discipline in the sense and that it has been elevated to the status of a branch of knowledge, with cumulative scholarship and accepted principles of analysis. Also have grown alongside academic paraphernalia; e.g. academicians and their associations, periodic publications, acceptance by the universities and other places of learning, and research and training centres. At the 4th International Conference on Hygiene a section on "Demography" was included, thus according it international recognition. Thereafter, the International Statistical Institute published a paper by Emile Levasseur on world population in 1885. The multi-disciplinary and the inter-disciplinary bases of this science was established, when Adolphe Quetelet advanced the concept of "social physics", to cover a range of studies from anthropometry to psychology, via demography by conducting demographic research on criminology, anthropometry, and even probability. Great impetus is provided to demographic studies by periodic censuses. Institutions have been set up in the present century to specialise in population studies. Training and research centres have also sprung up. The United Nations Population Studies, ^{and comparative} authentic (for their varied mass of information and span have stipulated deeper analyses. The 20th century has seen several population conferences, since when the first was held. The UN Demographic Yearbook, UN Population Bulletin, Population Index (Princeton), Population Studies (London), Population Review (New Delhi), In

Population Bulletin(Poona), and the Demographic and Development Digest(Lucknow)-- to name only a few -- have all added prestige and recognition to the discipline.

The demographer studies the biological and social correlates of the processes of population. Several other disciplines are involved: biology(of reproduction, and maturation), psychology(of personality), medicine(phenomenas of mortality, and morbidity, etc)sociology(of the family and nuptiality) anthropology(of primitive populations), and economics. In addition, it draws upon the conclusions of mathematics, statistics, geography, ecology, politics and administration. Its theoretical content is limited to the enunciation of a few theories and hypotheses, and more or less concerned with causes, determinants and consequences of population, and the probable course of its projected growth, highly conjectural, or at best explanatory. An analytical theory with hypothetical constructs can be formulated as exemplified in the statistical relationships between different variables, and in the logistic curve formula. Models have also been developed, describing functional relationships frames of reference, and referential concepts. Laws detail the specific empirical uniformities. Moreover, the right questions are being asked. The theory has been successful in binding the diverse findings of various investigations and in organizing knowledge. Still, little is claimed for predictability. Much emphasis has not been placed on its theoretical structure, for demographers have been busy collecting and sifting data, rather than theorising about it. Also, the period for which data are available has not been

long enough to justify that theoretical generalizations can be made. And lastly, the components of change are in sufficiently known and identified for casual relationship to be definite. In the analytical apparatus, we have the stable population theory (Lotka) which provides some sort of necessary relations, though it has its own deficiencies. The Malthusian theory is a class by itself, despite its well-known defects and shortcomings, it still offers a viable explanation of the trends of population of a large part of the world. The optimum theory, though pronounced dead by its critics, is an important landmark in the literature. The transition theory is yet another milestone; though some of the experts opine that it may be better to have a theory of population history instead. The psychosocial theories of fertility, group together skilfully the cultural, the motivational and the familial factors in fertility. Some have actually visualised in this context the development of "psychological demography" and/or microdemography. On the other hand, there is a strong movement for the retention of "macrodemography" too.

The above theoretical discussion merely describes (not defines) demography as the study of the size, spatial distribution and composition of the population, with changes therein, including an analysis of nuptiality, natality, mobility, mortality, etc. In this context, the composition of the population is the most important element; e.g. age, sex, status (marital, occupational and social), race, nativity, family and household, literacy and education, migration, and distribution, etc. Biometric and anthropometric analyses are

also employed while psychometric, genetic and other enumerative and measurable traits are accounted for. Demography in this sense embraces both demographic analysis and population study and comprises population economics, population geography, statistical and mathematical demography, and even population history, let apart the development of demographic thought, demographic anthropology, ecological demography and the biology of population.

A word about the various branches of demographic studies may be in order. The core relations in these studies are biological and social. The various variables are generally treated statistically under pure or formal demography-- and include the study of nuptiality, fertility (also fecundity), morbidity, mortality, migration and mobility, and distribution and composition. Incidentally, pure (or formal) analysis makes a contribution through new investigations and surveys. The construction of mathematical models and statistical tables to bring out the inter-relations among demographic and other variables could be described as applied demography: the study of factors influencing fertility, nuptiality, mortality may call for the applications of physiology, sociology, medical sciences (respectively). Theoretical demography concerns the study of the principles underlying the demographic discipline. I would rechristen it rather as the "Principles of demography" or "Pure demography", ^{it is} destined to play an important role in the future development of the science. Another related branch is demographic thought, its history and developments: ^{an} interesting study. ^{The} Study is a pointer to the further trends of development in the theoretical arena. Much of the thinking springs from the

interpretation and review of the current phenomena; the contemporary conditions (social and economic) affects contemporary thought, at least in the social sciences; an intensive study of the development of demography in the context of social and economic history is highly useful. Comparative demography seeks to study intensively the world demographic data, with a view to finding out the optimum and scientific basis for appropriate policies to be followed. These provide the expert with an insight and give him experience and wider data on which to work. Potential demography, (better termed proleptical) makes estimates and projections about the trends of population-- on this exercise depends the successful carrying out and implementing of the planning and developmental programmes in nearly all spheres of activity--social, education economic, etc. And lastly, Quantitative demography confines itself to a mere description, of the populations, their distribution, composition and such other items; this may all be introduced at the school level, or in the elementary training institutes; A growing body of demographic research, popularly known as analytical demography, establishes various correlations among several variables, and unravels some hidden and apparently invisible processes of demographic development.

Greater stress is being laid these days on empirical studies. The processes of population change are examined often under specific, social and biological phenomena; e.g. measurement of demographic phenomena in respect of variations of fertility, morbidity, mortality (for example) as related to sex, age, location, residence, time, community, race, activity, occupation,

education and family. Other topics refer to the analysis of the effects of automation on the labour requirements, and employment, or the impact of health services on morbidity and mortality rates, or the effects of family pensions and other social security measures on (say) longevity. Information on consumer markets, manpower planning and recreational facilities falls in the same category. Demographic theory would stand to gain immensely from these empirical surveys. Further, old results may be checked and verified by new surveys-- that will restructure, if need be, the theory of pure demography and give a ^{more} precise insight into the processes and trends of population growth and trends. A number of biological factors in relation to population (as for instance in genetics) are studied empirically and conclusions tested. Similarly, sociological, anthropological, psychological and even ethical concepts are applied. Demographic data are of great importance and relevance to the growth of the discipline. Their collection, in turn depends upon the methodology adopted. The past data are meagre, for demographic records are practically non-existent for the pre-census periods. An observational science, as demography, its data collection is neither dependent upon the efficiency of a single observer, nor on control factors, as in a laboratory. The data include the enumeration of population, its classification, and the measurement of the components of its change. The two sources are the field counts, and the records (or registers). The latter comprise the vital registration system, the population register, and other administrative records; and the former, the sample surveys, the census and other actual enumerations, e.g. the

pre-census probes. But these are limits: human populations could not be subjected to laboratory observations, while the number of generation over which the records go are far too few to help in valid generalisation, or in the formulation of longer-term conclusions. Thus, there persists difficulty of perspective in their interpretation. The old data may appear to be defective but the data may never become perfect. Briefly, the data must to be improved always qualitatively, spatially, & if possible historically. There always remains the need to obtain various data from several sources, to complement and supplement them.

The methods of this science, referred to ^{above} ~~cover~~ data collection; their evaluation, adjustment, correction and estimation; and analysis. In ~~recollection~~, the most popular form is the census enumeration, and now self-enumeration which, however is limited in the underdeveloped regions. Several type of queries are made; open, closed, structured, unstructured, sorts multiple, funnel sequence, indirect, direct, projective, etc. Probably, little effort has been made to improve interview techniques. Processing of the data has now been mechanized, and even electronic equipment is being employed. Several processes (e.g. editing, coding, punching, tabu-lating, etc.) have to precede verification of the data, seeks in order to eliminate the errors of reification. Here again the qualitative aspect pose a challenge-- classification of attitudes, for instance. The sample, the pretest and the post-enumerative surveys are devised for purposes of verification. But the record systems, where available, are perfect e.g. vital registration system, the

governmental and the non-governmental ones. Records should have uniformity, and comprehensiveness. The population register has found favour in a few countries. Other administrative records of public and private agencies may refer to social security, life insurance, elections, etc. In the methods of evaluating, adjusting and estimating data, the most important considerations refer to validity, reliability and accuracy. The major criteria are coverage, comparability, and quality. There are often the coverage and the response errors, especially in the developing regions. In estimating mathematical, symptomical and combined techniques are employed. Recently, the book-keeping methods have been used with partial success, but experiments have a preference for a composite methods: calculations on aging may be verified by "aging" the previous population. For analysing the data, the concept of stationary population is often used. On the basis of the stable population, the reproduction rates (gross and net) are calculated. Time-analysis is probably the most favoured exercise in demography. There is more emphasis on "longitudinal" rather than merely cross-section studies. In the analysis of fertility, there is the emergence of the concept of "cohort" fertility, but the older notions of completed and cumulative fertility have not been discarded. Estimating raises a host of difficulties, especially in anticipating the birth rates (which are also psychosocial phenomena) and the migration trends (which may result from political compulsions). Realistically speaking, only conditional predictions, estimates and projections, tied to specific assumptions are possible. Future trends are usually calculated with the help of mathematical extrapolation,

empirical types of component projections, and a combination of both these.

The above conceptual survey about the content of demography indicates the immediate tasks before the educationist and the training personnel. Their assignments may be formal and informal, the latter being more important no doubt, but not of immediate concern to us, for no specific policies ^{are} implemented regarding informal instruction imparted through mass media, traditional story-telling and folk-lore, and cultural and social practices. It is obviously not possible to regiment or direct any of these methods. Informal education is a life-long process. Informal training is secured through experience. Most of the demographers are self or informally trained. This process could continue as long as one ^{is} engaged in discharging a certain duty. In the sphere of formal education, there are the school, college, the university and the post-graduate levels. In the sphere of training, there may be pre-service and inservice, applied and extended training. In addition, there may also be refresher courses, seminars, workshops, etc. Intensive training is in the form of concentrated, continuous and intermittent doses. Or training may be arranged at frequent intervals- the same level may be maintained by giving the trainees more practice in order to improve their skills, (e.g. repetitive training courses); or gradually the level may go on rising (e.g. for improving the content in the succeeding training courses); or alternative opportunities may be provided for field work or practice. Education and training may also be devised for groups or for individual needs. Under formal

education, there is rarely the possibility of providing for individual instruction, except at the postgraduate and the research levels. Theoretically, arrangements can be made for a particular trainee to have the benefit of individual attention-- micro-training can be to suit a particular aptitudes and backgrounds, administrative needs and urgencies, and training facilities and possibilities. But generally, the training courses are on macro-lines and designed for groups, though special needs and requirements are kept in view and met.

Informal education comprises the mass media (films, newspapers, brochures, handouts, television, hoarders, leaflets, etc.) folklore, folksongs, and folk literature; and public contact, including kathas, kirtans and formal public relations. These do not discriminate between the various audiences, though directed to a special one. Posters and handouts could be read by anybody who cares to. But discrimination could be exercised by distribution channels; children's literature could be sent to schools for whom some special films, radio and television programmes could be prepared. To reach the audience, for whom the programme is specially meant, is an important task in informal education. The demographic organisation, by employing an expert public relation staff, effectively, disseminates among masses and other special publics suitable demographic information. Special programmes could be broadcast and telecast for (say) the rural masses, the educated classes, the literate and the semi-literate people and even for the experts. Appropriate literature (booklets, leaflets, pamphlets, etc.) may be distributed among various classes, when it is sought to educate on a special

themes. Informal education is a well-known powerful weapon, which the educationists, despite all pedagogical advances, have not been able to wield efficiently. Publicity about the census work could advise people of the desirability and necessity of having an enumeration, its advantages and benefits and therefore the importance and urgency of cooperating with it. Select students, may be exposed to literature designed to interest them in demography. Supplementary books, if given to school and college libraries, at subsidized rates, help in the discovery of suitable talent interested in pursuing demography as a career. Demographic material and concepts may be built into several newspaper articles, especially in the local languages. Some extension lectures may be arranged on demographic subjects, both for the school and the college students in an interesting sequence ^{and} couched in very simple language and organised. Similarly, the community development centres, with the help of several well-known and tried methods spread population knowledge or at least remove demographic illiteracy and ignorance. The first step in the spread of education is motivation and readiness-- informal education is capable of building up both these.

Formal education could be imparted in the school, the college, and the university. Schools have little demographic education, except in France, Japan, and to some extent in India, where a start has recently been made in the form of "Population Education". The primary objective is to inculcate in the pupils' mind a desire to acquire more information about the demographic processes and an attitude of rationality towards family planning and population behaviour. In France, the maj

demographic aspects of national and world problems are sought to be stressed in school instruction. Teaching is based on the study of family life in the neighbourhood and stresses the importance of demographic factors therein. Some surveys and environmental studies are encouraged to be carried out by students. Children are introduced to the civil registration system, while some concrete elementary ideas ~~concerning~~ about population are conveyed through the teaching of civics, geography, history and economics. At the primary stage, there are only rudimentary concepts; but at the middle stage essays on some general characteristics of the local population may be assigned. Prizes and competitions are instituted at this level to make awards of the best essays. For the guidance of the teacher, the Alliance Nationale has published "La Demographie a l'École" in a large edition. Some lectures are organised by the Alliance Nationale in the secondary, technical schools, vocational apprentice and teacher training institutions, and in all educational meetings especially for the benefit of the primary school teachers. In secondary schools, some lessons on civil registration system and demographic institutions are incorporated in civics books. In the high school, in particular, some attention is devoted to the descriptive aspects of the French demographic problems. Students are acquainted with the recent material relating to natality and mortality, and sometimes into nuptiality. They are also introduced to the concepts of migration, and are taken on excursions to the countryside to witness the phenomenon of rural exodus. In the higher secondary stage, there is a deliberate attempt to let them study national population problems-- nuptiality, natality, morbidity,

mortality, mobility, etc. No mere citation of dull and drab facts and figures, but the students' interest is aroused by talking about people's hygiene and health problems. In the history and the geography lessons, the rudiments of population demography are interspersed. But the credit goes to economics and economic, human and commercial geography for dealing with elementary, comparative and analytical demography in the context of national issues. Some effort is also made to touch problems in qualitative terms: the syllabus stresses the study of "qualitative value of the French population". In the technical training schools (e.g. handicrafts, and mechanics; vocational, industrial, commercial, hotelkeeping and catering, and economics) and in the apprentice centres suitable topics in demography (both descriptive and comparative) are taught. To teachers under training, some demographic knowledge is imparted.

In Japan, population studies figure in the schools and professional institutes -- agricultural, medical etc. In the agricultural schools, demography is woven in economics courses. In the schools for nurses, and midwives, ^{eugenic} eugenics and population problems are studied in the demographic context. In the medical schools, demography is taught as a part of the public health problems. Elsewhere, population problems are included in cultural geography. I understand that in the elementary and the secondary education, some topics are included on "Population education", somewhat similar to the efforts being made in India. Syllabi could ^{cover} ^{deal about} certain concepts of population. The concepts for each stage are carefully selected, and interspersed in the appropriate courses: ^{and} social studies, and nature study (at the elementary level), ^{at middle level} geography, Economics and science. At the higher secondary

stage, population studies and concepts are interspersed in economics, biology, agriculture, geography, social studies and general science. The emphasis is primarily on the description and rudimentary comparisons. But there is ^{very} no depth study or even analysis. Surveys and reports are often excluded, probably on pedagogical grounds. In the NCERT (National Council of Educational Research and Training) where this programme is being phased out and planned in details, greater attention is being devoted to the designing of courses in population education to school teachers. The teacher training institutions, (especially the elementary) may under its guidance, frame courses to include detailed references to population problems, descriptive and comparative. An effort is also afoot to produce some supplementary books for the use of the students at all levels of instruction. A study could be conducted of the feasibility of introducing some correspondence courses designed to meet the needs of the teachers in service. Since, the motivation provided by a degree or diploma or even a certificate is an important pull factor, the possibility and desirability of terminating such a correspondence course with an appropriate award may also be examined. It may be useful to weave into the existing correspondence courses (for the secondary school students, and for the elementary and other teachers) important concepts of demography. Some facts, figures and broad generalisations about the trends of populations and their consequences, may be underlined in their syllabi.

At the undergraduate level, the study of population problems should cater to some concrete needs, which may be served by suitable objectives. In the first instance, there is

the aim of motivating students to be active participants in population projects and ^{amen} ~~appreciate~~ ^{politics} the State. This requires some detached thinking, which the student, as a citizen should have. The urbanward movement of the population has raised problems of readjustment of economic policy (in relation to employment, location of industry, and general manpower) and social policies of town planning. Social security and public health programmes require a wider study of the population and other allied problems. From the purely academic viewpoint, the science of demography is rich in both analytical and synthetical content, and provides a fruitful exercise for imagination as also a good deal of adventurous survey work for the juvenile spirit. It is thus full of promise for the youthful mind. With relation to other subjects, the biological, the medi-c-al the mathematical, and the social sciences, it provides sufficient material for application and experimentation. And above all, in undergraduate training, education and instruction in demography is the first important step to ensure the regular supply of trained personnel, that nearly all governments would require in the near future to meet their increasing demands for work in the demographic sphere. In view of their greater dependance upon an utilisation of demographic data. Hence there must be a basic course in demography, separately designed for supplementing those in the social, the biological, the medical, the behaviour and the mathematical sciences. This would serve to make the education in these branches more realistic and pragmatic. An independent course in demography at the undergraduate graduate and the postgraduate levels, with subsidiaries from the above-mentioned disciplines, or built as the core with these adjuncts

would go far to equip suitably the future demographer. Thereafter may follow specialisation, at the doctorate and research levels, in one of the branches of demography, or its application or extension, e.g. demographic statistics, etc. Since demographers are required at all levels, there should be capsule courses (even technical) to meet specific needs. Public health workers may require a short, precise and informative instruction in demography, in order to acquaint them about the phenomena^{of} mortality and morbidity. In the advanced stages, there may be supplementary courses in demography of a longer duration for seasoned and accomplished experts (economists) willing to join this profession. For the honours and the M.A. students, specialising even in some other subject, the study of demography as a subsidiary would go far to make them useful as potential demographer administrators or coordinators, or other personnel in those organisations (like the census) which expand unusually at the time of the decennial enumeration, or some such periodic national surveys.

A course in demography, now being offered by few universities, is also very urgently required to be instituted, at the schools/institutes of higher learning. This can be phased at the honours and the M.A. levels in basic and an advanced grades respectively. The basic course must treat at some length the data (its sources, collection etc.) and the methods of measuring population changes. The student must be made aware of the limitations of both the data and the methods employed, so that he does not accept them blindly but seeks to improve both. He knows the deficiencies and limitations of the census. At the advanced level, he should have some exercise in the collection of data, according to own design. This will give them the much

needed experience in data collection, its sifting, classification, tabulation and interpretation. While the simpler techniques of measuring demographic phenomena should be learnt at the honours stage, the more complicated methods may be practised at the higher level, e.g. cohort analysis, reproduction rates. Simple estimation and projection formulae may be taught at the lower stages; but the problems of selecting the correct method (theoretically speaking) in a certain set of circumstances is best left to the advanced students. The relations between the different demographic factors should also be identified by the junior student, while the senior should be able to formulate these relationships, and study their importance and relevance in demography. The honours student understands the underlying principles (e.g. the life tables) while his senior appreciates these principles in the perspective of the development of demographic thought. The concept of the stable population, for instance, may be introduced at the lower stage, but its utility and limitation in fertility, mortality and age analysis at the higher ^{one} ~~stage~~. The biological, the historical, and the social setting of the population changes can be comprehended even by juniors while the comparative trends in different periods and countries may be grasped at the advanced level. The demographic importance of the family, and the institutions connected with it may broadly be studied at the lower ^{stage}, while their demographic implications analysed ^{later} ~~at the higher stage~~. Similarly, the rudiments of the various population theories may be taught in the introductory classes but its more detailed refinements, together with the latest theories (e.g. Harvey Liebenstein's 'of Economic-Demographic Development') to the advanced

students. Also, the wide disparity in the equation of population to the resources and economic opportunities within a certain region and the in the world may be brought home to the elementary students; and the historical processes and the cultural-economic-political factors associated with this may be reserved for the higher classes. The focus on migrations (both national and international) may be on the descriptive side for the un-initiated while the economic, social, political, cultural and sociological determinants and consequences of the mobility of population (including geographical, social and economic) may be analysed as the graduate student. In addition to this, the students should be familiar with some literature and periodicals in the subject. The elementary student may master textbooks along with some recent material, the advanced student must go to the original sources.

A word may be said about the content of demography as a subsidiary in other disciplines, or as an option or elective (e.g. as in medicine, economics, statistics, mathematics, history, geography, anthropology, genetics, etc.). The main subject is not demography here, but the other discipline to which it is an adjunct. Hence the course has to be flexibly built to serve its main objectives and fall in line with the major syllabus. For instance, the syllabus in demography as a subsidiary to economics may be so structured as to give some importance to the economic analysis applicable to demographic phenomena. In the sociological courses, the stress in demography (as a minor) may be laid on the family as a demographic unit, and on nuptiality, natality, mortality, morbidity, and mobility. The student should not deviate much from the parent course; its demographic content may flow from the main subject and provide its application

and extension. Also, the inter-disciplinary approach is eminent^{ly} suited to the study of demography. Even at the elementary level, the study of population geography, population economics, and population history may be pursued. In these courses, the curriculum makers will concentrate (say) on the spatial distribution and movements of population (population geography) or demographic changes over time (population history) or the implications of the demographic phenomena for the economy (population economics), etc. These elementary courses are best pursued at the undergraduate level at the honours levels, but not higher up.

The methods of instruction should be accord to the nature and substance of the content. The courses in the subsidiaries may be given by the subject specialists, who have had additional grasp of demography. But when demography is a major subject of study, the teachers should be a known demographers. The practical application of techniques should be strictly insisted upon in this course; there must be a well equipped laboratory, for ^{practising} the methods of tabulation and classification. Students ^{must} do a good deal of actual survey. For related fields e.g. subsidiaries or electives, the teacher ^{must} belong to an other discipline but must have had further training or education in the branch of demography. This arrangement will ensure specialisation of instruction at the postgraduate level, as also make up for the shortage of qualified teachers for higher education.

Teachers of demography (pure and applied, etc.) may be classed in three groups. In the first place, there are those at the school level, who studied population education in the training institutes. Next, the college lecturers should have had some courses in demography, or preferably be qualified

demographers, with, if possible, some actual field work to their credit. At the undergraduate level, they need not have a mastery of the research techniques, but rather a wide familiarity with the demographer's literature and its philosophy, along with its relationship with other disciplines so as to appreciate its multi-disciplinary and inter-disciplinary nature. What needs be stressed is the breadth of study, rather than mere depth and narrow specialisation. They should have also had some grounding in research techniques, statistics and mathematics. At the undergraduate stage, its concepts must be clarified to the students, rather than ^{with} its intricacies and controversies over ~~em~~ issues. The teacher must have a clear understanding of the major ideas, add the fine shades of distinctions between apparently synonymous terms. The honours teachers for demography (as a minor or ^{or} a subsidiary), must also be similarly qualified. But in addition, he should have an elementary knowledge of the subject, for which demography is a subsidiary, in order to be able to slant their instructional programme accordingly. With comparable qualifications and experience, he will be suitable, provided his assignment relates to pure demography, but is not inter-disciplinary (i.e. demography, and not, say, population geography or population economics). For the inter-disciplinary courses, the qualifications of teachers should have a fairly good background of the main subject (economics, geography, etc.) on the demographic canvas (even if he is basically a demographer with some knowledge of economics, history, geography, etc., he is suitable. But the teacher for pure demography must have a thorough knowledge of demographic principles, their applications, and limitations, plus an understanding of the applicability

of statistical-mathematical techniques. Research experience alone gives him a correct insight into its problems. He must also be fully conversant with classical works, as well as ^{latest} modern contributions. And above all, he must have had quite a long teaching experience for effective and efficient communication.

At the postgraduate stage, research assumes superlative importance, and teaching becomes guidance. The teacher must have bright academic attainments, and upto-date knowledge of the ^{recent} latest advances in the subject. Being research-minded, with an aptitude for research, he must have to his credit published works of an original nature. His specialisation and depth study would determine his field of instruction. For instance, if he has specialised in the demographic thought, and has mastered the masters, he must confine himself to that alone. For optionals or electives (like nuptiality and natal specialists) in ^{the} their or allied fields should be selected. If specialists for other demographic fields should preferably be selected from those disciplines, with an extended training and education in demography. Equipped with full understanding of their own discipline, they would be better able to deliver goods than those who are qualified only in demography. In case of the expert teaching demographic economics, or demographic mathematics or demographic statistics, it should be the economists, the statistician, or the mathematician who should be the handle these subjects. Where the emphasis is on population studies (and not merely their application). The demographer-lecturers should have had additional training

demographic content rather than its economic, sociologic or medical base.

The organisation of university--undergraduate graduate and postgraduate teaching varies in different countries. There are the difficulties of comparison in respect of the level of the first degrees in various faculties. For instance, much of the intensive instruction in demography (e.g. construction of life tables, analysis of population replacement, and the various approaches to the problems of fertility, etc.) may be imparted at the undergraduate level or (latest) the honours stage, while in the USA, this may be reserved for the M.A. or even the doctorate levels. It would be in sequence to give in brief the instructional objectives in general of the teaching of demography in the university.

The most important objective is to provide trained staff for national demographic offices and census organisations. Some breadth and vision should invest the teaching of population. There are several types of demographic personnel required to man the ~~organisations~~, hence there must be education for the administrators, the coordinators, the organisers, the policy-makers, the enumerators, the research workers, the laboratory personnel, the teachers and trainers, and above all the demographic technicians. At the university stages, instruction should be varied and compared of several types of content. For a person, requiring to become an administrator, appropriate courses have to be chalked out, while for the demographic technician, there would be an entirely different syllabus. Similarly, for the laboratory personnel, there may

same holds good for enumerators, and other field workers. The basic training in demography may be the same for all the categories, but the emphases on specialisation would naturally differ with the clientele. The basic essentials of demography have to be included in the equipment of all of them, while the practical training and further education or specialisation may vary. Another objective of the university training in demography is to turn out a band of good teachers in the discipline. The training of school teachers, and of the lecturers for pedagogical institutions has been talked of already. In the training of university teachers (of demography) there should be a depth study. But the turning out of adequate numbers is equally important. Another instructional aim is to inform the intelligentsia about population problems and demographic issues so as to ensure their cooperation in the implementation of kindred policies. Still another purpose would be to feed civil servants, doctors and other professions with sufficient personnel having an intelligent understanding of national population problems. Still, another very important target is to create a band of devoted research workers. It is possible for demography (unlike other disciplines) to draw upon the experts from other disciplines, to give them the needed orientation (through condensed intensive instruction) and let them conduct research in the allied population problems. For instance, medical experts have capsule curricula in demographic problems (as in fertility, natality or morbidity) and methods suited thereto.

Demographic studies at the university level in various countries have been too varied to let one keep abreast of the

latest position. Pure demography is taught in very few universities, except sometimes ~~and~~ at the honours, or the M.A. stages. Demography as a distinct discipline has still to be recognised by university pedagogues. Very few professors are qualified to teach this. In the statistical and the actuarial sciences, the pure and formal variety is being encouragingly introduced. Also, on the peripheries, (e.g. in sociological, in medical and in biological sciences) it has been built in to suit their requirements. But the possibility of pursuing population studies in the framework of some major discipline (e.g. medical sciences or economics) has still to be examined. Even a separate department of demography may be developed and ~~be~~ sustained. Demography, to attain full maturity, now needs better treatment at the university stage, and must not merely be an adjunct to another discipline without a full-fledged department or school assuming responsibility for the conduct of research and instruction (so essential for the development of any discipline) it may remain neglected. For the expansion of the instructional span in demography, documentation is necessary. Under the auspices of the International Union for the Scientific Study of Population, the Committee on Instruction in Demography, prepared an annotated bibliography of publications useable for the teaching of this subject. Some periodic bibliographies are available in the "Population Index". Trend reports should also be published to highlight the points of strength and weakness in demographic instruction, and in the programmes of training and research. "Current Sociology" outlines some of these reports, but the need for a separate exclusively devoted journal could hardly be

over-estimated. There are at present few monographs on special regional and area problems of population. Need for "abstracts and digests" in demographic and population problems and instruction persists.

In Britain, there is limitation on the variety and spread of demographic teaching at the university stage. At the undergraduate level, one rarely comes across a full-fledged course in demography. It is mostly offered as an elective in the first degree (B.A., B.Sc., B.Econ., etc.) by students specializing in economics, anthropology, statistics, and sociology, even social studies and criminology. By the end of their graduation, these students have attained a fair standard in demographic analysis. Demographic applications of statistical and mathematical theory are also a common feature of graduate instruction. Economic courses include demographic statistics or economic theories of population, and even demographic history. Formal demography is covered in geography: e.g. demographic distribution and mobility of population. But more of formal and pure demography is taught in the actuarial sciences, where content is rather concentrated. In the courses in economic history (in the departments of economics or history) demographic developments or history may feature. The specific courses of instruction are formal demography, social structure of UK, statistics, theoretical demography, population geography, etc. Formal demography is an elective under sociology, economic geography, or social studies. The emphasis is on comparative population trends and some social (not strictly demographic) statistics. Under statistics, the stress is on demographic treatment and on a brief introduction to life tables. Demographic

universities approach these studies via applied statistics. In the schools of economics, demography deals with population theories; ~~and~~ the structure, composition, trends and policies of population; ~~and~~ the concepts like reproduction rates, differential fertility, and both census reports and those of special commissions and committees. Under anthropology, population is studied along with social (including the vital and the health) statistics. The demographic content of statistical methods is more or less incidental. Geography has, formal demography is as elective, comprising structure, trends, distribution and theories of population. Economic geography includes population statistics, mapping, migration, structure and trends. Regional geography teaches fertility, mortality, structure, trends, composition, policies and statistics while human geography, population theory. Sometimes, there are special (demography) courses, depending upon teachers, their aptitudes and qualifications. The history curricula, especially in social and economic streams may trace history of population movements and theories. Field work is encouraged in the reconstruction of population statistics of the past from local records and registers. But the most important and formal courses in demography are available under the actuarial sciences-- as conducted by some universities- they are elemental while those by the professional bodies are harder, underlining the impact of demographic factors on actuarial problems. The finished actuaries are expected to have a thorough knowledge of life table construction in particular, and of the theory of life contingencies in general. For the higher degrees,

Demography is an explicit subject for the master's degrees in geography, sociology, economics and statistics. Demographic specialisation at the doctorate levels is permissible in respect of special topics and specific problems, under the departments of economics, geography, anthropology, and sociology. Similar courses are also provided on the peripheries of other subjects and diplomas in public administration, public health, social medicine, psychology and general sociology. These are short-term, intensive and specialised courses, directed to the fulfilment of some specific objectives.

In France, demography has spurred into active academic programmes after long eclipse-- the world war was an eye-opener to specialists, policy makers, and academicians. But lack of liaison between the demographers and other experts persists. Interfaculty institutes function on the French soil. Demography has been mostly taught as a part of other disciplines, in all the four faculties-- law medicine, art and science. Within the last two decades, there has been considerable progress in the teaching of demography at the university stage, especially of inter-disciplinary nature. The Institut National d'Etudes Demographiques arranges for some demographic courses which covers national policy, history of population, general demographic factors, surveys and statistics, and also bearing on genetics, geography, economics, nutrition and health. Select demographic problems and policies are discussed at undergraduate level. Population studies figure in universities, in the faculties of law (demography, in economics) and

sciences(statistics): a few have organised population studies sections for intensive work in population problems of underdeveloped nations; migration, aging and urbanization. Extra-curricular lectures are often arranged by Institute National d' Etudes Demographiques. Demography figures at level the Licence(B.A.) and the doctorate levels in the schools and faculties of law, under the main discipline of economics. Instruction in pure and applied demography is given with reference to international problems(comparative demography) and special statistical applications. In the faculty of medicine, stray courses deal with demography from the point of view of health, preventive medicine, physiology, gynecology, and genetics. In the faculties of science, mathematics and statistics comprises related aspects of demography. Certain topics are taught within the framework of general biology, psychology, physical geology, and anthropology. The specialised institutes of health offer instruction in population problems, policies and theories. The faculties of arts teach the subject in social and economic history, geography, sociology, ethnology, and social psychology. Some special degrees are instituted for courses on demography and related subjects, like demographic history, population problems, demographic transition, etc. In the Fondation National des Sciences Politiques(to advance the study of social, political and economic sciences), and L'Ecole Nationale d' Administration (for the training of civil servants) and Le College de France (for scientific research) and several other governmental and private institutions, students discuss demographic questions,

e.g. methods of demography, current population developments, and allied problems and policies.

In the pedagogical and instructional programmes, in Italy, slight importance attaches to population studies. Demographic studies are not generally included in the programmes, but are incidental to postgraduate studies. Courses in demography, where instituted, are of elective nature, except in schools of statistics, population statistics is compulsory. Consequently, there is no full time professor of the subject at any Italian university. But there is a combined degree in statistical and demographic sciences, with a specialisation in either. In the actuarial sciences, too, demography figures. Population changes biometry, anthropometry and demography (proper) are some of the subjects taught. Happily quite some work is being done in the field of demographic journalism and documentation. In Germany, there are no special chairs for public examinations in demography; even population statistics are studied as a part of the economics. Recently, however some universities (e.g. Muenberg) have made some pioneer efforts in this direction. Demography is taught within the other allied disciplines. Medical statistics is concerned with population problems e.g. biostatistics and medical, genetical, and population statistics. Demography is also taught as a part of social hygiene. In GBR, population is treated in the statistics courses on industrial and labour economics. Some special courses, seminars and workshops are arranged for the benefit of economists and sociologists; the subjects include sociography, social ecology, migration, social biology, and anthropology-- all from the

demographic angle. In geography, history, and sociology, demographic courses are interspersed. Schools of public health also touch upon several population questions. In Austria, these studies are a part of the regular curricula in hygiene, social geography, anthropology, statistics, etc. The Institute of Statistics trains demographers. In Switzerland, population statistics is a part of statistics; in Zurich, demography is admitted for examinations and degrees as a separate subject. In Hungary, though a separate subject, systematic instruction is provided for an examination in population statistics, conducted by the Central Statistical Office. At the university level, demography is taught along with statistics, geography, and public health administration. In the faculties of law and political science, it along goes with statistics. Economic geography offers some demographic instruction. Some select problems are also discussed in the fields of ethnography, anthropology, town planning and health administration. In the Netherlands, demographic statistics is within the frame of economics and statistics, actuarial sciences, anthropology, physical planning and medicine and public health. There are however several doctoral dissertations in demography. In other European countries, several aspects of demography are taught under statistics, sociology, economics, social policy, & geography, and modern history. For instance, the course "Denmark in Statistics" covers several population problems for degrees in social sciences, descriptive sociology, economics and commerce. But formal demography and its methods (relating to vital statistics) are comprehensively taught only in the

actuarial sciences. In Finland, the content of demography is much bigger, especially in economics and geography. Commercial and social colleges run compulsory courses on demography. In Norway, economic studies, geography, and social work have formal demography and its problems included in their curricula. In Sweden, sociology courses, geography syllabi, and economics studies have sizeable instruction devoted to demography, which also figures in the lectures on history, geography, social work, social and economic history, and regional and local planning. In Yugoslavia, lectures on theoretical, descriptive and methodological aspects of demography are held in economics, statistics, and geography. Special importance attaches to the study of geodemography. Related courses are compulsory for students offering economics and statistics; population statistics, structure, migration and other movements. Practice is also given in the collection, sifting and tabulation of data. Regional studies are conducted in the provincial universities.

In the United States of America, too, demography has not yet received the status of a separate department. At the undergraduate level, it forms a small portion of the syllabus, though it may be an elective. At the graduate level, some degree of specialisation is possible under sociology. In some universities, there are offices or centres of population research and study, which impart specialised training and provide facilities for specialised research. At some colleges and universities, demographic courses are offered in the liberal arts programmes. Most of the courses are under the

sociology departments, but some others are run by departments of hygiene, public health and medicine; and only occasionally by the departments of economics, rural sociology, geography, biology, political science, and mathematics and statistics. There are few courses in population statistics or methods of demography. Under sociology, statistics of population or data collection is not given much importance. Specialised training or education in demography (pure and formal) is very rarely available. The typical course is "population", which generally deals with several problems. In urban, rural and pure sociology, the stress on the study of population is sizeable. At the undergraduate stage, there are only elementary offerings while in the postgraduate institutions (having facilities for research) elementary courses do get supplemented with some advanced studies in demography. In the specialised schools awarding doctorate degrees, the treatment population advanced. Most of the content dealt with the population problems of the U.S.A., and some of them (about one-third, roughly) with world issues. The topics dealt with range very widely; population size, distribution, growth, trends, and prospects; facts about age, manpower, family, marriage, social and economic living; fertility, mortality, natality, life tables and reproduction rates; migration, mobility, colonization, urabanisation, controls and quality; population size and resources, theories, policies and ecology; statistical data its collection, projection, estimation, etc. The latter are purely mathematical in content but the former are mixed. In teaching sufficient use is made of the population journals. (especially at the

advanced levels) and the various census and other reports. Some soft spots are still visible in the teaching of demography; there is lack of professionalism among teachers; they have limited knowledge of the statistical techniques and of literature (other than textbooks). In the course structure, sociology appears to have overshadowed pure and formal demography.

In the Latin American countries, demography is not generally included in the curricula, except in Argentina, Brazil, Chile, Costa Rica and Venezuela. There are complementary courses to strengthen demographic studies. Since the mid-century census in 1950, several universities have built up demographic courses especially after the Rio de Janeiro Seminar on Population (1956). Special courses have been offered and laboratory facilities provided. In Argentina, teaching covers various aspects of demography ever since the commission on the Scientific Study of Population and the Congress on Population made some pioneer and interesting studies. The School of Economic Sciences of Buenos Aires offers a course in biometrics, that of Hygiene and preventive Medicine of Santa Fe on bio-statistics, and that of economic Sciences of Rosario in population statistics. Actuarial analysis is coupled with demographic analysis and its applications. An Institute of Population has since been established for professional education. Econometrics is extended to cover population data, too. In Brazil, the statistical laboratory under the Institute of Geography and Statistics, has been an asset to demographers.

In the several schools of economics, and of philosophy demography is taught as a part of the statistical courses. At the School of Economic Sciences, (Rio de Janeiro), there is a chair for "Mathematical and Demographic Statistics". In the School of Statistical Sciences, demography has been receiving primary attention; life tables are a part of instruction, along with fertility, biometry, and morality, morbidity, and mortality rates. The economics of demographic processes and phenomena are specially attended to in the teaching of the subject. Students are motivated to have some practice and applications. In Chile, two international centres have been operating; Inter-American Centre for Biostatistics, and Inter-American Training Centre for Economic and Financial Statistics. The Bureau of Vital and Health Statistics is another active institution. The University of Chile, through its School of Health, provides a short course in demography. In other colleges and schools, etc. there is hardly any instruction in demography, except in conjunction with geography, economics, statistics, etc. In Cost Rica, the National University, in its School of Economic and Social Sciences, provides demographic instruction. More detailed teaching, especially in population statistics, is imparted at the Institute of Statistics. In Venezuela, demographic studies are located in the School of Economic and Social Sciences, especially in its Department of Actuarial and Statistical Sciences, where concentrated courses are offered, (e.g. demography, biometry, sampling), along with seminars on various subjects. In addition, there are some courses on demographic statistics

under mathematics and statistics. In El Salvador, the government in collaboration with the Inter-American Statistical Institute has set up the Central American Course in Statistics. Special attention is being paid to the collection of data, its processing and tabulation; nuptiality, natality, morbidity, and mortality problems; life and other tables; and population theories and surveys. The more advanced and comprehensive Courses are offered in Brazil at the Statistical Laboratory and the School of Health in Chile, and other specialised statistical institutes. The subjects include formal and pure demography, data and statistics, mobility and migrations, census ~~include-formal-and-pure-demography~~ distribution, composition and structure, and natality, nuptiality, fertility, morbidity, morality, accident and life tables and their construction.

In Australia, a separate department of demography functions within the framework of the Research School of Social Sciences of the National University. Instruction is at the postgraduate level only. But the greater emphasis is on research, which is at the doctorate level, and is mainly directed towards the topics of current interest, e.g. migration, population in the Pacific islands, and the demographic history. Research scholars working for their doctorate are provided the necessary competence, through individual tutorials, seminars, and class work. Students, who have majored in economics, sociology, statistics, and history, etc., are admitted. In Japan, formal instruction in demography is imparted at the undergraduate and the postgraduate levels. At the former stage, classes are held for

the students of economics, politics, medicine, etc. Demography is an independent discipline, and also a part of some other major subject, e.g. economics, geography, anthropology, and public health. In demography proper, the topics studied are: theory, statistics, problems, policy, public health and eugenics. Special slant is now given to the economic bias in the study of population problems. Population is also taught cultural geography and public health majors. At the postgraduate levels, demography is pursued mainly as a part of the research programmes culminating in doctoral awards. In the National Institute of Public Health, professional qualified medics receive instruction in demography, mainly for doctoral degrees, and junior personnel for short-term courses. The Training Institute of Statistics (in the Prime Minister's Office) also provides short-term instruction in demography for government officers. In the other countries of Asia, demography is usually taught along with other subjects. In Ceylon it is a part of economics and statistics honours. Population problems are also treated in the sociology department. The topics include formal demography, population theories, trends and policies, and simple surveys. In Burma, demography forms a part of the curricula in economics, sociology and statistics. In Malaya, the situation is similar at the undergraduate level; there is teaching of vital and health statistics under social medicine and public health, and of medical statistics (in the diplomas on Public Health) covering vital and health statistics, including demography. In the Philippines, population problems form part of sociology (and other social sciences and of Agriculture). Some academic training is provided also in the UN

Statistical Centre on "Demographic and Health Statistics". In Indonesia, some demographic courses have been developed at the Faculty of Economics in the University of Indonesia) and the Institute of Social Research in the Faculty of Law. In Thailand, the slight reference is made to demographic studies at the university level, while some research is being conducted by the National Economic Council. In Pakistan, demography is dealt with in the economics and statistics courses at the undergraduate level. At the postgraduate stage, demography is an elective covering population trends (a comparative study) and movements, structure, composition, planning, policy and controls. The Institute of Statistics (of the Punjab University) imparts instruction in demography, related to basic and elementary concepts. Some emphasis is placed on vital statistics, collection of data and the methodology of demography.

In India, interest in this subject has recently been roused with the establishment of some research institutes. The All-India Population Conferences held from time to time, aroused considerable interest in the subject. Still demography has not always attained the status of a distinct discipline at the university stage. At the undergraduate level, demography receives scant attention; some stray courses are appended to economics, sociology, and statistics in some universities. It is only at the postgraduate level that demography receives fuller attention; Kerala University (in Trivandrum) is probably the only university to have a full-fledged course in demography (M.Sc. degree), while as many 26 universities offer some postgraduate courses. For

instance, the Baroda, the Udaipur and the Bombay University there are two elective papers in demography. for the M.A. course in economics. In Baroda, by careful selection, the candidate can choose four papers, while in Bombay only two may be offered. In the Lucknow University, there is one paper in demography. In the Poona University, in the postgraduate course in statistics, there is a compulsory paper on "demography and actuarial sciences". In the Aligarh University, there is an independent composite paper on population problems. Some doctorate theses have been published. The Lucknow University has been encouraging pioneering work on tribal demography in its department of anthropology. Similarly, the University of Calcutta has initiated a few projects in its Department of Geography; the Madras and the Mysore Universities have not lagged behind. But the work of the Kerala University, in its statistical division, has been pathbreaking in some respects. In sum, the teaching of demography at some universities in India is yet in its infancy, though the foundations have been laid for the scientific teaching of demography. Some of the common points regarding the undergraduate and the postgraduate instruction at the university stage may now be surveyed in brief. In nearly all universities, the undergraduate courses in demography are tagged on some other discipline, mostly economics, sociology, and statistics, or medical sciences. But is rarely demography taught as such. The lack of qualified teaching personnel is responsible for this neglect. It could surely have been possible to have independent courses in demography even at the undergraduate level. For

instance, a pass course (B.A.) could be instituted comprising of three papers in demography; say in the principles of demography, comparative demography, and population problems. At the honours level, demography could assume the status of a major subject, with eight nine or ten papers in the subject. The subsidiary subjects could be economics, sociology, statistics, biology, agriculture, history, or education, depending upon teaching resources. In the major subject of demography (at the honours stage) the papers could be pure demography, formal demography, comparative demography, development of the population over a period of time (where such statistical data exists as for instance in the case of India, it is available for about a century), applied demography, the construction of life tables, some important concepts (e.g. nuptiality, natality, fertility, morbidity and mortality, etc.), the economics and sociology of mobility (including international and internal migration) distribution, composition, and structure of population etc. This list could be modified to suit local requirements and to exploit available resources. The course could be supplemented with some demographic surveys, howsoever elementary. At the M.A. stage, there could be eight or more papers of an advanced level. To moot, the coverage could be the theories of population (including the psychosocial, the economic-demographic and recent ones), the methodology of the subject, the procedures for the verification and correction of the data (including the methods of tabulation by the latest mechanical devices), the actuarial approaches to demography (e.g. life tables, etc.) projection and estimation of the census count (especially in the pre-censal and the

inter-censal periods); and the bases for the population planning and policies, with special reference to own country. These may be compulsory; the electives may be diversified to cater to students aptitude and the experience of the staff and their capacity. There may either be a dissertation equivalent to two papers, or two optionals instead. The electives might include population geography, population economics, population statistics, or any other such interdisciplinary topic. Or there may be an analytical study of say mortality, or family, or natality, etc.

The training programmes in demography are equally important, in view of the acute shortage of demographic personnel. The training programmes have to be planned to suit all types of staff requirements, and others engaged in similar work. As pointed out above, the objectives of this programme have to be clearly spelt out before something concrete could be said about running it, or even assessing the present programmes in different countries. One of their most important objectives is to give practical know-how to the trainees. For instance, the laboratory worker may be unacquainted with the operation of the demographic-statistical equipment. The programme must provide him with the required knowhow, and give him good practice in operating the various machines and other apparatus usefully. A second objective would be to update the employee's knowledge and give him fresh practices in the new machines and their operation. The third one is to introduce the worker to the new methods of working that may have been initiated or are likely to be put into operation in that

office. There might have been a change in the organisation of the trainees' office, or in his own assignment; he has therefore to be re-oriented to new routine. Fourthly, the trainee should become more efficient by initiating him to the new methods of work, even if his duties might have remained the same as before. Training may be given to the trainee to improve his prospects for the next higher grade. There may also be conferences, seminars, workshops and action re-search projects - broadly designed to enable the participants to have exchange of ideas and experience, and share and benefit from the maturer and wider responsibilities of other colleagues and above all get motivated to be better equipped from the discharge of their duties. To these meetings may be invited outside experts/officials.

In the absence of adequate facilities for education in demography, the training programmes are being increasingly depended upon in all parts of the world. In Europe, the most advanced courses are in Britain. At the London School of Economics, and the London School of Hygiene and Tropical Medicine, training in demography is imparted to government officials and the university faculty members. Some foreign governments also depute their census and other officials for one-year training at these schools. Groups are formed on the basis of their background. In the London School of Economics, the focus is on demography, while in the School of Hygiene and Tropical Medicine, the course concentrates on statistical methods in medicine epidemiology, mortality, life tables, medical statistics. In the University College at Swansea, there is a course on population structure, trends and policies under "Social Policy and Administration". In

France, demographic training is more extended especially for civil servants. In the L'Ecole Nationale D' Administration, which caters to government servants, (except engineers and technical personnel), important demographic questions are dealt with in each of its four sections: general administration, economic and financial administration, social administration and external affairs. Refresher courses are offered on request, by the departmental heads of the Institut National d' Etudes Demographiques. L'Ecole Pratique des Hautes Etudes also provides practical training under eminent demographers. L'Institut National d'Etude du Travail et d'Orientation Professionnelle-- an institute for vocational guidance,-- provides some training for demography in that context. Supplementary training and refresher courses for medical officers of health are organised by L'Ecole Nationale de la Sante Publique, (in conjunction with the Ministry of Foreign Affairs) for potential population inspectors. The French Ministry of National Defence in its highly professional schools imparts some knowledge of demography and its problems. The private organisations, especially the catholic institutions make a regular contribution to the teaching and training of demographers, even under law, social service, journalism and politics. For the social service workers, the courses (on demography) are quite significant; same could be said for the nurses' and welfare workers' training. In Germany, the School of Public Health (Hamburg) in its training course for physicians, deals with demographic questions; similar courses are available in other schools of public health. In Austria, demography is the part of the public

health physicians' training, at the Institute of Statistics (Austria). Similar efforts are being made in Switzerland. Probably, the extension of demographic training courses has by now taken place in Germany in the University of Kiel (Institute of World Economics). Some curricula are being framed in the University of Munster at Dortmund (Institute of Social Research), and the Institute of Empirical Sociology, Hannover, where the emphasis is on practical training. Training facilities have also been planned at the Sociographic Institute at Frankfurt, and other specialised institutes of geography, regional research and anthropology. In Hungary, the training of statisticians, especially in public health administration, has sufficient demographic content. The Department of Population Statistics (under the Central Statistical Office) and the National Institute of Public Health (under the Ministry of Public Health) provide some training in demography and population statistics. In Italy, the Central Institute of Statistics imparts training in special statistical techniques, applicable to demography. The Netherlands Demographic Society arranges training in demography. Demographic statistics figures in actuarial instruction.

In the USA, certain agencies offer courses in population and demographic techniques. The office of the Coordinator for International Statistics, Bureau of Census, has trained a very large number of specialists in demography, and in census procedures. The trainees are first given a theoretical grounding, which is followed by visits to census offices, the IPI, Remington Rand Institute, and various life insurance

companies. Instruction in the practical operations of data compilation, processing and analysis is provided in Universities, National Office of Vital Statistics, the Bureau of Labour Statistics, the Population Research and Training Centre (University of Chicago), Office of Population Research (Princeton University), the Institute of Mathematical Statistics (University of North Carolina), the Bureau of Population and Economic Research (University of Virginia), the Bureau of Applied Social Research (Columbia University), Institute of Population Research (Louisiana State University) and the Scripps Foundation extend facilities for training and apprenticeship courses in the practical operations of data compilation, processing and analysis. Training programmes, in the USA, emphasise research techniques and laboratory work, coupled with individual attention. In Argentina, there is a stray course for the training of professional demographers, in the school of Economic Sciences, Rosario. The Institute of Population in collaboration with the Institute of Statistics, and the Experimental Research Centre in Economic Statistics, gives training of a specialised nature. Training The National School of Statistical Sciences (Rio de Janeiro) imparts instruction in practical methods of data collection and demographic statistics, their processing, tabulation and interpretation. In Chile, a one-year course is conducted in the School of Health, the Inter-American Centre for Biostatistics, and the Inter-American Training Centre for Economic and Financial Statistics. In Costa Rica, demographic training has been provided in the Institute of

Statistics. In Venezuela, the Department of Statistical and Actuarial Sciences (in the School of Economic and Social Sciences) conducts courses for demographers. El Salvador caters to the countries of the Central American Isthmus-- the Central American Course in Statistics is sponsored by the Inter-American Statistical Institute and the government of El Salvador, for the intensive training of demographers and other population workers and experts. In Australia, the Department of Demography (in the Research School of the Social Sciences of the Australia National University), concentrates on demographic methodology. In Asia (except India) Japan has facilities in the Training Institute of Statistics (in the Prime Minister's Office) which runs courses of about six months' duration for the benefit of the technicians and other personnel in the demographic and allied offices. The National Institute of Public Health also trains about 80 postgraduate students in its one-year advanced course in public health. In Pakistan, in-service training is provided in demographic subjects in the Central Statistical Office. In Ceylon, this is given in the Department of Census and Statistics, and in the Registrar-General's office and is of a very practical type, oriented to their actual work. In Burma, the Central Statistical Office has similar provision for census workers. The Thailand Government Statistical Office offer some short courses in demography, while formal demographic statistics knowhow is included in the programmes of public health personnel. In the Philippines, the US Statistical Centre in collaboration with the University of the Philippines provides a short training course in

Demographic and Health Statistics. The Institutes of Economic and Social Research (under the Faculty of Economics) and Institute of Social Research (under the Faculty of Law) organise advanced training, as a part of comprehensive demographic courses. The Government Statistical Office, in Malaya, gives in-service training in demography, and especially in connection with census operations, procedures and problems.

In India, the most important institution is the Demographic Training and Research Centre, Bombay; short-term training courses are conducted at the Centre mainly for the benefit of the government personnel, working in the census and other demographic and allied organisations. In addition nine demographic research centres, mainly devoted to research, impart some short-term training to staff. The Indian Statistical Institute, Calcutta (and now also at Delhi) has training courses for aspirants to a demographic career. The nine Communication Action Research Centres, dotted all over the country, gives only fragmentary in-service training to their own staff, and select personnel from the government departments. In the biomedical research centres, a specialised form of training is given. There are four Central Training Institutes, where mostly District extension educators are trained. Some Indian scholars have also benefitted under the fellowship programmes sponsored by the Population Council of the U.S.A. The Indian Council of Social Science Research has a section on demography, and may start some training courses. The Statistical Department of the Institute of Hygiene and Public Health,

Calcutta, has also been interested in training programmes in demographic statistics. The Indian Statistical Institute, in collaboration with the Central Statistical Organisation (Government of India) has been running courses, e.g. Officer's Training Course and the Statisticians' Course to give practical training in demography and its statistical methods) and other specialised courses on population studies and vital statistics. The Statisticians' Course is of three years' duration, the officers' courses take nine months, and the specialised courses three months. But the amount of training given is meagre considering the vast and varied nature of the population problems of India.

In sum, the position regarding the training courses is far from satisfactory. There is no educational effort of note in the African continent. The underdeveloped countries are in dire need for better demographic education and training but, so far, are the most neglected areas. In most of the training courses, there is more stress on the statistical angle problems, while in some the public health aspects (again from the statistical angles) have been the dominant feature. Capsule courses have yet to be devised and popularised. Laudable efforts have been made in several centres to give practical training to participants, but not much attention has been devoted to the field work in connection with population training often ignored, or overlooked in the great emphasis placed on statistical training. Little attention is devoted to the planning of non-statistical courses; the qualitative issues have not been given the place they deserve. Similarly, the sociological focus has been

wanting in the content of training curricula have been mainly devised for demographic technician or the professional demographers; these should also have planned for laboratory workers, enumerators, and even for teachers and the training staff. Laboratory techniques in data tabulation, processing and projection are of superior importance, but the personnel are more often than not, imperfectly qualified or experienced or even educated. Hence, the imperative need for giving some short-term courses to them in the operation of machines, the maintenance and repair, etc. Importance should also be attached to the work of the enumerator, on whose efficiency, the whole data depend: his assignment is of superlative importance. He must have practical training in the techniques of interviewing, and collection of data, its tabulation, verification and correction. The training of the training personnel is an equally specialised job; e.g. the techniques of training, and planning the need-based courses. Again, sufficient attention has not been paid to seminars, workshops, conferences, lectures, discussion, meetings and groups for solving some common problems and sharing experiences and thrashing some general, but challenging difficulties. Evidently, the planning, organisation, and the conduct of the training programmes should best be left to the experts if only to ensure that the objectives are realised.

Before concluding, a few suggestions for the improvement of this specialised instruction and training may be in order. In the first place it is essential that separate chairs be established for demography in as many universities as

possible; demography should be given the status of a separate discipline, if not of a department. And, at least, one major demographic research institute should be set up, where no separate chair for demography could be established; this research institute should have facilities not merely for research but also for short-term training of personnel. Even without a research institute, some training centres could train a band of workers in demography in collaboration with the local university, or college. Young and budding demographers may be financed to make an on-the-spot study of the working and functioning of the demographic research/training/teaching institutes abroad, so that they are aware of the latest trends in training and education. An expert committee should go into the problems of teaching and training of demographers, so that an authentic account of the situation could be had. An association of teachers of demography should be organised in order to exchange professional experience and ideas, and work for improvement of instruction. Suitable textbooks must be commissioned in demography, for though there is no lack of data in the population studies, there is definitely an acute shortage of good texts, especially at the undergraduate stage. The need for proper documentation services and for good library facilities is doubtless pressing and urgent. And last, but the most important point, is that demography must be included in the curricula of teachers' colleges and university departments and schools of education, to ensure a good supply of teachers with a knowledge of population education. Where it is not possible to have separate departments of demography,

there must be a couple of papers in this subject at the honours and the postgraduate levels, for a multi-disciplinary and an inter-disciplinary field as this study as it is, it could be fused with other disciplines, so that the training of demographers could be truly extensive in nature.

In the end, I would like to thank the sponsors of the Conference in giving me an opportunity of putting my views before the august gathering of experts here. I have very little claim to being a demographer, but have some experience of the teaching profession and of instruction in a subject close to demography. Personally, I find that the demographic concepts (even the elementary ones) are of great interest to young minds, particularly because they are related to human experience, and not confined artificially to a single narrow discipline in which the adolescent mind finds it difficult to function properly and creatively. And then the modern trend towards cross-disciplinary approach in studies and scholarship would rediscover in demography a very appropriate field of study and research, as also for instruction. (But I must caution against any haste in framing curricula, for with the several disciplines of the periphery of this subject, the far-reaching impact of each of them has to be evaluated carefully, closely and cumulatively.)

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XI. 02

Probable Literacy Rates in India by 1986 Under
Different Assumptions of Population Growth

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PROBABLE LITERACY RATES IN INDIA BY 1986
UNDER DIFFERENT ASSUMPTIONS OF POPULATION
GROWTH

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At the time of independence India started with a very low level of literacy¹ in the population. At the time of the 1951 census, the literacy rate in the total population in India was 16.7 per cent, and in population aged 10 and over, it was 29.6 per cent for males and 9.4 per cent for females. Such low rates of literacy have not been observed in any of the so-called developed countries during the modern era.²

According to the 1961 census of India, there were only 24.0 per cent literate persons in the country and, among them, a little less than two thirds (62.9 per cent) had not been able to achieve even a primary standard of education. The developments in the field of education during the sixties could raise the literacy rate of the country to 29.3 per cent by 1st April 1971. In terms of percentage the achievement in the field of literacy during the fifties and the sixties has not been found impressive at all since more than 70 per cent of the country's population is still illiterate. In fact, the growth of literacy rate in the country slackened during the sixties.

If one considers the increase in the number of literate persons during the last two decades, it is found that, during the fifties, there was an addition of 45.6 million net and 52.0 million gross literates to a base figure of 59.3 million literates at the 1951 census. In terms of gross figures the number of literates during this period increased by 87.7 per cent. However, during the sixties the number of literates in the country increased by 55.3 million net and 64.5 million gross implying a gross increase of 61.3 per cent over the 1961 figure of literate persons. Further, while the number of illiterate persons in the country increased by 31.9 million during 1951-61 decade (excluding Jammu and Kashmir) their number increased by 52.9 million during the sixties. These data clearly reflect a slackening of the pace of growth of literacy during the sixties.

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In the light of these developments and keeping in view the targets for the development of compulsory education in the age groups 6-10 and 11-13 laid down by the Education Commission, 1964-66³, an attempt has been made in this paper to obtain likely literacy rates that shall be achieved in the country by 1986 under different assumptions of population growth. For this purpose the first step is to obtain enrolment projections, particularly in the age group 6-13, upto 1986. The next step involves estimation of literate persons during this period. The first section of this paper, therefore, deals with enrolment projections and the second section deals with literacy projections. In the final section of the paper an evaluation of the 1971 census literacy data in relation to the figures estimated in section II for that year has been made.

I

ENROLMENT PROJECTIONS

In recent years several attempts have been made to develop methodology of school enrolment projections. These have been mostly in concrete situations where the researchers had to produce estimates of school enrolment based on whatever data were available, and improvising or adapting certain methods which have seemed most appropriate in their circumstances. Among these, of special mention is the work done by Jacoby in preparing school enrolment projections for New Zealand and Western Samoa⁴. Descriptions of methods used in the United States by the Bureau of the Census and others working on enrolment projections are found in a number of articles and publications.⁵

Among the various methods utilized for enrolment projections, the most accurate method is the one called "cohort survival" or "grade succession" technique. In projecting school enrolments, the various grades within the school structure are analogous to the age - sex categories in the projection of population. Projection of enrolment are made on the basis of the "survival" of pupils from one grade to the next higher grade. Historical trends of grade-to-grade survival rates are derived and projected to future dates. Enrolment in the various grades are then moved annually through successive grades, in accordance with the appropriate series of projected rates, to obtain projected annual enrolment by grade for each year in the forecast period.⁶

The grade succession method requires detailed and historical data on school enrolment by sex, age and grade, number of new enrolments, number of repeaters, etc. and many of these details are not available in India. Moreover, the grade - succession method implied a regular progression of the grade cohorts with nil or negligible repeaters and drop outs in different grades during the compulsory school age, but in case of India it is estimated that of the total enrolment in grade I, roughly 40 per cent drop out before joining the next grade in the subsequent year.

ENROLMENT RATIO METHOD

Where current school enrolment data are not available in detail, but school age population by sex and age can be obtained from recent censuses and current estimates, the enrolment ratio method can be used for some approximate estimates of future school enrolment. This method requires estimates of population by sex and age, and school enrolment data (from current school statistics) also by sex and age.⁸

BASIC INFORMATION REQUIRED FOR ENROLMENT PROJECTIONS:

In order to estimate future school enrolment, at least four general types of basic information is needed. The first relates to the population of school age, the second to pupil enrolment, the third to various rates and ratios derived from the first two types of data, and the fourth to questions of administrative policy affecting education in general and school enrolment in particular.

To obtain enrolment projections for future dates, it is necessary to have population projections for school going ages under alternative assumptions of population growth. In connection with his Ph.D. work, this author obtained twelve sets of population projections for India and each state/union territory under three different assumptions about future course of fertility, two of mortality and two of migration.⁹

However, in order to keep the work within manageable limits only four projections with the following assumptions were selected for enrolment projections:

- Projection A: No decline in fertility, fast decline in mortality, and migration at current level.
- Projection B: Medium decline in fertility, fast decline in mortality and migration zero.
- Projection C: Medium decline in fertility, slow decline in mortality and migration at current rate.
- Projection D: Fast decline in fertility, slow decline in mortality and migration zero.

The population projections for India under these four assumptions upto the year 1986 are given in Table 1.

The quinquennial age groups in which the population projections are obtained do not directly give school going population in different ages. In India, formal schooling ordinarily begins at age 6 and, according to the pattern currently followed, primary stage covers age group 6-10 and middle stage covers age group 11-13.¹⁰ In order to obtain the population by sex in these age groups for each quinquennium, population in single year ages has been obtained first by using Sprague's multipliers, and then grouped in appropriate age groups. These figures for the period 1961-86 are given in Table 2.

It is noticed from here that the population in a particular year has not followed a smooth trend of change from high level to low level as the variant of population projection changes from A to D. This pattern emerges only in 1986. The explanation for this behaviour of the population lies in the assumptions underlying the four variants of the population projections wherein the effects of future assumptions of mortality and migration (by sex and age) are confounded in these age groups.

PUPIL ENROLMENT

The second type of information necessary to estimate future school enrolment relates to past and present figures on the number of pupils enrolled in.

schools at each level. Data on pupil enrolment by sex, age and grade are available for various years for the recognised institutions from the Education in India.¹¹ However, to apply the grade - succession method of enrolment projections one also requires information on the number of pupils who drop out of school system each year and who have to repeat their grades due to non-promotion.

An essential step in analysis of basic data on school enrolment is to discover how a cohort of pupils progresses through a school system in the course of a given number of years under prevailing conditions of admission, promotion, dropping out, repetition and graduation. Thus we need to compute such measures as the intake ratio, grade progression ratio, grade attrition ratio, repeater ratio, grade and school retention ratios, culminating in the output ratio.

Unfortunately, in India all this essential information is not available and hence it has not been possible to apply the grade-succession technique of enrolment projections. In what follows, the enrolment ratio method has, therefore, been used to make enrolment projections for the country in the age groups 6-10 and 11-13, separately for each sex. Table 3 gives the enrolment rates¹² for these age groups for the years 1961 and 1966 on the basis of school enrolment by sex and age published by the Ministry of Education. These data have been used to project future enrolment rates.¹³

If we assume a linear increase in the enrolment rate for each quinquennium at the 1961-66 level we observe that 100 per cent enrolment is attained among boys in the age group 6-10 during 1971-76 and therefore, it is assumed that there will be 100 per cent enrolment of male students from 1976 onward. A linear increase in enrolment rate in the age group 11-13 will lead to 100 per cent enrolment among boys by 1986 which tallies with the enrolment target laid down by the Education Commission in this regard.¹⁴

However, when the enrolment of girls is considered for future years, it is found that the growth in enrolment rate for 1961-66, if projected linearly up to 1986, will not lead to 100 per cent enrolment in any of the two age groups. Hence it would be necessary to step up girls enrolment and motivate them to continue to remain in the school system in these age groups. In order to achieve

the target of compulsory education in the age group 11-13 by 1986 among girls also, it would be necessary that 100 per cent enrolment of girls in the age group 6-10 is achieved by 1981. It has, therefore, been assumed that 100 per cent enrolment of girls in the age group 6-10 will be achieved in 1986. It may be mentioned here that the target of achieving 100 per cent enrolment of girls in the age group 6-10 by 1976 is not realistic in the light of the present trends. To obtain the projected enrolment rates for the intervening quinquennian, parabolic curves have been fitted to the observed enrolment rates for 1961 and 1966 and the targeted enrolment rate for 1981 for the age group 6-10 and for 1986 for the age group 11-13. The enrolment rates thus obtained for boys and girls are given in Table 4. Applying these enrolment rates to the projected population of each sex in the age groups 6-10 and 11-13 (figures in Table 2), the projected enrolments have been obtained as per Table 5.

This table clearly indicates the extent of efforts that are required to increase enrolment of boys and girls in the age group 6-13 under alternative assumptions of population growth, if it is proposed to ensure 100 per cent enrolment in this age group by 1986. In case of boys, it would be necessary to increase the enrolment in this age group from a figure of 34.8 million in 1966 to 91.2 million in the next twenty years if there is no decline in fertility (projection A), or to 59.3 million if the fertility declines by 50 per cent by 1986 (projection D). Under the medium projections it would be necessary to more than double the enrolment in order to achieve the targets of compulsory education for the two age groups. Although it is quite likely that the targets of universal education among boys will be achieved under all the four assumptions of population growth, the task of achieving this objective for girls is much more difficult. In their case it would be necessary to increase the enrolment from a level of 13.5 million in 1966 to at least 55.4 million (three times the 1966 level) within the next twenty years. However, if the population grows in future as per assumptions implied in projection A, it would be necessary to increase the enrolment to nearly four and a half times. Increasing female enrolment in school is much more difficult since this involves not only increasing the facilities for girls education but also a change in the social values of their parents, so that the facilities are properly utilized.

II

ESTIMATES OF LITERATES IN VARIOUS QUINQUENNIA

Having obtained the enrolment projections for future dates, our next task is to estimate the number of literate persons in each quinquennium so as to arrive at literacy rates that are expected to be achieved by 1936.

The literate persons at any particular point in time t_1 are constituted of survivors of literates at time t_0 and those who become literate through normal school system during t_0 to t_1 and through the adult literacy programme during the same period. A number of people become literate during any given time period due to their own efforts and account should be taken of these persons as well. However, it is practically impossible to have any reasonably correct estimate of such persons and hence no account has been taken, in what follows, of them. To this extent, literacy figures would be under-estimates.

As in the census, it has been assumed here that no child below the age of 5 is literate. Since the children in the age group 5-9 and 10-14 mostly become literate through the normal school system, it is possible to first estimate the new literates in these age groups at the end of each quinquennium. To this figure we add the survived literates aged 15 and over and also new adult literates. This method has been followed in estimating the literate population in this paper.

Estimate of Literate Population
in the Age Groups 5-9 and 10-14

Population in any of these age groups can be divided into four components: (1) those who are in the school system but still illiterate, (2) those who are in the school system but literate, (3) those who drop out from the school system after attaining literacy, and (4) those who are outside the school system and illiterate.

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Attainment of permanent literacy is considered to be the main objective of primary education and certain researchers have concluded that, as a minimum, four years of schooling is necessary for every child to ensure the retention of effective literacy in his later life.¹⁵ However, if one considers census definition of literacy which involves ability to read and write a simple message, it has been shown by Gadgil and Dandakar that, among those who leave schools from the III standard 37.3 per cent remain literate in the sense of census definition of literacy.¹⁶ These investigations were carried out more than 25 years ago. During the intervening period many more influences helpful to retention of literacy, e.g., newspapers, radio, films, and literature for new literates etc have begun to operate. In view of this it can be assumed that all those persons who leave the school after completing grade II are literate. Rege has also concluded that the achievement of literacy of the census level is attained after the completion of the second standard of primary education.¹⁷

Data on enrolment by sex, age and grade for India are available up to 1966 on annual basis from the Education in India. The 1961 census provides data on literate and illiterate persons in different age groups for the census count population. However, in obtaining population projections, smoothed age data have been used. In view of this estimates of literate persons in the smoothed population in the age groups 5-9 and 10-14 have been obtained on pro rata basis. From the enrolment data for 1961, estimates of children (boys and girls separately) who are in school but below grade III - illiterate - and who are in school in grade III and above - literate - have been obtained in these two age groups. The difference between the total literates and those literates who continue to remain in schools gives the estimate of literates outside the school system. Similarly, estimates of illiterates outside the school system have been obtained for 1961.

The enrolment data for 1966 provide us information on the number of persons who are in school but below grade III (illiterate), and those who are in schools in grade III and over and therefore literate. There has, however, been some problem in estimating the number of literates who are outside the school system. Table 6 and 7 present the computations of literate drop-outs in 1966 in the age groups 5-9 and 10-14 respectively. An explanation regarding the procedure followed in these tables will not be out of place.

Columns 1 and 2 start with the year 1966 and the age groups chosen for analysis of population in that year and move in the backward direction so as to follow the same age cohort up to 1962. Columns 3 and 5 give the enrolments in schools in grade II + and grade III + respectively for the corresponding age groups. Column 4 gives enrolment in grade II. Column 6 gives the difference in enrolment of grade II + in a year from enrolment in grade III + of the same age cohort in the subsequent year. These are the persons who fail in grade II/onward and drop out, pass grade II onward and drop out or drop out from different grades before completing the same. Cut of these persons, if one subtracts the number of repeaters in grade II in the subsequent year, one gets the number of those persons who leave the school system after passing grade II and above or after failing in grade III and above the dropping out. All these persons are literate persons. In the residual figure there may be a very small proportion of those who drop out of the school system before completing grade II, but it has not been possible to estimate their number and hence they have also been regarded as literate. As regards the number of repeaters in grade II in the subsequent year, some information is available for Madras (Tamil Nadu) for the years 1960-61 and 1961-62. Averaged over these two years, the estimate of repeaters in grade II is 17.6 per cent among boys and 13.8 per cent among girls. Tamil Nadu being an advanced State with regard to educational development and retention of pupils in the school system, these estimates may be a little higher, but in the absence of availability of any other information in this regard, these proportions have been applied to estimate the number of repeaters in grade II at the national level. These figures are given in column 7. The difference between columns 6 and 7, given in column 8, then leads to an estimate of literate drop outs. /but join the same grade in the subsequent years

It may be mentioned here that there seems to be quite a bit of direct admission in grade III in age group 5-9 which has caused a reduction in figures in col.6 of Table 6 to such an extent that, for a number of years, the figures in col.6 of Table 6 are less than the figures in col. 7. If the literate drop outs in this age group are taken as per column 8, the estimate of total literates aged 5-9 falls short of the 1961 figure of literates both among boys and girls. Since, there is no likelihood of a reduction in literate persons in this age group from 1961 to 1966, the figures

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given in col. 6 have been taken to represent the literate drop outs in this age group.

Assumptions Underlying Estimates of Literates from 1971 to 1986 in the Age Groups 5-9 and 10-14

The estimates of literate persons in the age group 5-9 and 10-14 and the assumptions underlying them have been discussed in this paper on the basis of medium high (set B) projections. The computations for the two age groups are presented in Tables 8 and 9 respectively.

Age Group 5-9: Columns 3 and 4 of Table 8 give the number of children in school but below grade III and in grade III and above respectively. The total number of children in school is given in column 5 and the projected population of the particular age group is given in column 6. Columns 7 and 8 give the percentage of children in school and percentage of children in school but below grade III respectively.

While making the enrolment projections (section I) it was assumed that 100 per cent enrolment of boys in the age group 6-10 will be achieved by 1976 and of girls by 1981. It is assumed here that enrolment of children below the age of 6 will be eliminated steadily and whatever little enrolment there would be, it will be limited to nursery/K.G. classes only. Thus, for the present purpose, it is assumed that 5 year old boys from 1976 onward and 5 year old girls from 1981 onward will be outside the school system. We have further assumed that, with the achievement of 100 per cent enrolment in the age group 6-10, children aged 6 and 7 years will be in classes I and II, and those aged 8 and 9 will be in classes III and IV respectively. Under these assumptions it is noticed from columns 7 and 8 that when 100 per cent enrolment is achieved in the age group 6-10, the proportions of children aged 5-9 in school comes to about 79 per cent and of those below grade III comes to about 40 per cent.

In case of boys the percentage of children in school in 1961, 1976 and 1986 are 59.49, 71.72 and 78.63 respectively, and the percentage of those below grade III are 42.73, 51.12 and 40.67 respectively.

In order to obtain the figure for 1971, it is noticed that continuation of the same growth rate as observed during 1961-66 will lead to 33.95 per cent enrolment which is higher than what is expected in 1976 and, therefore, not likely to be achieved. In view of this we have arbitrarily assumed that 70.50 per cent boys will be in school in 1971. In a similar manner it has been assumed arbitrarily that 50 per cent of the boys aged 5-9 will be in schools but below grade III.

In case of girls, 100 per cent enrolment in the age group 6-10 is likely to be achieved by 1981. Taking the proportion of girls in school in age group 5-9 in 1961, 1966 and 1981 a second degree curve ($y=31.100 + 13.122 x + 0.282 x^2$) has been fitted, and the proportion of children in school in this age group obtained for 1971 and 1976. By fitting another second degree curve ($y = 23.170 + 10.983x - 1.663 x^2$) to the proportion of children in school but below grade III to the values for 1961, 1966 and 1981, estimates of these proportions for 1971 and 1976 have been obtained.

Under the condition of 100 per cent enrolment of 6-10 age group children not in school and illiterate will be only 5 year olds, and the number of children not in school but literate will drop to zero. The number of boys outside the school system and literate in 1966 under the above mentioned assumptions comes to 2273 thousand (Table 6) which would become zero by 1976. In this case a linear decline in this figure from 1966 to 1976 has been assumed. In the case of girls, taking the proportion of literates outside the school system in the total population of the age group for 1961 and 1966 and assuming this proportion as zero in 1981, a second degree curve ($y=6.520 - 2.403 x + 0.193 x^2$) has been fitted to obtain the proportions for 1971 and 1976 and hence the number of literates who are outside the school system in these years. Under these assumptions estimates of literates in the age group 5-9 have been obtained in Table 3 for different years.

Age group 10-14: The estimates of literate population in the age group 10-14 from 1961 and 1986 are presented in Table 9. As in Table 3, the first two rows of each block depict the situation as obtained in 1961 and 1966 for boys and girls respectively. The estimates of children not in school but literate for 1966 (col.5) have been brought here from Table 7.

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Column 7 of Table 9 gives the percentage of children in school but below grade III, while column 3 gives the percentage of those who are not in school but are illiterate. It has been assumed earlier for making enrolment projections that 100 per cent enrolment of boys in the age group 6-10 will be achieved by 1976. This would imply that, in 1981, there will be no male child in the age group 10-14 who would be in school but below grade III; this could also imply that at that time there will be no child in this age group who would be outside the school system and illiterate. Hence these percentages in columns 7 and 8 in 1981 become zero. Taking the proportions of boys in school but below grade III for 1961, 1966 and 1981, a second degree curve

$$y = 4.140 - 0.055x - 0.245x^2$$

is fitted to these data to obtain the proportions for 1971 and 1976. These proportions then give the number of boys aged 10-14 who are in school but below grade III in these years. In a similar manner another second degree curve

$$y = 41.460 - 19.313x + 2.233x^2$$

is fitted to the percentage of boys not in school and illiterate in 1961, 1966 and 1981 to obtain their proportions and number in 1971 and 1976. Subtracting the figure of children in school but below grade III and of children not in school and illiterate, one gets the number of literate persons in the respective years.

In the case of girls it has been assumed that 100 per cent enrolment in the age group 6-10 would be achieved in 1981. Hence there will be no female child in the age group 10-14 in 1986 who would be enrolled below grade III or would be out of school and illiterate. With this assumption a second degree curve

$$y = 2.180 + 0.424x - 0.134x^2$$

but has been fitted to the percentages of children who are in school/below grade III in 1961, 1966 and 1986. This curve gives the percentages for the intervening period. Similarly another second degree curve

$$y = 69.410 - 7.767x - 1.223x^2$$

has been fitted to the percentages of girls not in school and illiterate in 1961, 1966 and 1986 to estimate respectively

percentages for the intervening quinquennia. As in the case of boys, estimate of literate females in the age group 10-14 have been obtained for the different quinquennia by subtracting the number of those who are in school but below grade III and of those who are outside the school system and illiterate from the total population of the age group.

Estimate of Survived Literates:

The literate population aged 10+ of 1961 when survived to 1966 becomes aged 15+. To this if one adds the estimate of literates in the age group 10-14 and of adult literates made during the quinquennium and survives them to 1971, he gets the estimate of literate persons aged 15+ in that year. This procedure has been followed here to estimate the literate population aged 15+ in different quinquennia. The total of literate persons in the age group 5-9, 10-14 and 15+ for the particular year gives the total literate population for that year.

To survive the literate population aged 10+ of one quinquennium to the next, one requires life tables for the literates for that period. However, no such life tables are available in India. What one can have, at best, for this type of work, are the life tables for the total population that are assumed for projecting the population for future dates and apply them assuming that the mortality pattern of the literates would not be worse than that of the general population.

This author has obtained estimates of India's expectation of life at birth (e^0) utilizing quasi-stable population model based on Coale and Demeny's model life tables and stable populations (model "west") and has obtained an e^0 of 37.5 years for males and 36.8 years for females for 1960-61.²⁰ For working out population projections involving fast decline in mortality, it was assumed that it would decline in such a way that e^0 will increase by 0.9 year per annum up to 1976 and 0.75 year per annum during 1976-86. Under the assumption of slow decline in mortality, unit increase in mortality level²¹ has been assumed from one quinquennium to the next. The computations for surviving the literate population from quinquennium to quinquennium for projection B are shown in Table 10.

Regarding targets of adult education, the Education Commission recommended that every possible effort should be made to eradicate illiteracy from the country as early as possible and in no part of the country, however, backward, should it take more than 20 years. The national percentage of literacy should be raised to 60 by 1971 and to 80 by 1976.²² As is clear from the 1971 census results, the country has not achieved even half the target set for that date and hence the above targets seem to be completely unrealistic.

The Ministry of Education publishes data on adults made literate under the programme of "social education" on an annual basis which are available up to 1964-65.²³ During the Second Five Year Plan, on an average, 5.47 lakh males and 0.97 lakh females were made literate annually. During the five years from 1960-61 to 1964-65, 7.10 lakh males and 3.16 females were made literate annually. Efforts have been made during the Fourth Five Year Plan to give greater importance to the programme of adult education²⁴ and it is believed that there will be a big impetus to the adult education programme in the seventies. However, in this paper, as a conservative estimate of 'adults made literate', it has been assumed that the number of adult literates among males and females will increase in the coming years at the same rate at which it grew between the Second and the Third Plan period. Taking the 1961 figure of 'adults made literate' as base, we, therefore, assume that during each quinquennium, up to 1986, 8.15 lakh males and 10.95 lakh females will become additionally literate among the adult population. These figures of 'adult made literate' during each quinquennium (given in column 11 of Table 10) have been added to the survived literate population aged 15+ to obtain the total literate population aged 15+. To these figures, estimates of literates in the age group 5-14 have been added to obtain total literates for each sex.

Similar computations have been made to obtain the literate population when the total population is assumed to increase according to assumptions underlying projections A, C, and D. These have been summarised in Table 11 by presenting estimates of literate population and of literacy rates. It may be mentioned here that a large part of the variation

in the estimate of literate persons under different assumptions of population growth is accounted by the size of population in the age group 5-14. The only other important factor which accounts for the variation is the differential assumption of mortality decline.

It may be observed from Table 11 that under projection A the size of literate population will increase to 407.1 million (241.9 million males and 165.2 million females) by 1936 from 105.5 million in 1961. On the other hand, under projection B the literate population will increase to 343.7 million. As regards the literacy rates, it is inferred from the above table that at least half the country's population would be literate only by 1936 under assumptions B, C and D of population growth. In that year the literacy rate would vary from 47.4 per cent under projection A to 53.0 per cent under projection B.

The female literacy rate would continue to lag behind the male literacy rate even in 1936. Although half the male population is expected to become literate in the next eight to ten years, we may achieve only about 40 to 43 per cent literacy among females by 1936.

Considering the literacy rate in population aged 10+, it is observed from Table 11 that, in 1966 itself, roughly 50 per cent of the males were literate; their proportion would increase to about 75 per cent by 1936. The females had a very low proportion of literacy in 1961, and with the assumed rates of growth of population and literacy, it is expected that half of them would become literate by the middle of the eighties.

III

EVALUATION OF THE 1971 CENSUS LITERACY DATA

The estimates of literate population obtained in the previous section provide an opportunity for the evaluation of the 1971 census literacy data.²⁵ Taking the estimate of literate population under projection B, the following picture emerges for 1971.

Literate Population

(Figures in million)

	Male	Females	Total
Census count	111.9	48.7	160.6
Estimated	122.3	54.3	177.6

Thus, one finds that the 1971 census count of literates in the country is lower than the estimated figure by 17.0 million persons (10.9 million males and 6.1 million females). The figures in the second row contain estimates of adult literates to the tune of 7.9 million males and 4.2 million females which were based on conservative estimates of 'adults made literate.' However, even if we exclude these persons, the census count still falls short by at least 5 million persons. The reasons for this short fall in the count of literate persons can be analysed only when detailed information on literates by age becomes available. Then one would be able to know whether the major difference is in the survived literate population or it is in the estimates of new literates in the age group 5-14. It is quite possible that the assumption of treating all those persons who have completed grade II as literate may go wrong and some alternative assumption might be more realistic. An analysis of the literacy data by sex and age at the state level is also likely to throw some light on this problem.

Conclusion

In this paper an attempt was made to obtain likely literacy rates by 1986 under different assumptions of population growth in the light of the progress of educational facilities and literacy made during the Third Five Year Plan. In making estimates of literates in the age group 5-14, it was assumed that these persons become literate only through the normal school system and those who complete at least grade II of the primary education attain literacy of the census standard and are able to retain the same during their later life.

It has been shown in this paper that one can expect 100 per cent enrolment of boys in the age group 6-10 by 1976 even if the educational facilities increase at a pace observed during the Third Plan, but to achieve 100 per cent enrolment of girls in this age group immense efforts would be necessary which would include the question of changing the attitudes of their parents. The problem of achieving 100 per cent enrolment in the age group 11-13 even by 1986 is much more complex.

Starting with 24.0 per cent literacy in the total population and 30.5 per cent in the population aged 10 and over in 1961, the country is likely to achieve a little over 50 per cent literacy rate in the total population by 1986 if the population grows according to any of the assumptions underlying projections B, C, or D, but would fall short of this mark if the population grows according to projection A. In the population aged 10+, about 75 per cent males would be literate by that date but the proportion of females would be around 50 per cent only.

Since all the children in the age group 6-10 would be compulsorily enrolled in the schools by 1981 under the assumptions made in this paper, there would be no young person who would remain illiterate beyond 1986. Hence, if the country must achieve higher rates of literacy during the next fifteen years, it would be necessary to step up efforts to make adults literate, especially women, than heretofore.

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References.

1. In the Indian census the test for literacy is satisfied if a person can with understanding both read and write in any language. Unless otherwise stated, the literacy rates given in this paper are based on total population including children in the age group 0-4.
2. In a study on Progress of Literacy in Various Countries(UNESCO Monograph on Fundamental Education, No. 6, Paris, 1955), UNESCO has presented data in illiteracy in 26 countries since 1900 onward, but none of the advanced countries covered in this report had so high an illiteracy rate as India had in 1951.
3. Ministry of Education, Report of the Education Commission, 1964-66, Education and National Development, Delhi: Manager of Publications, 1966, p.151. The Commission had proposed that all the areas in the country should be able to provide five years of good and effective education to all the children by 1975-76 and seven years of such education by 1985-86.
4. UNESCO, Methods of School Enrolment Projections, by E.G.Jacoby, Educational Studies and Documents, No. 32, Paris, 1959.
5. See, M.Zitter, "Forecasting School Enrolment for the United States and Local Areas," The Journal of Teacher Education, Vol.V, No.1, (March, 1954); C.M. Armstrong and E.S.Harris, A Method of Predicting School Age Population, Division of Research, State Education Department, Albany, New York, 1949; C.F.Schmid and F.S. Shanley, "Techniques of Forecasting University Enrolment," The Journal of Higher Education, Vol. XXIII, No. 9, December, 1952; Calvin F. Schmid, et al., "Enrollment Forecasts, State of Washington, 1965 to 1985", Olympia, Washington State Census Board, 1966.
6. Calvin F. Schmid, et al., Enrollment Forecasts, p. 12.
7. J.T.Naik, "Enrolment Policies in Indian Education," Manpower Journal, Vol. I, No.1, pp. 111f.

8. UNESCO/U.N. Manual, Estimating Future School Enrolment in Developing Countries, A Manual of Methodology, by Bangnee A.Liu, New York United Nations, 1966, Population Studies No. 40, p.20
9. H.K.Premi, Educational Planning in India; Implications of Population Trends, New Delhi: Sterling Publishers (P) Ltd., (in press). The assumptions underlying population projections are discussed in chapter 3.
10. For the system of educational structure currently prevailing in India, see the Report of the Education Commission, op. cit., pp.26f
11. Ministry of Education, Education in India, Vol. I and II for different years, Delhi: Manager of Publications.

The recognised institutions are identified as "those institutions in which the courses of study followed are those prescribed or recognised by the Government or by a University or by a Board of Secondary and Intermediate Education constituted by law and which satisfy one or more of these authorities, as the case may be, that they attain a reasonable standard of efficiency and those institutions are open to inspection by public authority.

12. "Enrolment rate" is defined here as the proportion of persons enrolled of a particular age group per 100 persons of that age group. Some people use the term "enrolment ratio" for the above quantity; but in view of the fact that numerator is a part of the population exposed to the risk which is in the denominator, the term "rate" has been used instead of "ratio".
13. In obtaining the enrolment rates for 1966 for the age group 6-10 and 11-13, the projected population under the medium high (set B) projections has been taken to represent the actual population for the year. This assumption has been made in view of the fact that author's medium high projections for 1971 are very close to the 1971 census count population. Moreover, this assumption avoids the problem of working with varying enrolment rates under different assumptions of population growth.

14. Report of the Education Commission, loc. cit.
15. Council for Social Development, Eradication of Illiteracy, Proceedings of the Seminar held at Hyderabad, November 4-7, 1966, New Delhi: India International Centre, 1968.
16. D.R.Gadgil and V.M.Dandekar, Primary Education in Satara District, Gokhale Institute Studies No. 32, Poona: Gokhale Institute of Politics and Economics, 1955, pp. 33-35
17. K.B.Rege, Magnitude of Illiteracy in India, 1961-81, New Delhi: National Council of Educational Research & Training, 1971, p.5.
18. Madras, Director of Public Instructions, Report on Public Instruction in the Madras State, for 1960-61 and 1961-62, Madras: Superintendent of Printing and Stationery.
19. Ansley J. Coale and Paul Demeny, Regional Model Life Tables and Stable Populations, Princeton: Princeton University, Press, 1966.
20. M.K.Premi, "Estimates of Vital Rates for India and States," paper read at the XVII International Congress of Orientalists, Ann Arbor, Michigan, August 1967.
21. These mortality levels are the ones used by Coale and Demeny in Regional Model Life Tables and Stable Populations, op. cit., Increase in mortality level by unity implies an increase of 2.5 years of expectation of life at birth among females and of 2.41 years among males.
22. Report of the Education Commission, p. 665.
23. Education in India, Vol. I for different years.
24. Education in India, Vol. I, 1964-65, p. 439.
25. Census of India, 1971, Series I, India, Paper I of 1971 - Supplement, Provisional Population Totals, Delhi: Manager of Publications, 1971, p. 76.

PROBABLE LITERACY RATES IN INDIA BY
1986 UNDER DIFFERENT ASSUMPTIONS OF
POPULATION GROWTH

(Abstract of the paper)

Mahendra K. Premi*

At the time of independence India started with a very low level of literacy in the population. Although efforts have been made by the Central and State Governments during the past two decades or so to increase the educational facilities, the literacy rate in the country could move only to 29.3 per cent in 1971 from 16.7 per cent in 1951. During the sixties, the number of literate persons in the population increased by 55.3 million, but the number of illiterate also increased by 52.9 million during the same period.

The rates of enrolment growth during 1961-66 in the age groups 6-10 and 11-13 imply that it would be quite feasible to achieve targets of compulsory education in these age groups among boys if the enrolments continue to increase at the observed rates, but the achievement of these targets among girls will be nearly impossible.

In the light of these developments an attempt has been made in this paper to obtain likely literacy rates by 1986 under different assumptions of population growth.

Taking the author's population projections under four different sets of assumptions, it has been concluded here that a little over half the total population will become literate by 1986 if the

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population increases according to projection A. In the population aged 10 and over, about 75 per cent males and about 50 per cent females would be literate by 1986. If it is desired to make most of the people literate in the next fifteen years or so, it would be necessary for the country to increase its efforts manifold for making adults literate than heretofore.

It is concluded in this paper that the 1971 census literacy count of population is lower than the estimated literate population for that year by nearly 17 millions. A probe into the reasons for this shortfall would be possible only when age-wise literacy data become available.

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XI DEMOGRAPHIC ASPECTS OF
EDUCATIONAL DEVELOPMENT

XI. 03

Demographic Aspects of Education

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DEMOGRAPHIC ASPECTS OF EDUCATION

Professor S. Shukla*

TEACHER SUPPLY AND EDUCATIONAL TECHNIQUES

1. An important demographic issue in respect of educational development relates to the supply of teachers adequate to the needs of the school going population. The broad contours of this problem are as follows: The population in the age range 6 - 14, the elementary school age range, is of the order of 20%. Further additions to the pupil-population would result from the following sources: (1) Children below 6 who join the elementary school. This is most often the case with urban middle class groups before provision of pre-primary schools on a substantial scale but also includes (2) Children below the age of 6 who are ready for the rather rudimentary and unchallenging school curriculum a year or even two ahead of the officially scheduled age, (3) Children in pre-primary schools (4) Students in post-primary schools, academic, technical etc. If the generally accepted norm of universal primary education is adopted, almost 30% of the population should consist of students. On a pupil-teacher ratio of 1:30, the order of magnitude of teachers required is 1% of the whole population¹.

2. In countries of the Third World, the populations are still young and the basic figures of 20% in the 6-14 age group

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rises to 22% or 23% in countries like India as against mere 17 or 18% in the developed countries.² Besides, the various factors that lead to retardation and stagnation operate with greater severity so that many children of ages above 14 are still in primary school³. An extension of the same phenomenon, fundamentally, is the vast and so far increasing backlog of adult illiterates⁴. If any sustained programmes of functional literacy for them are to be launched, the question of availability of teachers becomes even more acute.

3. These figures may appear paradoxical in a situation when close on 2 million matriculates are registered with employment exchanges as unemployed. But, in perspective, it must be conceded that the problem of securing teachers is a substantial one. It is, in numerical terms, presumably more severe in the underdeveloped countries on account of demographic considerations just presented. However, in economic terms, viz. the cost of withdrawing matriculates and above in the age-range 18 upwards from other gainful employment and putting them to teaching, the problem is much more severe in industrialised societies and will call for changes in the patterns of manpower use either in education or in other sectors of the economy. There is not always a very sharp dichotomy between developed and underdeveloped economies in these matters and very often the latter can profitably apply techniques suitable to the former either (a) by way of anticipating problems or solutions which developed countries only evolved when faced with them or (b) by way of solving in a better manner even the current

concentration into the problems of developed societies. They have the option of either economising on the use of educated and skilled man-power in non-education spheres or in the sphere of education or in both. In adopting the first course they would make available more highly educated manpower for education. This, in general, is the reverse of what is actually being done. To economise the use of educated manpower in education, it is possible to use techniques like programmed learning and team teaching. By using the former, it is possible to do with relatively less educated teachers for a greater proportion of the teaching task while deploying a very small number of highly trained people in developing materials and programmes. This expedient may be useful in an underdeveloped country like ours as well not in order to economise on trained teachers (typically, trained matriculates) but in order to make up for the deficiencies in their training and education. Thus, for improvement, though not for expansion of education will it be necessary. Similar will be the role of mass communication through radio and T.V.

4. The precise problem of teacher supply in an underdeveloped country is that of financing and deployment. In an absolute sense, it is arguable that in putting adults and children in association with each other for purposes of schooling no additional real costs need be involved other than those of buildings, books, equipment etc. For, both these groups are being nourished and maintained even outside of schooling in their state of unemployment. While the economic value of largely

economy is open to discussion by more competent people, it does appear clear that for effective learning children would have to ^{be} nourished at higher than the present sub-normal levels at which almost half the children seem to be⁵. In providing teachers for these children certain additional wage-goods would have to be produced. Discussions in the area of economic planning suggest that all this would involve substantial diversion of income from the upper ten per cent of the income range to other groups⁶. The financial costs of universal primary education may be very high in a relatively non-egalitarian income distribution when teachers would look for more and more sophisticated consumption items or relatively low in an egalitarian income distribution.

5. It is in the area of deployment of teaching manpower that demographic factors of another kind are important. The sex and rural-urban composition of the student-body differs very considerably from similar composition of the educationally qualified persons who can be employed as teachers. There are, also, in some small pockets of underdeveloped areas, regional shortages of teachers. Broadly speaking, fewer women teachers are available in rural areas than in urban areas. The same disparity in less acute form is seen in respect of all teachers. There are actual surpluses in the big cities, particularly among men teachers. Teaching suffers also from considerable loss of manpower among men by movement to other employment and among women by this cause as well by withdrawal from paid employment on account of household commitments after marriage⁷.

out taking into account not merely the normal expansion of the school system and the loss due to superannuation (which in an expanding system will be rather smaller than otherwise expected in a steady system) but also loss from the two causes just enumerated.

LITERACY AND PRIMARY SCHOOLING

6. One of the major disturbing statistics to emerge from the 1971 Census is the literacy rate which stands at 29.5. This is only 5.5 points higher than the 1961 figure which was 7 points higher than 1951 figure. Prima facie, the progress of literacy is slowing down presumably the figures given exaggerate the actual extent of illiteracy among those who could be expected to be literate. A more accurate estimate would be obtained by using percentages based on population above the age of 5 or 10 years of age. But the impression of slowing down would still persist. Besides, by the correction so introduced, we would merely obtain a pleasantter view of the present situation. If the children below five or ten are expected to survive at the anticipated rates, we are still faced with the situation that future magnitudes of illiteracy would be fairly high. All told, then, in the most elementary aspect connected with education we are faced with a rather negative picture whichever way we look at it.

7. An implication of the slowing down of the rise in literacy rate is the possible stabilisation of this rate at a plateau much short of the ideal 30% or above. This

suggests that a substantial proportion of the population is in danger of remaining outside the web of literacy and perhaps also other attributes of a modern economy or society. Seen in conjunction with the finding that substantial proportions of population have remained below the poverty line and may remain so, we project a divided society only one of its two parts being involved in schooling, market economy and so on.

8. Projections for the growth of the educational system are, therefore not as closely related to population growth as one might expect, as will be evident from even the following unsophisticated argument. A rise of population of the order of 2.2 or more per cent will be reflected in the child population by a slightly higher percentage in view of the fact that birth rates are higher than mortality rates. However, all this child population need not be coming to schools. If the improvement in the conditions (and consumption levels) of the bottom 40% rural and 50% urban population remains marginal and if the rise in the literacy rate is as small as in the past decade achieved largely through an expansion of primary schooling, the rise in the participation in schooling will be barely in line with population increase. If, on the other hand, programmes of eradicating poverty make any substantial headway, the capacity of parents to send children to schools and of children to stay there may rise through, on one estimate, not very considerably⁷. If this decrease in poverty is accompanied by rise in adult literacy in a short period, the tendency of the literate parent to send his child to school may ^{be} expected to operate sooner,

provision of elementary schooling. If, however, adult literacy is not stressed, the snowball effect of literate or educated parents on rising participation in schooling will be felt only a generation later. Thus the increases in demand on the elementary school system will be a function more closely linked to the policies in the areas of income distribution and adult literacy/primary schooling than to actual demographic increases. A little consideration will show that growth in secondary and higher systems is similarly less connected with population factors than with social factors such as growth and power of middle classes and the wage differentials between jobs of differing educational levels.

9. Higher incidence of schooling as well as literacy in urban areas is a well-known phenomenon. It is worth examining how far this holds in the recent spurt in Indian urban population during ^{the} past decade. From the findings on poverty viz., that a greater proportion of urban than rural population are living below the poverty line, one would presume that the recent increases in urban population may not have been accompanied by corresponding rises in primary schooling and literacy in urban areas⁸.

NOTES

1. S. Shukla "Educational Techniques and Educational Planning with special reference to Demographic Considerations" (Educational Sciences An International Journal, Vol.II no. 1 Oct. 1967 Pergamon)
2. A Study shows "Nearly 42 per cent of the Asian Population is under 15 years of age as compared to 32 per cent in North America and 26 per cent in Europe" (Bulletin of the UNESCO Regional Office for Education in Asia Vol.1 no. 1 Sept. 1966 Bangkok)
3. Enrolments in Grades I - V are, therefore, often found to be more than the estimated population in the age range 6+ and e.g. enrolment in Kerala was 116% of the relevant population (Second All-India Educational Survey p.30 Delhi, National Council of Educational Research & Training 1967).
4. Over 350 million now.
5. The estimates of Dandekar and Rath ('Poverty in India' Economic and Political Weekly Jan. 2 and 9 1971) are that 40% of the rural and 50% of the urban population live at nutrition levels of under 2000 calories per adult per day. Against this background, the finding that school lunches do not improve significantly the enrolment, retention or academic achievement of scheduled caste and scheduled tribe children in Orissa CARE feeding programme areas (School Lunch Programme in Orissa, Delhi, Council for Social Development 1971 mimeo) suggests that the poor families might actually be withdrawing equivalent amount of food from schoolfed children for feeding other members in the family. Thus, to maintain these children efficiently in school, the whole family has to be equally well-nurished! See, for further discussion my "Principles in Educational Policy" (Economic and Political Weekly Special Number 1971).
6. Dandekar and Rath op. cit.

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7. Dandekar and Rath (op. cit) estimate that to raise the total consumption level to 18-21 rupees per month, the minimum nutrition level, the rise in educational services will be of the order of only 6.43% above the present level. Although I have pointed out in my article quoted earlier that with a somewhat different development strategy, the increase in educational services may be larger, it still falls short of universal elementary schooling.
8. The small rise in Delhi's literacy rate (3.9% i.e. from 52.75% in 1961 to 56.65% in 1971) may suggest that the recent migration to the metropolis may belong to those sections which are not literacy prone and their living and working conditions in the metropolis make them no more so.
9. Maps 155 et. seq in Census of India Vol.IX Pt. I Census Atlas, 1961.

DEMOGRAPHIC ASPECTS OF EDUCATION

S. Shukla

SUMMARY

On account of the age-structure of the population of underdeveloped countries like India, there will be a proportionately large school-age population and consequent possibility of paucity of manpower for education. In developed countries, comparable problems, though less acute, are capable of abatement by use of new educational technology. In developing countries, however, new educational technology offers greater possible use in improving the quality of education rather than making up manpower shortages.

The sluggish - and decelerating - growth of mass literacy & education is seen to be related to uneven distribution of incomes. Future requirements of teachers are thus seen to be dependent not upon demographic factors such as growth of population but on the extent of equalisation of incomes, and corresponding phenomenon of poverty, urban educational inadequacies are seen to be as acute as rural ones. Some regional and rural-urban differentials are noticed.

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XI DEMOGRAPHIC ASPECTS OF
EDUCATIONAL DEVELOPMENT

XI. 04

Provision of Educational Facilities and Services to
Scheduled Tribes of India

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PROVISION OF EDUCATIONAL FACILITIES
AND SERVICES TO SCHEDULED TRIBES OF
INDIA

DR. L. R. N. SRIVASTAVA*

INTRODUCTORY

There are more than 450 tribal groups and sub-groups in India with population varying from 19 of the Andamanese to about 4 million of the Gonds. They speak a large number of dialects which have no scripts. These tribal communities live in forest-clad hill tops or isolated areas in the plains. For centuries they lived in isolation, unaffected with the socio-economic and political developments in the neighbouring areas.

2. This isolation of the tribes did not create conditions for their initiation into the formal system of education obtaining in India. Education for them had altogether a different meaning.

3. In the early stages one of the main functions of education in the pre-literate tribal societies was to sustain and perpetuate the tribal culture. This consisted of the imparting of the knowledge and skills of growing food, hunting and fishing, weaving, basket-making and other arts and crafts, maintenance of inter-personal relationships, knowledge of the codes of behaviour and skills in oratory and putting up of cases in the village council, knowledge of the magical formulæ religious rituals and so on. So long a member of the tribe could gain mastery over these aspects of culture, the knowledge of the characters was not considered essential for him. The parents took upon themselves to discharge these functions through the media of folklores, folk-tales, myths and such other cultural materials. The village institutions like the dormitories catered to these educational needs.

4. With the passage of time the tribal areas began to be gradually opened up. Efforts began to be made to bring these

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tribal societies in contact with the more enlightened neighbouring non-tribal communities. The tribal culture felt the first impact of change from the measures for opening new communication channels to connect the isolated tribal villages with the neighbouring urban centres. These measures were intended to bring to them the benefits of a modern and sophisticated living, but they also brought with them various kinds of disadvantages. Through the new roads came new tools and techniques, new ideas and new diseases to cope up with which the tribesmen were not adequately prepared. Hitherto the tribes had lived in isolation and they had limited wants and desires. These communication channels opened a flood-gate of wants and desires to fulfil which they had no resources. New practices of health and sanitation increased the birth rate and decreased the death rate. This resulted in a sharp rise in their population. Within a span of 20 years from 1941 to 1961 the tribal population in India rose by 66 percent. The land under cultivation, however, remained as it was and could hardly sustain the growing population.

↳ This resulted in the unscrupulous trader - from outside the tribal area

5. To supplement their needs, tribesmen began to shift from their traditional to newer occupations. New trades, of which the tribes had no knowledge, began to infiltrate into tribal areas, exploiting and fleecing the tribesmen to such an extent that the latter fell over head and ears in debt and had to part with a substantial fragment of their land. When they went out in search of newer occupations, spatial and social mobility took place and the tribesmen found themselves unable to adjust themselves to the changed situations.

6. The erstwhile function of education had thus to change now. It had to assume newer dimensions. It was no longer desirable to keep the cultural values as they were in days gone by. They required to be adjusted in unison with the changing conditions. New situations needed new knowledge for which the tribesmen had to go for a different kind of education.

7. The introduction of new methods and techniques of cultivation, fertilizers and irrigation systems, cooperative societies, health and sanitation all needed new knowledge. When the tribesmen found themselves unable to cope up with these changing situations they had perforce to take help from outside agencies who, however, could impart education to them according to their own convenience.

8. This then is the background in which the programmes of educational development of the scheduled tribes began to be

implemented by the Central and State Governments. These programmes largely flow from the constitutional provisions made for the protection of certain rights and making available certain privileges for the economic and educational development of the scheduled tribes.

CONSTITUTIONAL PROVISIONS

9. The Constitution of India makes several provisions for the welfare and development of the scheduled tribes. Two of its articles are relevant to the theme of this paper.

10. Article 46 stipulates that, 'The State shall promote with special care the educational and economic interests of the weaker sections of the people, and, in particular, of the Scheduled Castes and Scheduled Tribes, and shall protect them from social injustice and all forms of exploitation.'

11. Article 275(1) states that, 'Such sums as Parliament may by law provide shall be charged on the Consolidated Fund of India in each year as grants-in-aid of the revenues of such States as Parliament may determine to be in need of assistance and different sums may be fixed for different States:

'Provided that there shall be paid out of the Consolidated Fund of India as grants-in-aid of the revenues of a State such capital and recurring sums as may be necessary to enable that State to meet the costs of such schemes of development as may be undertaken by the State with the approval of the Government of India for the purpose of promoting the welfare of the Scheduled Tribes in that State or raising the level of administration of the Scheduled Areas therein to that of the administration of the rest of the areas of that State'.

OBJECTIVE OF THIS PAPER

12. The limited objective of this paper is to present demographic data and their analysis pertaining to the educational facilities to and representation in services of the scheduled tribes over a number of years, and show whether the educational facilities and representation in services are commensurate with their population.

POPULATION AND GROWTH RATE

13. One of the major handicaps in discussing any problem of the scheduled tribes is the paucity of demographic data on them. During a hundred years of the Indian Census a total enumeration of all the tribal communities in all the States and Union Territories has never been done. The first census was conducted in 1872 when perhaps none of the tribal communities was enumerated. In 1881 only 55 tribal communities were enumerated. In some cases castes and tribes were mixed up as no clear-cut definition of tribe then existed. Tribes and castes changed positions. A tribe which was enumerated in one census was left out in another.

14. The number of tribes enumerated varied from census to census. Even as late as 1961 most of the tribes of the North-East Frontier Agency were left out of the scope of the census. But from whatever figures are available (Table 1) it is apparent that the tribal population rose very slowly during 1881 to 1951. The highest rise was during 1951 to 1961 when it rose by more than 7 million or 32.73 percent, that is, an annual growth rate of 3.27 percent. This growth rate was 42 percent more than the growth rate in the general total population of India during the same period which was 2.30 percent.

15. Assuming that the population of the scheduled tribes as given in Table 1 was their total population during the different years, it is expected that the facilities provided to them for their educational development and their representation in services would rise in proportion to the rise in their population. This will be examined in the subsequent paragraphs.

LITERACY AMONG THE SCHEDULED TRIBES

16. As there was no full-scale enumeration of the tribes during the different censuses, the number of literates among them is not available. But it can be safely assumed that, considering the low levels of literacy among the total population of India, the level of literacy among the tribesmen has been very low (Table 2). Literacy figures for 1921 are available in case of 20 tribes only. Then it was just one percent

as compared to 8.3 percent among the total population of India. Within a span of 30 years from 1931 to 1961 the literacy percentage among the tribes registered a bare rise of 1.6 percent as compared to 14.9 per cent among the general population. From Table 2 it can be seen that the level of literacy among the tribes has been rising at a much slower pace than among the general population. This shows that the progress of their educational development programmes has been slow.

EDUCATIONAL FACILITIES FOR SCHEDULED TRIBES

17. Schools in Tribal Areas. A major index of educational development is the number of schools. In the pre-1947 period there were very few schools in tribal areas. This greatly hampered their educational development. Smaller children of school-going age could not go to schools in far off places. A determined and bold step in this direction was taken during India's second five year plan (1956-1961) when 2,440 schools were opened in tribal areas with an expenditure of Rs.18.67 million (Table 3). This was followed by 554 schools with an expenditure of Rs.7.59 million during the third plan. These schools provided educational facilities to about a quarter million additional children. There are being provided seats in the schools every year. Once schools were opened children began attending them, through in trickle, and a climate conducive to the growth of education was created.

this process is continuing and more and more children

18. Ashram Schools. These are residential schools opened exclusively in tribal areas. They have made a great contribution in attracting tribal children to schools because of the attendant facilities of board, lodging, environment and the like. A beginning was made in the second plan by opening 299 ashram and 120 sevashram schools with an expenditure of Rs.9.92 million (Table 4). During the third plan again 155 ashram schools were opened with an expenditure of Rs.25.70 million. Today there are about 700 ashram schools in tribal areas. These schools have created a great impact on the tribemen and have led to large-scale expansion of education in tribal areas.

19. Enrolment of Scheduled Tribe Students. The enrolment of tribal students in schools is not as much as one would desire it to be. For this there are several reasons which cannot be discussed in this paper. But one thing is certain. And that is that the enrolment is increasing at a rate faster than the

in enrolment population is increasing. Against the growth rate of 3.27 per cent of the tribal population, the increase in general and professional education during 1961-62 was 15.2 per cent over the enrolment in 1960-61 (Table 5). It may be inferred that the situation may not be very different in subsequent years. If this trend continues for a few more years the large gap between the number of children of school-going age and number of children attending schools may be considerably narrowed down.

20. Pre-matric Scholarships. Such scholarships are one of the most important incentives given to tribal students to prosecute their studies. The nature of these scholarships varies from State to State. Somewhere these are given only to meritorious students, somewhere to poor students and somewhere to both. But all the States do have some sort of scheme for awarding scholarships. And in this field also the coverage of recipients has been increasing every year. Whereas during the five years of the second plan 0.51 million students received scholarships, in 1968-69 alone the number of recipients was 0.76 million. The expenditure also increased three-fold from the second to the third plan (Table 6).

21. Tuition and Examination Fees. All tribal students are exempted from the payment of tuition and examination fees. In some States these are deducted from the scholarships they receive, but not in other. The amount spent on this assistance is also not insignificant. In the second plan Rs. 3.31 million was spent which rose to Rs. 15.59 million during the third plan - a rise of 470 per cent in five years. (Table 7).

spectacular 22. Book Grants. The economic condition of the tribal parents is such that they cannot afford to purchase text-books for their children. To provide facilities in this direction the State governments have launched this scheme. Though it has not made any progress over the years, it has maintained an upward trend except during 1968-69 when the number of children getting book grants was about a thousand less than that during 1967-68 (Table 8).

23. Midday Meals. It has often been reported that the tribal children suffer from malnutrition and undernutrition. This adversely affects their attendance in schools and the consequent development of their education. Apart from the State govts.

an agency known as CARE has rendered a good deal of assistance in this field. This scheme has reportedly been very popular in tribal areas and has been able to attract a large number of children to schools. The State Governments spent Rs.0.55 million in the second and Rs.0.72 million in the third plan on this scheme providing midday meals to 57,000 and 18,000 tribal children respectively (Table 9). In the subsequent years also the number of children who were given midday meal has been increasing from 0.30 million in 1966-67 to 0.45 million in 1967-68 and 0.56 million in 1968-69 - a rise of 187 percent during two years.

24. Hostels in Tribal Areas. The fact that tribal areas very badly lack communicational facilities makes it all the more necessary that hostels are provided at central places so that students do not have to walk long distances to attend schools. In the second plan as many as 333 hostels were opened and 429 buildings constructed with an expenditure of Rs.9.47 million. This expenditure increased to Rs.13 million in the third plan though the number of hostels opened and buildings constructed were less (Table 10). Obviously the increased expenditure was on better amenities provided to a large number of students. In each of the three subsequent years, that is, 1966-69, on an average, as many hostels were opened and buildings constructed as were during the five-year period of the second and the third plans. The number of boarders residing in these hostels also increased considerably.

25. Girls' Hostels. The education of the girls in India is lagging behind. It is more so among the scheduled tribes. In order to provide educational facilities to them the Government of India took upon itself to open hostels for them under the Central Sector of the welfare schemes. A little less than half a million rupees were spent each year during the three-year period from 1966-67 to 1968-69. The number of hostels opened during these three years was 45, 61 and 55 respectively (Table 11). Though the number of hostels opened does not indicate any spectacular increase over the three-year period, yet a good beginning can be said to have been made. The social conditions are such that development will take place at a very slow pace in this field.

26. Post-matric Scholarships. It is really in the field of post-matric scholarships, which are awarded under the Central Sector scheme, that a great stride has been made. The scheme began in a most modest way in 1948-49 awarding scholarships to

only 84 students with an expenditure of Rs.46,000. Within a span of 22-years the number of recipients of scholarships rose to 29,200 - a rise of 348 times. The expenditure also rose phenomenally - from Rs.46,000 in 1948-49 to Rs.14.95 million in 1970-71. This recorded a rise of 325 times (Table 12).

27. It is thus seen that the expenditure incurred on this scheme increased in almost the same proportion as the increase in the number of recipients of scholarships.

28. This is also corroborated when the per capita expenditure on post-matric scholarships is analysed. In the initial year (1948-49) of the scheme the per capita expenditure on post-matric scholarships was Rs.548, and after 22 years (1970-71) it went down to Rs.512. The position was still worse at the end of the 11th year of the initiation of the scheme (1959-60) when the per capita expenditure was only Rs.390. But the fact remains that this scheme has had a wide coverage and has provided financial assistance to a large number of tribal students who, in absence of such assistance, in all likelihood, may not have been able to prosecute their studies further. During these 22 years from 1948-49 to 1970-71 as many as 2,16,220 tribal students were awarded scholarships with an expenditure of Rs.101.534 million - the average per capita expenditure being Rs.470.

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29. From the above it appears that efforts have been made over the last twenty years or so to provide educational facilities to the scheduled tribe students. It will be seen that in almost all cases of provision of assistance, it has increased at a rate higher than the corresponding rate in the rest of the scheduled tribes. Under each of the five-year plans specific provisions have been made for the educational development of the scheduled tribes. It may, however, be said that even this provision has not been enough to bring about a rapid educational development of the tribes so that they may catch up with the educational level of the non-tribal population. But the trend indicates that, with more and more funds allocated for the educational development of the tribes, a larger number of scheduled tribe students would come under the ambit of these programmes. While conceding that much more remains to be done and there are great possibilities for further improvement of their educational condition, one can derive satisfaction by the fact that during a small period of about

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20 years ~~hundreds~~ of millions of rupees have been spent and a large number of students have benefitted from the assistance rendered them by the Central and State governments. It is understood that in the years to come, besides the existing schemes, more and newer schemes aimed at rapid educational development of the tribes are going to be launched. These schemes may, it is hoped, narrow down the gap that exists between the educational levels of the non-tribal and tribal population of India.

REPRESENTATION OF THE SCHEDULED TRIBES IN SERVICES

30. Providing financial assistance for the educational development of the tribes is only one aspect of the efforts made for their educational and economic development. The other aspect is to ensure that after getting education the members of these communities are adequately represented in the Central and State government services. To achieve this objective, a certain percentage of posts according to their population are reserved for persons of these communities. If suitable personnel are not available from among these communities the reserved posts are thrown open to persons of non-tribal communities.

31. Each State has fixed its own quota of reserved posts varying from 3 per cent in Mysore to 20 percent in Orissa. But except in Assam and Rajasthan (only in case of class IV employees), everywhere the actual representation of scheduled tribe persons is less than the percentage of reservation prescribed. In Orissa the actual representation is only 2.30 percent against the prescribed reservation of 20 percent. Even in Madhya Pradesh, the State having the largest tribal population in India, the actual representation is only 4.6 percent against the prescribed reservation of 18 percent of class I and II and 20 percent of class III and IV posts. In Bihar and Mysore the prescribed reservation is more than the percentage of scheduled tribe population to total population in the States. In many States the percentage of prescribed reservation is combined for scheduled castes, scheduled tribes and other backward classes.

32. Representation in Central Government Services. The representation of scheduled tribe persons in Central Government services is far from adequate. During the eight/period from 1959 to 1967 their representation has risen only by 0.63 percent, from 1.71 percent in 1959 to 2.34 percent in 1967 against an estimated rise in population by about 26.16 per-

cent. The increase is only in case of class I, III and IV services. In case of class II services the representation has even gone down from 0.47 percent in 1959 to 0.25 percent in 1967. Even in class III and IV services for which their little education, lower qualifying marks and other reservations, make them suitable for the posts, their representation has increased at snail's pace. In class III posts it has shown an increase of 0.40 percent -- an annual increase of 0.05 percent, and in class IV an increase of 0.97 percent -- an annual increase of only 0.12 percent (Table 13).

33. It is really discouraging to note that in spite of all the facilities available and reservations made for their appointments, scheduled tribe candidates are not well represented in the Central Government services. The position is slightly different in State government services. To cite an instance; in Bihar Government services the representation of scheduled tribe employees, as on 1st January 1960, in class I, II, III and IV services was respectively 0.67, 2.36, 6.17 and 11.75 percent. Serious efforts need to be made to improve the representation of scheduled tribe employees in both Central and State government services.

34. Representation in All-India Services. The I.C.S./I.A.S. and I.P./I.P.S. are some of the key services in India. The appointment is made through a competitive examination in which the scheduled tribe candidates are given certain preferences in terms of lower qualifying marks and reservation of certain percentage of posts. But even then their representation in these services is very low. It is commensurate with neither their educational standard nor their population. The annual rise in their representation also does not keep pace with either the rise in their educational standard or with increase in population. During the ten-year period from 1957 to 1967 their representation in I.C.S./I.A.S. has increased only by 1.67 percent, from 0.23 percent in 1957 to 1.90 percent in 1967 -- an annual increase of only 0.167 percent while the annual growth rate of their population is 3.27 percent.

35. In case of I.P./I.P.S., the position is still worse. The annual increase of their representation has only been 0.09 percent -- from 0.69 percent in 1957 to 1.6 percent in 1967 (Table 14). In other All-India Services for which very few scheduled tribe candidates compete, the situation is really discouraging.

36. It thus appears that in spite of different kinds of financial assistance provided to the scheduled tribe students, reservation of seats made for them and all other kinds of

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facilities given, the return is not commensurate with the expenditure incurred. The educated tribesmen have not been able to find suitable employment. They are disadvantaged in two ways. Their population is rising at a rate 42 per cent faster than the growth rate of the general population, but their representation in services is not even keeping pace with the representation of general population what to speak of increasing at a faster rate. It is likely that with rising population and falling percentage of representation the problems of educated unemployment may assume alarming proportions among the scheduled tribes.

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TABLE 1. POPULATION OF SCHEDULED TRIBES IN INDIA

Years	Total Population	Scheduled Tribe population	No. of S.T. covered	Percentage of S.T. population
1872	206,162,360	N.A.		
1881	253,896,330	4,840,378	55	1.91
1891	287,314,671	11,908,732	91	4.14
1901	294,361,056	12,311,536	102	4.18
1911	315,156,396	15,431,015	101	4.90
1921	318,942,480	16,808,502	98	5.27
1931	352,837,778	19,583,073	110	5.55
1941	No census	18,000,000 (estimated)		
1951	356,879,394	22,511,854 (except Andaman Nicobar Dadra, Nagar, Haveli and NEFA)		6.31
1961	439,235,082	29,879,249	(do)	6.80
Percentage growth rate 51-61	23.07	32.73		
Annual Growth Rate	2.30	3.27		

(Source: Census of India)

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TABLE 2. PERCENTAGE OF LITERACY

Year	Total Population	Scheduled Tribe Population
1901	6.2	N.A.
1911	7.0	N.A.
1921	8.3	1.0*
1931	9.1	6.9**
1941	14.6	N.A.
1951	16.6	N.A.
1961	24.0	8.5

*Among 20 selected tribes only
 **Among 30 selected tribes only
 (Source: Census of India)

TABLE 3. SCHOOLS IN TRIBAL AREAS

	II Five Year Plan 1956-57 to 1960-61	III Five Year Plan 1961-62 to 1965-66	1966-67	1967-68	1968-69
Schools opened	2,440	554	29	15	37
Buildings constructed	803	57		20	14
Aids given to schools		952			
Residential schools			3	6	19
Grants given to schools			519		
schools upgraded			36		
Expenditure incurred in million rupees	18.67	7.59	N.A.	N.A.	N.A.

(Source: Department of Social Welfare, Government of India).

TABLE 4. ASHRAM SCHOOLS IN TRIBAL AREAS

Physical targets achieved	II Five Year Plan	III Five Year Plan	1966-67	1967-68	1968-69
Ashram Schools opened	299	155	57	26	40
Sevashrams opened	120				
Buildings constructed		17			
Schools upgraded		15			
Teachers' quarters constructed			20	3	
Attendant's quarters constructed			20		
Total expenditure incurred (in million rupees)	9.92	25.70	N.A.	N.A.	N.A.

(Source: Department of Social Welfare, Government of India)

TABLE 5. ENROLMENT OF SCHEDULED TRIBE STUDENTS

Year	General Education	Professional education	Total*	Percentage of increase in		
				General education	Professional education	Total
1960-61	1,497,082	114,288	1,611,370			
1961-62	1,709,483	146,723	1,856,211	14.19	23.38	15.2

*Figures for 13 States only.

(Source: Report of the Commissioner for Scheduled Castes and Scheduled Tribes, 1963-64, Govt. of India, New Delhi, 1965)

TABLE 6. PRE-METRIC SCHOLARSHIPS TO SCHEDULED TRIBE STUDENTS

II Five Year Plan		III Five year Plan		1966-67	1967-68	1968		
No. of students getting scholarships (in million)	Expenditure incurred (in million rupees)	No.	Expenditure	No.	Expenditure	No.	Expenditure	
0.51	13.97	0.76	33.04	0.51	N.A.	0.61	N.A.	0.76

(Source: Department of Social Welfare, Government of India)

TABLE 7. TUITION AND EXAMINATION FEES TO SCHEDULED TRIBE STUDENTS

II Five Year Plan		III Five Year Plan	
No. of students getting tuition and examination fees (in million)	Expenditure (in million rupees)	No.	Expenditure
0.039	3.31	0.19	15.59

(Tuition and examination fees awarded during 1966-69 have been included under scholarships - Table 6)

(Source: Department of Social Welfare, Government of India)

TABLE 8. BOOKGRANTS AWARDED TO SCHEDULED TRIBE STUDENTS

II Five Year Plan		III Five Year Plan		1966-67	1967-68	1968-69	
No. of students getting book-grants (in million)	Expenditure in million rupees	No. of students	Expenditure in million rupees	No. of students	Expenditure in million rupees	No. of students	Expenditure in million rupees
0.10	1.38	0.11	1.23	0.005	H.A.	0.014	H.A.

(Source: Department of Social Welfare, Government of India)

TABLE 9. MIDDAY MEALS GIVEN TO SCHEDULED TRIBE STUDENTS

II Five Year Plan		III Five Year Plan		1966-67	1967-68	1968-69	
No. of students provided with mid-day meals (in million)	Expenditure in million rupees	No. of students	Expenditure in million rupees	No. of students	Expenditure in million rupees	No. of students	Expenditure in million rupees
0.057	0.55	0.018	0.72	0.30	H.A.	0.45	H.A.

(Source: Deptt. of Social Welfare, Government of India.)

TABLE 10. HOSTELS OPENED IN TRIBAL AREAS

Physical targets achieved	II Five Year Plan	III Five Yr. Plan	1966-67	1967-68	1968-69
Hostels Opened	333	327	79	292	575
Buildings Constructed	429	368			
Boarders	7,684	22,938	5,772	6,324	10,585
Expenditure incurred in million rupees	9.47	13.09	N.A.	N.A.	N.A.

(Source: Department of Social Welfare, Govt. of India)

TABLE 11. GIRL'S HOSTELS OPENED IN TRIBAL AREAS

1966-67		1967-68		1968-69	
No. of Hostels Opened	Expenditure incurred in million rupees	No. of Hostels	Expenditure	No. of hostels	Expenditure
45	0.45	61	0.46	55	0.54

(Source: Deptt. of Social Welfare, Government of India)

TABLE 12. POST MATRIC SCHOLARSHIPS AWARDED TO SCHEDULED TRIBE STUDENTS

Year	No. of Scholarships awarded	Expenditure in million rupees
1948-49	84	0.046
1949-50	186	0.096
1950-51	348	0.185
1951-52	575	0.282
1952-53	1,093	0.522
1953-54	1,587	0.818
1954-55	2,356	1.238
1955-56	2,883	1.305
1956-57	3,482	1.578
1957-58	4,300	1.897
1958-59	4,821	2.076
1959-60	6,112	2.389
1960-61	6,877	3.096
1961-62	8,548	3.678
1962-63	10,249	4.437
1963-64	11,836	5.028
1964-65	13,500	6.063
1965-66	15,925	7.058
1966-67	17,760	8.384
1967-68	21,261	10.634
1968-69	26,616	12.086
1969-70	26,621	13.689
1970-71	29,200	14.950
Total	2,16,220	101.534

(Figures for 1969-70 and 1970-71 are provisional)
 (Source: Deptt. of Social Welfare, Govt. of India)

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TABLE 13. PERCENTAGE OF REPRESENTATION/SCHEDULED TRIBES
IN CENTRAL GOVERNMENT SERVICES

Year*	Class I	Class II	Class III	Class IV**	Total
1959	0.13	0.47	0.79	2.60	1.71
1960	0.21	0.74	0.94	2.93	1.90
1961	0.21	0.67	0.92	3.13	2.02
1962	0.27	0.68	0.98	3.11	2.02
1963	0.23	0.38	0.99	3.14	2.05
1964	0.22	0.31	1.09	3.22	2.15
1965	0.53	0.28	1.11	3.38	2.21
1966	0.52	0.27	1.10	3.41	2.21
1967	0.33	0.25	1.19	3.57	2.31

*As on 1st January of every year

** Excluding sweepers

(Source: A Statistical Handbook of Tribal Welfare
and Development, Department of Social Welfare,
Government of India, New Delhi, 1968).

**TABLE 14. REPRESENTATION OF SCHEDULED TRIBES IN I.C.S./
I.A.S. AND I.P./I.P.S.**

Year*	Total	Scheduled Tribes	
		Number	Percentage
1.	2.	3.	4.
I. C. S. / I. A. S.			
1957	1253	3	0.24
1958	1521	6	0.39
1959	1649	6	0.36
1960	1700	10	0.58
1961	1737	15	0.86
1962	1794	20	1.1
1963	1908	23	1.2
1964	2002	28	1.4
1965	2105	34	1.6
1966	2211	40	1.8
1967	2314	45	1.9
I. P. / I. P. S.			
1957	729	5	0.69
1958	812	5	0.62
1959	904	7	0.77
1960	943	6	0.64
1961	963	5	0.52
1962	1020	6	0.59
1963	1068	11	1.03
1964	1124	16	1.42
1965	1199	17	1.42
1966	1279	18	1.41
1967	1348	22	1.63

*As on 1st January of every year.

(Source: A Statistical Handbook of Tribal Welfare and Development, Department of Social Welfare, Government of India, New Delhi, 1968)

NOTES AND REFERENCES

1. Constitution of India, p.6, Bhartiya Adimjati Sevak Sangh, Delhi, 1950.
2. Ibid., p.8.
3. L.R.N. Srivastava, Education and Modernization among the Munda and Oraon of Ranchi, Ph.D. thesis (unpublished) Patna University, Patna, 1968.

A SUMMARY OF THE PAPER ON
PROVISION OF EDUCATIONAL FACILITIES
AND SERVICES TO SCHEDULED TRIBES
OF INDIA

By

DR L. R. N. SRIVASTAVA

The constitution of India provides that the States shall promote with special care the educational developments of the scheduled tribes. In pursuance of this directive different types of financial assistance are provided by the Central and State government to bring about the educational development of the tribes.

2. These assistance are in the form of pre-matric and post-matric scholarships, hostel grants, book grants, exemption from tuition and examination fees, midday meals and the like.

3. Hundreds of millions of rupees have been spent on these schemes and a large number of tribal students have benefited from these educational facilities.

4. The tribal population has grown at the rate of 3.27 percent per annum during the period 1951 to 1961. But the financial assistance given to tribal students have increased at a much faster rate. In all cases the rise in expenditure and in number of students benefited has been more than the rise in population.

5. But the representation of the scheduled tribes in the Central and State government services has not been commensurate with their population. Their representation in these services has been very meagre, and the annual increase in their representation has not been keeping pace with the rise in their population.

INDIAN CENSUS CENTENARY SEMINAR

October 23-29, 1972

SESSION : **XII DEMOGRAPHIC TRAINING & RESEARCH**

MODERATOR'S STATEMENT

By

C. Chandrasekaran

OFFICE OF THE REGISTRAR GENERAL, INDIA
Ministry of Home Affairs
New Delhi

MODERATOR'S STATEMENT FOR THE SESSION

"DEMOGRAPHIC TRAINING AND RESEARCH"

by

C. Chandrasekaran*

(Senior Advisor on Policy and Planning,
United Nations Fund for Population Activities)

It gives me great pleasure to participate in the Indian Census Centenary Seminar and in particular to act as the Moderator for the Session on "Demographic Training and Research". On this occasion we, as demographers cannot but look back with appreciation and gratitude at the systematic and prodigious efforts that were made at each decennium through the last hundred years for taking a population census of India along modern lines. Each census in India has involved greater efforts than the previous one because of the increasing realisation of the utility of the census for the management of state affairs and the rapid increase in population in the last five decades has also made the task of census-taking increasingly more difficult. The zeal and enthusiasm of the census commissioners of India have well-matched the tasks they had to face and, as you are all well aware, world's acknowledgement of the efficiency of the Indian Census operations was expressed about 18 months ago when the preliminary figures on India's population were released to the public 8 days after the date of the Census.

Having served for over six years as the Director of the Demographic Training and Research Centre, Bombay - now renamed the International Institute for Population Studies - I have a deep and abiding interest in problems related to demographic training and research. The importance of this subject is well-reflected by the fact that it has received attention at several international forums. The World Population Conference held in Belgrade in 1965 devoted a special session for this topic. The United Nations arranged an Inter-regional Workshop on programmes of training in the field of population at Elsinore, Denmark in June 1967. A meeting of the Expert Group on Population Research in National Institutions was also arranged by the United Nations at Lyon, France in June 1971. The General Conference of the Inter-

* The author is serving with the United Nations. The views expressed are personal and do not commit the United Nations in any manner.

national Union for the Scientific Study of Population to be held in Liege next August includes a session on demographic training and research (1) Among the numerous research Committees functioning under the auspices of the Union is one on "The Teaching of Demography and Training in Population" under the Chairmanship of Professor D.V. Glass. The Second Asian Population Conference to be held in Tokyo in a few days will consider the training and research needs in population as related to the ECAFE region. What we are concerned with today is a consideration of demographic training and research as related to our own conditions in India. It is my hope that during this session you will make a critical survey of the training and research facilities in the field of population that exist in the country assess future needs and the developments that are required, and make concrete recommendations for achieving reasonably satisfactory goals. My review of the papers presented to this session and my own analysis of the problems that we are facing, will I hope prompt you to participate freely in the discussion and make this session not only lively but also constructive.

Six papers have been submitted to this session. Three of these papers deal with demographic research; one with demographic training and one is more general in character. I will begin with papers relating to research partly because I feel that research and studies in the field of population should to a large extent be oriented to practical issues as reflected in the demographic conditions of a country; as such an appreciation of the research needs in a given situation not only helps in understanding the nature and volume of the population studies that are required but also indirectly helps in assessing the talents and therefore the trained personnel required for the purpose.

The first paper on research which I will deal with is by Mr. S.P. Jain entitled "A Developmental Strategy for Demographic Research in India". He begins his paper with the truism that in order to develop a strategy, it is necessary to review critically the present status of demographic research in the country. His primary focus on demographic research relates to the processing and analysis of census data. In this perspective he refers appreciatively to the reports of the Indian Census Commissioners which gave some insights into population dynamics and more

particularly to the regular practice of preparing life-tables following each census. He makes specific reference to the estimation of vital rates after the 1951 and 1961 censuses with which he himself was connected, as well as to the extension of the efforts of recent censuses to provide data on fertility. In the 1951 census, the states were given a choice to collect information on children born and surviving or on unemployment. Following the 1961 census an independent fertility survey was carried out in each state by the census organisation. In 1971 questions on age at marriage and on birth which occurred in the twelve months prior to the census to currently married women have been included. Mr. Jain does not offer any comments as to how far the 1951 and 1961 attempts to obtain data on fertility proved successful.

The rest of Mr. Jain's paper is partly a tirade against the organisational efforts made in the country after 1951 to foster demographic research and partly his own suggestions for the steps to be taken for improving the status of demographic research in India. Mr. Jain's criticism on organisation is mainly directed against the set-up of the Demographic Advisory Committee and the Family Planning Communication Action Research Committee which have now been merged as Demographic and Communication Action Research Advisory Committee.

His criticisms against the Committee are (1) that the leadership and membership of the Committee lack talent in demography (2) the Committee's support has been largely oriented towards family planning and (3) the Committee has not succeeded in fixing priority fields for research. Among his suggestions for improving the organizational structure at the top is the creation of a "brain cell" to support the activities of the Demographic and Communication Action Research Committee. The function of this brain cell will be (1) to identify specific topics for analysis from available data which can be entrusted to one or other of the existing demographic research cells (2) to provide advice for persons from other fields who take up research projects supported by the DCAR. . .

large amounts of money spent by the Government in financing the activities of demographic research institutions and centres, he draws attention to the practice of annual funding for the maintenance of most of these centres which militates against developing a long-term programme of research activities by these centres. While advocating reorganisation on the financial side which will permit long-range planning activities by these centres, it is Mr. Jain's view that these centres should not undertake field studies without special sanction which will also provide additional staff facilities. According to Mr. Jain the normal functions of the research centres should only be the analysis of existing data. In his view, each centre should be assigned a special area for demographic research, which as stated earlier, would relate to the analysis of existing data. The studies emanating from such centres should be summarised in an all-India publication.

Mr. Jain refers also to research promoted through two other aegis: (1) institutions which are not primarily engaged in demographic studies but which are well-equipped to carry out field surveys such as State Directorates of Economics and Statistics, Statistical Sections of Health Directorates or private institutions engaged in social welfare work and (2) individual research workers such as those attached to university departments in economics, sociology, anthropology, psychology, etc. Careful selection of institutions with experience in survey work, as well as of university-based persons from other fields who can undertake demographic work will in Mr. Jain's view enrich demographic knowledge as well as analysis of demographic data. Such selection according to Mr. Jain should be a function of the "brain cell" of the Demographic and Communication Action Research Committee whose creation he is advocating.

In the concluding part of his paper, Mr. Jain pleads for the creation of at least one reference library where research workers will be able to consult reports containing basic data produced by censuses, national sample survey and other important surveys, as well as findings of important demographic researches. The creation of one or more libraries being so important a measure, it is necessary in Mr. Jain's view to carefully consider a similar plan put forward by the National Family Planning Institute and take active steps for early realisation of this idea.

The second paper which we will review is by Dr. Talwar and is entitled "Demographic Research in India and its Needs", although the paper focuses attention on research relating to non-medical aspects in the fields of fertility and family planning. For purposes of his discussion, Dr. Talwar divides research activities into the following four categories:

- a. Analysis of Secondary Data
- b. Data Collection and Analysis
- c. Theoretical model building studies, including simulation as well as mathematical models, and
- d. Methodological studies for improving the quality of data.

According to Dr. Talwar demographic research in India is not spread evenly over the four categories and that there is a need for establishing a balance between them by setting up research priorities. In particular he emphasises that much more data are collected than what is being utilised effectively. Raising the question as to why is it that research workers are not interested in analysing secondary data, he answers it by stating that one of the reasons is the non-accessibility of such data to research workers. He suggests, therefore, that agencies should contract out research projects but should maintain close contact to control its quality.

Turning his attention to KAP surveys which have been conducted in large numbers in India, Dr. Talwar is of the view that a large number of them are deficient in many ways and cites smallness of sample size, poor quality, lack of team work and non-comparability of data obtained as some of the failings in these surveys. He also maintains that the surveys, as they are not repeated over time, fail to give trends in the family planning field. Much of the research in this field according to Dr. Talwar is not programme-oriented i.e., are not designed with a view to improve programme operations. Even when the findings of research could be implemented, there is no feed-back to those in charge of family planning programmes.

These considerations lead him to suggest that there should be a strong "research coordinating agency" at the Centre which would be staffed by researchers and programme implementors and which would determine programme priorities, contract out research to outside agencies, maintain

close contact with the progress of research, arrange for technical guidance where necessary and assist in feeding back research findings to improve the programme. Dr. Talwar deals at some length on the co-ordinating agency and states that steps have already been taken by the Government of India - presumably the Ministry of Health and its Department of Family Planning-to reorganise research activities by giving emphasis to "Perspective Planning, Analysis of the Family Planning Performance Statistics and Research Management".

Among the other suggestions made by Dr. Talwar are the following: improvement of library facilities, including the setting up of a Documentation Centre at the NIFP, the establishment of a Data Bank which could be a part of the Documentation Centre, the publication of a monthly or bi-monthly newsletter to spread information on on-going research activities and the introduction of a good demographic journal.

Dr. Talwar also draws attention to the need for strengthening the staffing pattern in the DRC's which are the local centres for carrying out demographic activities. He feels that even in the IIPS and NIFP, the staff provided needs to be augmented.

In the concluding part of his paper, Dr. Talwar lists research priorities. These include Methodological Research in the collection of data, studies on data available through Censuses and National Sample Surveys and a number of specific topics in the field of family planning.

The third paper to be reviewed is by Messrs. H.S. Rhatnagar and T.P. Das entitled Demographic Research: Priorities and Programmes. The paper begins with a description of the recent activities of the Census Organisation and their relationship to demographic research. In particular it draws attention to the basic data made available by the numerous publications of the 1961 Census and those proposed to be issued after the 1971 Census. Reference is also made to the ancillary studies carried out after the census such as the Socio-economic survey of 500 villages conducted after the 1961 census and the programme for a survey of 200 towns dove-tailed with the 1971 census. The programmes of Sample Registration and Model Registration are also referred to, as well as publi-

cation of the 'Indian Population Bulletin' in which the findings of the Census Office and of other organisations are reported. The authors recommend the conversion of the Office of the Registrar-General into a "Bureau of Census and Demographic Research" in order to coordinate the work of demographic institutes and centres and to assist in the conducting of ancillary surveys and research. In addition, it is suggested that a 'training institute' to train workers in the field of vital statistics, census and mechanical tabulation etc. be established in the office of the Registrar-General. Further, in order to promote research within this organisation, it is suggested that the Registrar-General should call for a meeting of the heads of demographic institutes in the country. The topics proposed for research studies include analytical work in various demographic fields, development of estimation techniques where basic data are erroneous or incomplete and study of regional problems. The authors also draw attention to the establishment of the Indian Association for the Study of Population and urges that the Association in collaboration with the Population Council of India arrange periodically, seminars and discussions on demographic subjects.

We now turn our attention to the only contribution made to this session on the training of demographers, by Dr. C.M. Abraham entitled "Organization and Teaching of Demography in the Universities of India". In the first part of the paper the author points out that the population problem is not just a clinical or biological problem; it has social, economic, political, moral, religious, cultural and psychological overtones. Basic changes in motivation, beliefs and values are required to limit the family size. The author, therefore, advocates the introduction of population education in the secondary school which will serve as a background for the practise of family planning when the youngsters become adults. The potential content of population education for the youngsters has been identified.

In the second part of the paper the author has described the present position of teaching of Demography in India. He has given a list of 43 universities that provide one or two optional or compulsory papers in demography or population problems in the curriculum for M.A. degree in Economics, Sociology, Statistics, Geography and Commerce. Kerala University is the only one in India having an academic programme in Demography

leading to the M.Sc. degree.

The author points out that although there has been considerable development in the teaching of demography at the post-graduate levels during the last two decades, yet the progress made in teaching of demography in Indian Universities is not adequate. He points out that most of the universities have introduced courses in demography but they remain in the optional category and are seldom taught. ^{According to him} / the study of complex interrelationships between population growth and other aspects of economic and social change is not given sufficient importance in the existing syllabus. Little attention is given to the teaching of demography at the undergraduate level. No attention has been accorded to demographic and population studies in the curriculum of Science, Engineering and a large part of Commerce and Arts subjects other than Sociology, Economics, and Geography. The author feels that the dearth of qualified and trained persons to teach courses in demography is responsible to some extent for keeping the demography papers optional or restricting the scope to elementary topics only.

One of the papers contributed to this session is by Mr. A.K. Banerji entitled 'Some Considerations concerning the Policy Matters affecting the Growth of Population with reference to the Demand and Supply of Demographers'. This paper is only of peripheral interest to this gathering, as it is largely oriented to ways and means of furthering the family planning efforts made in the country. The suggestion to have a National Demographic Organization with three tiers - at the national level, at the state level and at the regional (or area) level is too naive considering the time and attention already given in this country in establishing a reasonably sound set-up for the popularisation of family planning programmes. The role of demographers in the promotion of social education to foster family planning and the proposal to tie up nutritional programmes along with those of family planning programmes to make the latter more effective - two points made by Mr. Banerji in his paper-deserve careful consideration.

The last paper to be reviewed is by Mr. B.H. Pal entitled 'Research in Population'. A major part of Mr. Pal's paper is devoted towards attempting the impossible task of reviewing demographic developments around the world from the earliest times - for what purpose I cannot discern. The treatment relating to India is partly historical and partly a cataloguing of all aspects relating to demography, from problems in the collection of data to studies in population - resource balance. The paper is replete with advice - the creation of an International Migration Institute, the introduction of continuous population registers, which many of us know have failed to work in India, the improvement of the quality of data and so on. Verily, the author has bitten more than he could chew!

Taking an overall-view of the papers presented to this session the following major problems can be identified.

1. What is the organisation now needed to give a fillip to demographic research?
2. What is the type of demographic research which should be encouraged at the present time?
3. What is the role of the Office of the Registrar-General as the chief producer of demographic data in the country, in the field of demographic research?
4. What are the pre-requisites for establishing sound demographic research activities in the country?
5. What recommendations can be made to improve the training of demographers?

We will now discuss these five questions keeping in the background the views of the authors.

Organisation for Demographic Research: Let us review quickly the set up that now exists for demographic research. The Department of Family Planning under the Ministry of Health has been entrusted with the main responsibility of co-ordinating and funding research related to demography and family planning. The research activities supported by the Department are undertaken in two ways. One is through a vertical set-up extending from the centre to the periphery paralleling the set-up in the administration of family planning programmes. The Demographic Evaluation Cell at the state level holds a key position in this research set-up. The second way in which demographic research is promoted is through the operation of the DCAR Committee referred to earlier which supports Demographic Research Centres and DCAR cells, as well as promotes research in several autonomous institutions. In addition to the support that is given to demographic research through the Department of Family Planning, the Home Ministry through the Registrar-General's office, the Cabinet Secretariat through the National Sample Survey Organisation, the State Bureaus of Economics and Statistics, and the Planning Commission through the Programme Evaluation Organisation are also supporting research in demography and family planning.

I feel that / the time has now come to differentiate research in family planning from other types of demographic research, including research in fertility. Twenty years ago, when India embarked on a national family planning programme, demography was in an infant stage in India and whatever demographic skill was available in the country had to be harnessed for planning, operating and evaluating this programme. Over the years, not only have other interests developed but it has also been realised that the demographic work as related to the family planning programme is not only highly specialised in character, but large enough in volume to be considered an entity by itself. Logically all activities connected with the family planning programme should form part of the responsibility of the Ministry of Health and should be taken up through its Department of Family Planning. Equally, it is logical that all other types of demographic research should develop under the aegis of the office most directly concerned with the inter-relationships of economic, social and population changes. To my mind, the Office of the Registrar-General is the organisation which should be entrusted with the responsibility for developing demographic research in India.

Leaving family planning research aside for a moment, it is our feeling that the Registrar-General's office should discharge their obligations towards demographic research through an autonomous board which will take on the relevant functions of the DCAR Committee. The Chairman and members of this Board will be distinguished scholars - not necessarily demographers - with demonstrated interest in the growth of demography as a science. This Board should have a secretariat composed of persons with research experience in the demographic field. This secretariat will act as the 'brain-trust' to the Board for screening research projects for support. The Secretariat should conduct research on its own, and its members should also be required to give assistance to junior research workers in other organisations.

An attempt should be made to set up at least one Demographic Research Centre in each State. The main responsibility of such a centre would be to study the demography of the State in which it is located. In addition to the State Demographic Research Centres, additional demographic research centres should be established which will specialise in research in one or two demographic topics. The Demographic Research Centres attached to the Institute of Economic Growth or the Indian Statistical Institute will

if they should be put to optimum use. The Census Organisation has a special responsibility in this regard and we shall touch upon this briefly in a latter section. The above comments should not lead you to feel that I do not share the view that priority should be given to the analysis of available data. However the practical and methodological difficulties that arise in their analysis tend to shy away young demographers from this task.

When we come to surveys conducted for obtaining additional basic data there can be no justification for piling up the collected data without analysing them adequately and at the same time embark on additional surveys. Such a criticism applies particularly to surveys conducted by research centres. The analysis of data will reveal methodological deficiencies, in addition to providing substantive findings and both these will assist in the planning and execution of fresh surveys. Having made this remark, I would still urge that decisions to discourage future surveys should be made with caution. There are several aspects in the demographic field where it is necessary to go beyond the study of simple inter-relationships between demographic and economic and social factors, in order to obtain some insights into human behaviour. Surveys of this type have rarely been conducted in India and usually call for expertise in other fields than demography. Even in respect of surveys which would appear hum-drum, it is necessary to ask ourselves whether we have reasonably accurate basic data to be in a position to advise on policies and evaluate programmes. In my view what is to be blamed is not the number of surveys that have been conducted in the country but the absence of an interest in improving the methods for collection of data. This fact, more than the lack of comparability of the design of different surveys is responsible for the poor information provided by these surveys. The introduction of an organisational set up as suggested above will not only give due importance to methodological research but will also assist in enlarging the number of demographic topics on which studies will be made.

Role of the Registrar-General's Office: There would be general agreement that in the last decade or so the Registrar-General's Office has striven hard to improve the quality of demographic data available in the country. The efforts made to obtain estimates of vital rates through the Sample Registration and Model Registration schemes are particularly of inte-

rest as they have the potentialities for providing reasonably accurate data in a sadly neglected field. I am not certain if the initial enthusiasm for research and investigation which prevailed when these schemes were launched still persists. There is need to keep such enthusiasm going as prima-facie there is evidence that the accuracy of the vital statistics data obtained from these sources require further improvement.

As the decennial census is the main source of demographic data in the country and the responsibility for undertaking the census lies with the office of the Registrar-General, the office should spare no pains to improve the quality of data obtained in the censuses. Unless I am not properly informed, I feel that the census organisation has done little in between the censuses to undertake investigations on concepts and definitions of items to be included in the census schedule and on the field procedures to be applied in order that the data obtained in the censuses would be of most value to the users of census data. The census organisation should explore the most useful ways of collecting data on internal migration, economically active population and fertility - to mention only three topics of interest - in conjunction with scholars in this field and taking into account the practical problems of data collection. The energies of the Central as well as State Census organizations should be directed more and more towards these ends.

At least one paper presented to this session deals with ancillary studies conducted by the census organisation in the form of village or town surveys. These studies have to be undertaken, in my view, in collaboration with agencies such as demographic centres or universities which can bear to bring the adequate amount of expertise in the prosecution of such projects.

One of the services which the Registrar-General can perform is to augment his present efforts to facilitate provision of data obtained in censuses to research workers for analysis. It is not unlikely that there are some provisions for secrecy with respect to information obtained in censuses. In some countries, data in the aggregate can be released freely,

as the main restriction is to the divulging of the identity of the person to whom specific data reveals. It has to be clearly understood that scholars will be willing to make more and more use of census data, only if they can earn credit for the analytical work which they carry out. In this regard, the Registrar-General should explore ways and means by which basic data can be made freely available and scholars analysing the data will have the latitude to interpret the data and publish the findings under their authorship. If scholars get more and more busy analysing existing data, the tendency to seek fresh data from the field will correspondingly diminish.

Pre-requisites for establishing sound demographic research activities:

It is impossible for me to deal with this subject at any length and my main object in raising it is to throw it open for an objective and detailed discussion at this meeting. Earlier I have outlined an organizational set up which I feel would be conducive to the promotion of demographic research relating to geographical areas of the dimensions of a State as well as to specific topics considered important in the demographic field. In view of the growing volume of literature in demography and allied fields, I fully share the views expressed in some of the contributions to this meeting that adequate library facilities should be made available to research workers. A proper atmosphere conducive to the promotion of demographic research will be created if the newly created Indian Population Association will hold annual meetings along the lines of the Population Association of America.

An imperative need in promoting demographic research is the availability of persons with experience in research work. It is indeed unfortunate that the large majority of persons who received formal training in demography and were sent abroad for higher studies have failed to return and are working outside India. Although this problem of so-called 'brain-drain' is not special to the field of demography, its effect is more acute in this field because of the paucity of well-trained Indian demographers. A concerted effort has to be made to induce a large number of them to take up positions within the country. My discussions with a number of persons working abroad have shown that many will return if they are given working environments and salary levels consistent with their training. Provision

of positions of responsibility and relatively long tenures of office should serve as added inducements. In view of the long number of years required to produce qualified demographers, I would urge those in influential positions to exert their influence in getting back to India most of the Indian demographers now working outside the country.

Training of Demographers: Turning now briefly to problems in the training of demographers, it will be recalled that the establishment of the Demographic Training and Research Centre at Chenbur, Bombay in 1956 was the major step taken for the provision of systematic training in demography in India. Born out of an agreement between the Government of India and the United Nations and the cooperation of the Sir Dorabji Tata Trust, the Centre which is now called the International Institute for Population Studies, has certain built-in features which may not be wholly advantageous for development of high-grade training in demography. The Centre is not an integral part of a university set-up and, therefore, lacks an academic atmosphere, and needless to say the support and cooperation of specialists from other disciplines which would otherwise have been possible. To make up this deficiency in the early stages of the centre's development, special efforts were made to establish cooperative working arrangements with the Departments of Economics and Sociology of the Bombay University, the Indian Cancer Research Centre in Bombay and some other organisations. I am given to understand that such arrangements have progressively been curtailed. Another point to note is that the Centre serves the interests of the ECAFE Region and trainees from different countries in the region take advantage of its facilities through fellowships offered by the United Nations. In principle, it is wholesome to have trainees from different countries studying together, and this is particularly so in the case of demography where experiences in different parts of the world have to be compared and discussed. However, it is well-recognised that students from other countries who come to the Bombay Centre are not always academically oriented as many of them come from different parts of the national governments, and indeed it is difficult for any centre to rise to high levels of excellence in their training programmes, if it has to deal with students of heterogeneous calibre. Looking into the Centre's

technical strength, it is a matter of regret that it has not been able to attract on its staff larger number of Indians who have taken their Phd. degrees abroad. It is to be hoped that efforts in this direction will soon be made and will prove fruitful.

Among the universities in India, Kerala University, as is well-recognised, is the only one which has a full-fledged course in Demography leading to a post-graduate degree. This development is due to the far-sightedness of Dr. K.C.K.E. Raja, who had a broad approach to study of demography and recognised the multi-disciplinary aspects of population studies, including the biological and genetic. If a student is to be exposed to these multi-disciplinary aspects, the University is the right place to impart such training. Even within the University setting, the training can be done successfully only if the departments in related fields such as economics, sociology, statistics, biology, psychology etc. are sufficiently enlightened to cooperate in this undertaking. To start a department of demography which will be self-contained with respect to all these disciplines will be extremely expensive and will cut into the essential provision that has to be made with respect to the teaching of demography proper. As such, it will be prudent to select carefully a few universities where post-graduate teaching of demography can be started and in the light of the experience gained extend such teaching to other universities. However, there is no objection for including the teaching of demography at the under-graduate level in several universities, even recognising that the emphasis given to various demographic aspects will vary with the universities. It is high time that the University Grants Commission and the Indian Council of Social Science Research focus their attention to ways and means of extending facilities for demographic training in India. Such extension will automatically assist in curbing the tendency of Indian students to go abroad for advanced training in demography and indirectly help in counter-acting the 'brain-drain' to which I have already made reference.

To conclude the tone of the papers submitted to this session and some of my own remarks might give the impression of being critical of

demographic developments which have taken place in this country. I would, therefore, like to voice before you of my personal feeling that we in India, have made great strides in the field of demography in the last two decades and that the contributions of Indian demographers both at home and abroad have been of a standard to win international recognition. Very few issues of foreign journals relating to population studies, for instance, do not now carry at least one contribution from an Indian worker. However, we cannot afford to be complacent and must look forward to taking steps for fostering demography as a science. Indian demographers should band themselves together and develop the esprit-de-corps necessary for attaining high standards of performance. The recently created Indian Population Association provides a forum for this purpose and this Census Centenary Seminar has helped to bring together a large number of Indian demographers from different parts of the world. Let this be an opportunity for laying sound foundations for the growth of demographic science in India of which not only the present generation but those to come can rightly be proud of.

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Organisation and Teaching of Demography in the
Universities of India

By

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ORGANIZATION AND TEACHING OF DEMOGRAPHY IN THE
UNIVERSITIES IN INDIA

Dr. C. M. Abraham.*

1. Since Thomas R. Malthus's famous essay on 'The Principles of Population' (1798), the importance of the population issue has been alternately ignored and widely debated. But at the present time the claim of the Father of Demography as the prophet of doom, has been widely recognised and those who are concerned with the future of mankind all over the world consider no other problem, except the threat of the nuclear warfare, as more grave in the long run than that of the population explosion. The unprecedented and alarming growth of population and its tremendous ramifications are today's concern not only for the developing countries, but also for the developed ones. The seriousness of this pressing issue and the need to solve this delicate and complex problem by a rational, humane and moral approach, has been stressed the world over.

2. The population problem is not just a clinical or a biological problem; it is at once a social, economic, political, moral, religious, cultural and psychological. Attitudes, motivation, beliefs, values, preferences and local cultural patterns are at the back of this hypersensitive issue. John Lewis, Dean of Princeton University's Woodrow Wilson School of Public and International Affairs, who spent more than four years as U.S. Aid Mission Director in India, writing for the Population Reference Bulletin, said, whatever we had learned so far about the motivation of Indian families 'confirm the common impression that the average Indian couple wants at least two surviving sons'. He continued, 'since daughters were approximately as numerous as sons it was evident that the large family tradition would keep India's birth rate high unless there was a basic change in motivation'.

3. Educational measures are useful in supporting several demogenic policy goals, including creation of socio-psychological support for limiting the family size by accepting contraception and above all developing a realistic sense of urgency over the population problem. It must also be used to generate the motivational force for creating the right attitude to accept the small family norm. Dr. V.K.R.V. Rao, in his inaugural speech to the National Seminar on Population Education (August 2, 1969) in New Delhi, pointed

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out that family planning and reduction of the birth rate is not a 'once-for-all' affair, nor is it concerned only with the currently fertile population that is capable of adding to the country's numbers. Even as eternal vigilance is the price we have to pay for liberty, similarly, family planning education and programmes have to be on a continuous basis, as each batch of new entrants into the fertile age group has to be injected with the desire for and knowledge of family planning. It is here that population education becomes relevant as a motivational instrument that will inject these new entrants with the desire to adopt family planning as a way of life.

4. Population education is not sex education or education in contraceptive techniques. It is simply the instruction of the dynamics of demography (population dynamics) to the students, who are the potential parents of tomorrow, so that they should already be in possession of the knowledge of how population grows and how the population variables affect the social and economic order and in its turn the development and progress of a country. They are also made to understand the advantages of a small family from both the personal as well as the national viewpoint. Once the younger generation realize their responsibility towards themselves and to the nation, they would be able to see family planning as a secular matter based on rationality and not on hoary traditions, taboos and dogmas. Dr.P.B. Gajendragadkar, the Vice-Chancellor of the Bombay University, in his inaugural address to the Seminar on Population Education, held in Bombay on 7th March, 1969, mentioned, "In my view no subject today is as important for the future of democracy of this country as population education . . . this work will pay dividends in due course, because the boys and girls who are in your schools today will go to college tomorrow, and when they go out of the Universities, they have to settle down and make their own decisions."

5. The Education Commission of India (1964 - 65) begins its report thus: "The destiny of India is now being shaped in her class rooms. This we believe is no more rhetoric. In a world based on science and technology, it is education that determines the level of prosperity, welfare and security of the people. On the quality and number of people coming out of our schools and colleges will depend our success in the great enterprise of national reconstruction whose principal objective is to raise the standard of our people." Today in India, about 47 per cent of the population consists of children below the age of 16. The education of this age group is therefore of crucial importance to the country as these youngsters

will be the citizens of tomorrow who would be shaping the future of this greatest democracy in the world. Education of these youngsters would help in fostering a scientific and rational approach to all problems, particularly the problem of population control and thus make the family planning programme more effective and purposeful.

6. It is heartening to notice that in recent years much attention has been focused on the desirability of introducing population education at all levels of education starting from the secondary to the university level. Two seminars and one workshop had already been conducted in 1969, focussing on this subject. The first seminar on population education for the young generation was held in Bombay on 7th & 8th of March, 1969. This was organized by the Family Planning Association of India and attended by school teachers. The second national seminar on population education was also held in Bombay on 2nd and 3rd of August, 1969 to understand the various implications of the problem. The Ministry of Education and Youth Services and the Ministry of Health and Family Planning in consultation with experts and social workers in the field drew up a tentative programme of action. The seminar was organized by the National Council of Educational Research and Training, New Delhi. The Third Workshop was held in New Delhi from December 1st to 6th, 1969, to work out a tentative syllabus and programme for the introduction of Health & Population Education at all levels of education.

7. PRESENT POSITION OF TEACHING OF DEMOGRAPHY IN INDIAN UNIVERSITIES.

Demography, as a fully developed science, remains in its infancy. It has not yet acquired the status of a distinct discipline in India. At present, Kerala University is the only in India, having an academic programme in Demography leading to M.Sc. Degree, but this programme is not organised by an independent Department of Demography. It is run by the Department of Statistics. In other universities whatever teaching in Demography is provided is given within the frame work of other disciplines such as Sociology, Economics, statistics, Geography and Commerce. The details of the courses provided in the above mentioned disciplines are given in the chart attached with this paper and the summary is given below:-

COURSES IN DEMOGRAPHY PRESCRIBED IN UNIVERSITIES AS
CCMPULSORY OR OPTIONAL PAPER -
SUBJECT WISE.

Sl. No.	Subject	Number of Universities where Demography prescribed as Compulsory Paper.	Name of Universities where Demography is prescribed as compulsory paper.	Number of Universities where Demography is prescribed as optional.	Name of Universities where Demography is prescribed as optional paper.
1.	Sociology	1	Indore	14	Agra, Banaras, Bhopal, Bombay, Gorakhpur, Jiwaji, Lucknow, Meerut, Nagpur, Ujjain, Poona, Punjab & Kannu
2.	Economics	Nil	-	33	Agra, Aligarh, Allahabad, A.P. Singh, Baroda, Bhopal, Bombay, Calcutta, Gauhati, Gorakhpur, Gujarat, Indor, Jabalpur, Lucknow, Marathwad, Poona, Punjab, Rajasthan, Sangar, Shivaji, South Gujarat, Sardar Patel, SMDT. Sri Venkateswara, S.V. Vidyareeth, Udaipur, Ujjain, Utkal, Osmania, Banaras & Kanpur.
3.	Statistics	2	Poona & Gauhati	15	Agra, Allahabad, Andhra, Annamalai, Banaras, Baroda, Calcutta, Delhi, Madras, Punjab, Rajasthan, Shivaji, Saurashtra, South Gujarat, Karnatak.
4.	Geography	Nil	-	6	Aligarh, Allahabad, Banaras, Madras, Marathwada, Punjab.
5.	Commerce (M.Com)	Nil	-	3	Bombay, Gujarat & South Gujarat

Jiwaji,
Jodhpur,

- 1 0 -

UNIVERSITIES OFFERING COURSES IN DEMOGRAPHY AS OPTIONAL
OR COMPULSORY.

Sl. No.	Name of University.	Optional					Compulsory				
		Sociology	Economics	Statistics	Geography	Commerce	Sociology	Economics	Statistics	Geography	Commerce
1.	Agra	1	1	1							
2.	Aligarh		1		1						
3.	Allahabad		1	1	1						
4.	Andhra			1							
5.	Annamali	1*		1							
6.	A.P. Singh	1	1								
7.	Banaras	4	2	1	1						
8.	Bangalore	1+									
9.	Baroda		2	1							
10.	Bhopal	1	1								
11.	Bombay	1	2			1					
12.	Calcutta		1	1							
13.	Delhi			1							
14.	Gauhati		1					1			
15.	Gorakhpur	1	1					1			
16.	Gujarat		1			1					
17.	Indore		1				1				
18.	Jabalpur		1								
19.	Jiwaji	1	1								
20.	Jodhpur		1								
21.	Kanpur	1	1								
22.	Karnatak			1							
23.	Lucknow	1	1								
24.	Madras			1	1						
25.	Marathwada		1		1						
26.	Meerut	1									
27.	Nagpur	1									
28.	Poona	1	1					1			
29.	Punjab	1			1						
30.	Punjabi		1	1							
31.	Rajasthan		1	1							
32.	Saugar		1								
33.	Shivaji		1	1							
34.	Saurashtra			1							
35.	South Gujarat		1	1							
36.	Sardar Patel		1			1					
37.	S.N.D.T. Bombay		1								
38.	Sri Venkateswara		2								
39.	S.V. Vidyapeeth		1								
40.	Udaipur		1								
41.	Ujjain	1	1								
42.	Utkal		1								
43.	Osmania		1								
44.	Kerala									M.Sc. in Demogra- phy.	

* M.A. Sociology closed down.

+ will come into force from next year.

8. Since the advent of independence, the planners, administrators and policy makers of free India felt the need for understanding the problem of population explosion scientifically and they also stressed the need to catch the students in the schools and colleges while they are young and make them realize their responsibility in shaping the future of our nation. Hence, there has been considerable development in the teaching of demography at the post-graduate level, during the last two decades. But considering the urgency of the situation, the progress made in the teaching of courses in Demography in Indian Universities is not adequate. Some Universities have just introduced courses in Demography but they remain in the optional category, but not taught. Few students opt for Demography paper because of the fact that a lot of statistics is involved in it. Added to this there is no paper on Demography at the undergraduate level and hence the students are reluctant to take up a new paper in which they have no background at all. Moreover, the dearth of qualified and well trained persons to teach this course, is also responsible for keeping the paper as an optional paper or just incorporating the elementary topics in one of the papers.

9. At the undergraduate level some elementary topics in Demography have been incorporated in Sociology, Economics, Geography, Statistics and Commerce. But the gravity of the population problem vis-a-vis with social and economic development of the country, the social and cultural factors affecting the demographic variables and the demographic variables affecting the social order etc. are not given sufficient importance in the existing syllabus. Moreover, the students of science, engineering, a large part of Commerce and Arts other than Sociology, economics and geography are not at all exposed even to the elements of Demography.

10. TEACHING OF POPULATION DYNAMICS AND FAMILY PLANNING IN THE CURRICULUM OF UNDERGRADUATE MEDICAL EDUCATION.

Studies conducted by Anand, Bali, Malhotra and others at the Lady Hardinge Medical College revealed that the medical colleges have been slow in their integration of family planning as a subject for introduction in the undergraduate curriculum. Sixty one medical colleges devoted 0 to 13 hours (average 6) to lectures on family planning.¹ Rice also made a survey in 1966 which showed that the medical colleges in India are assigning five to six times as many hours to the lectures discussion and demonstration on population dynamics, family planning programmes, conception control techniques and related social, cultural, educational

and motivational aspects as compared to an average medical school in the West. Lecture discussion time devoted to these subjects in 48 medical colleges from which information was obtained averages 10.5 hours during the 5 plus years of medical education. About 60% of the time was allotted by the Department of Social and Preventive Medicine and 40% by the Department of Obstetrics and Gynecology.²

11. WHO TEACHES COURSES IN DEMOGRAPHY AT THE UNIVERSITIES.

No university in India is having a separate Department of Demography. The post of Reader in Demography has been created in the Department of Statistics of the Kerala University and Economics and Sociology Departments in the University of Bombay. In other universities, teachers belonging to the Departments which organize courses in Demography teach the paper on Demography.

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2. Ibid. p.179.

UNIVERSITIES IN INDIA OFFERING COURSES IN DEMOGRAPHY OR POPULATION PROBLEMS. (1970-71)

Sl. No.	Name of the University.	Degree for which a paper is prescribed, as a compulsory or optional or it forms part of a paper			Title of the Paper	Remarks
1	2	3	4	Forms part of a paper	6	7
1.	Agra		M.A.Sociology		Population problems & Public Health. Demography.	
			M.A.Economics	M.A.Geogra-phy.	Population Geography forms a part of the paper Human Geogra-phy.	
			M.Stat. M.Sc.Statistics.		Demography. Vital Statistics & Population Studies.	
2.	Aligarh		M.A.Economics		Demography.	
			M.A.Geography	B.Sc.Sta-tistics.	Population Geography Vital Statistics forms part of a paper.	
3.	Allahabad		M.A.Economics		Population problems.	
			M.A.Geography		Geography of Popu-lation & Settlement. Demography.	
			M.A./M.Sc. Statistics			
4.	Andhra		M.Sc.Statistics.		Demography.	
				M.A.Econo-mics.	Population problems forms part of a paper.	
				M.A.Socio-logy.	Population forms part of a paper.	

2	3	4	5	6	7
. Annamali		M.A.Sociology		Population problems with special reference to India. Population forms part of a paper. Demography & Population Studies.	No M.A.Course in Sociology at present.
		M.Sc.Statistics.	M.A.Economics.		
. Avadesh P. Singh University, Rewa.		M.A.Sociology M.A.Economics		Social Demography. Demography.	
. Banaras		M.A.Sociology		<u>Two Optional Groups of four papers:</u> 1.Social Demography 2.Indian Population Problems. 3.Theories of Population. 4.Demographic problems in Developing & Developed Countries - A comparative study. <u>One Optional Group of Two Papers:</u> 1.Economics of Population. 2.Indian Population Problems. Population and Settlement Geography. Demography & Actuarial Statistics.	Semester System.
		M.A.Economics			
		M.A.Geography			
		M.Sc.Statistics			

2	3	4	5	6	7
B. Bangalore	M.A. Sociology		Social Demography (For Part II U.A.)	Included in the <u>revised</u> <u>syllabus.</u>	
D. Baroda		B.A. Economics.	Problems relating to population forms part of the paper V. Indian Economic Problems.	(Compulsory)	
		B.A. Sociology.	Population & Parti- tion - Part of paper IV. Indian Society.	(Compulsory)	
		M.A. Economics.	Population Change & Capital formation in Paper V. Economic Development & Plann- ing.	(Compulsory)	
	M.A. Economics		<u>Two Optional Papers:</u> 1. Economic Demography 2. Demographic Ana- lysis.	included in the <u>revised</u> <u>syllabus.</u>	
	M.Sc. Statistics.		Demography.		
		B.Sc. Statistics.	Vital Statistics forms part of P.IV.		
		M.Sc. Geography.	Population Geography & Settlement forms part of Paper.IV. Human Geography.	(Compulsory)	
		M.A. Geography.	Population Geography & Settlement forms part of Paper.III. Human Geography.	(Compulsory)	

1	2	3	4	5	6	7
10. Bhagalpur				M.Sc. Statistics.	Vital Statistics forms part of a paper.	
11. Bhopal		M.A. Sociology			Demography & Population Problems.	
		M.A. Economics		M.A. Geography.	Population problems. Population Geography. (Compulsory) forms a part of the paper Human Geography.	
12. Bihar				M.A. Geography.	Population Geography forms part of the paper Human Geography.	
13. Bombay				M.A. Sociology.	Demography - forms part (C) of the Paper II. Social Biology. Paper. III. Social Demography or Urban Sociology.	(Compulsory)
		M.A. Sociology			<u>Two Optional papers:</u>	
	M.A. Economics.				1. Economic Demography	
					2. Demographic Analysis.	
	M. Com.			M.Sc. Statistics.	Vital Statistics - forms part of a paper Demography.	Bombay University has recently formulated schemes for undertaking research in some aspects

1	2	3	4	5	6	7
13. Bombay (Continued)				M.A. Geo- graphy.	Population Geography as part of Human Geography paper.	of popula- tion growth on an inter- disciplinary basis.
14. Calcutta		M.A. Econo- mics. M.Sc. Sta- tistics.			Vital Statistics.	
				M.A. Geo- graphy.	Population Statis- tics - includes a project dealing with differential ferti- lity, mortality, migration, occupa- tional mobility and population growth of each of the Sta- tes in India. Population Geogra- phy forms part of the Human, Econo- mics and Plant Geography (Compul- sory).	
15. Delhi				M.A. Socio- logy.	Population forms part of the paper Marriage and Urba- nization.	(Optional)

1	2	3	4	5	6	7
15.	Delhi (Continued)	M.Sc.Sta- tistics.	M.A.Econo- mics.	(1) Trends in Popu- lation - a topic in Paper V. Selected Problems of Econo- mic History, Part.B. (Indian Economic History, 1860-1947). (2) The Principle of Population in Malthus & Ricardo forms part of the paper - cla- ssical and political economy. Vital Statistics & Demography.	(Compulsory)	
			B.A.(Hons.)	Trends in population in the first half of the 20th Century (forms part of paper VII - Indian Economic Problems - Compulsory).		(Optional)
			B.A.(Pass)	Growth & Density of Population - forms part of the Paper III. Problems of the (Com- pulsory) Indian Econo- my. Vital Statistics & Demography.		
16.	Gauhati	M.Sc.Sta- tistics.	M.A.Economics	M.A.Geo- graphy.	Population problems. Population Geography- forms part of the pa- per Human, Economic & Plant Geography. Demography.	(Compulsory)

1	2	3	4	5	6	7
17.	Gorakhpur		M.A.Sociology M.A.Economics		Social Demography Population Problems.	
18.	Gujarat		M.A.Economics M.Com		Demography & Vital Statistics. Demography.	
19.	Indore	M.A.Socio- logy.		B.A.Socio- logy. M.A.Economics M.Sc.Sta- tistics.	Demography & Popu- lation Problems. Population & So- ciety - forms Sec- tion 4 of B.A.Part II. Paper.II. Elements of Sociology Social Structure and Dynamics. Population Problems. Vital Statistics - forms a part of one paper.	(Compulsory)
20.	Jabalpur		M.A.Economics	M.A.Geo- graphy.	Demography & Vital Statistics. Population Geogra- phy - forms part of the paper Human Geography.	(Compulsory)
21.	Jadhavapur			M.A.Applied Economics. M.Sc.Sta- tistics.	Population problems- part of a paper. Vital Statistics - part of a paper.	(Optional) (Optional)

1	2	3	4	5	6	7
22.	Jammu			M.A.Economics.	Population Problems - (Optional) part of a paper.	
23.	Jiwaji		M.A.Sociology M.A.Economics	M.A.Geography.	Demography & Population Problems. Population Problems. Population Geography - part of Human Geography.	(Compulsory)
24.	Jodhpur		M.A.Economics	M.A.Sociology. M.A.Statistics. M.A.Geography.	Population Problems. Population Problems - part of a paper. Vital Statistics - part of a paper. Population Geography - part of the paper Anthropogeography.	(Optional) (Compulsory)
25.	Kanpur		M.A.Sociology M.A.Economics	M.A.Geography.	Population Problems & Public Health. Demography. Population Geography - part of Human Geography.	
26.	Karnatak			M.A.Sociology. M.A.Geography. M.Sc.Statistics.	Population - forms part of a paper. Population Geography - forms part of the paper Human Geography. Geography.	(Compulsory)

1	2	3	4	5	6	7
27.	Kashmir			M.A.Economics.	Population Problems - part of a paper.	(Optional)
28.	Kerala	M.Sc.Degree in Demography.			<u>Six papers, Thesis & Viva:</u> I. Population Problems. II. Techniques of Demographic Analysis. III.(a) Introduction to Sociology. (b) Elements of Social Psychology. (c) Economics. (d) Human Genetics. (e) Physiology of Human Reproduction & Family Planning. IV. Stochastic Process & Population Models. V. Statistics. VI. Research Methods.	

1	2	3	4	5	6	7
28.	Kerala (Continued)					<p>REMARKS: M.Sc. Degree in Demography - the first of its kind in India - was started in the year 1963 in the Department of Statistics, Kerala University. Those holding M.A/M.Sc. degree in Mathematics, Statistics, Economics, Sociology, Psychology or related fields are considered eligible for admission to this course. Admissions vary from 4 to 6 in a year.</p> <p>Those who pass this course are also finding difficulty in getting employment.</p> <p>Kerala University is the only University which has approved a Ph.D. programme in Demography.</p> <p>B.A.Economics. Indian Population- (Compulsory) forms part of a paper.</p> <p>B.Sc.Statistics. Vital Statistics - (Compulsory) part of a paper.</p> <p>M.Sc.Statistics. Vital Statistics & (Compulsory) Population Projection as part of a paper.</p>
29.	Kurushetra					<p>M.A.Economics. Population Problems - part of a paper. (Compulsory)</p>

1	2	3	4	5	6	7
30.	Lucknow	M.A.Sociology M.A.Economics	M.Sc.Sta- tistics.	Social Demography. Demography. <u>REMARKS:</u> Population Course for M.A. in Economics was first introduced in the for- ties, but was discontinued after a few years. It has been reintroduced about 8 years back (1962). Vital Statistics- (Compulsory) forms part of the paper Statistical Methods.		
31.	Madras	M.A.Geography	M.A.Social Sciences.	Section IV of pa- (Compulsory) per I. Advanced Sociology - The Ecological & Demo- graphic substructure of Human relation- ship. Also in Paper.VI. (Compulsory) Social Statisti- cs - A section dealing with Stan- dardized Demogra- phic Rates, Morta- lity tables, Growth Curves & Population Projection. Population Geogra- phy.		

1	2	3	4	5	6	7
31.	Madras (Continued).			Diploma in Geography. M.T.C.P.	Population paper part of Human Geography. So- cial & Cultural causes of Popu- lation growth, Birth control - in paper Urban & Rural Socio- logy.	(Compulsory)
					Introduction to Demography - in paper Statistics & Demography.	(Compulsory)
		M.Sc.Sta- tistics.			Demography.	(Not taught)
				B.Sc.Sta- tistics.	Vital statistics forms part of the paper Statistics. V.	(Compulsory)
32.	Magadh			M.A.Geo- graphy.	Population Geogra- phy forms a part of the paper Hu- man Geography.	
33.	Marathwada			M.A.Economics	Population Prob- lems.	
				M.A.Geography	Geography of Popu- lation & Settle- ment.	

1	2	3	4	5	6	7
34.	Meerut	M.A.Sociology			Social Demography.	
35.	Mysore		M.Sc.Sta- tistics.		Vital Statistics forms part of a paper.	
36.	Nagpur	M.A.Sociology		M.A.Econo- mics.	Population Prob- lems. Population Prob- lems - forms part of the paper 'Economic Problems and Planning in India' for M.A. Part II students. REMARKS: In the revised syllabus which will come into force from 1971-72 academic year, includes a paper on Demography as an optional paper.	
37.	North Bengal		M.A.Geo- graphy.		Population Geo- graphy - forms part of the pa- per Human Geo- graphy.	
38.	Patna		M.A.Econo- mics.		Population - forms part of the paper Indian Economic Problems.	

1	2	3	4	5	6	7
38.	Patna (Continued)			M.A. Geo- graphy.	Population Geo- graphy - part of the paper Human Geogra- phy.	
				M.Sc. Sta- tistics.	Actuarial & Vi- tal Statistics- form part of the paper Sta- tistical Meth- ods.	
39.	Poona	M.Sc. Sta- tistics.			Demography.	
			M.A. Economics		Population Prob- lems.	
			M.A. Sociology		Social Demo- graphy.	
40.	Punjab		M.A. Sociology		Social Demogra- phy.	
			M.A. Geography		Population Geo- graphy.	
41.	Punjabi		M.A. Economics		Demography or Population Prob- lems.	
			M.Sc. Sta- tistics.		Population Sta- tistics.	
				B.A. Socio- logy.	Population & Society - part of a paper.	
				B.A. Econo- mics.	Population Prob- lems-part of a paper.	

1	2	3	4	5	6	7
2.	Rajasthan			M.A.Socio- logy.	Nature of Urban (Optional) Population & Vital Statis- tics - part of the paper Ur- ban Sociology.	
				B.A.Socio- logy.) Topics on Popu- lation form parts of paper.	
				B.A.Econo- mics.		
				B.A.Geo- graphy.		
				B.Sc.Sta- tistics.		
		M.A.Economics M.Sc.Statis- tics.			Demography. Demography: Substantive & Technical.	
				M.A.Geo- graphy.	Population Geo- (Compulsory) graphy - as pa- rt of the paper Human Geography.	
3.	Ranchi			M.A.Econo- mics.	Population Prob- lems - part of a paper.	
				M.A.Geo- graphy.	Population Geo- graphy - part of the paper Human Geography.	

1	2	3	4	5	6	7
44.	Saugar	M.A.Economics	M.A.Geo- graphy.	Demography. Population Geo- graphy - forms part of Human Geography.		
45.	Shivaji	M.A.Economics M.Sc.Statis- tics.	B.A.Econo- mics.	Demography. Demography. Population - as part of a paper.	(Compulsory)	
46.	Saurashtra	M.Sc.Statis- tics.		Demography.		
47.	South Gujarat.	M.A.Economics M.Com M.Sc.Statis- tics.		Population Prob- lems. Population Prob- lems. Demography.		
48.	Sardar Patel	M.A.Economics	B.A.Econo- mics.	Population Prob- lems. Population of India - part of a paper.	(Compulsory)	

1	2	3	4	5	6	7
49.	S.N.D.T.(Bombay)		M.A.Socio-logy.	Population prob- (Compulsory)		
				lems - forms		
				part of the pa-		
				per II. Indian		
				Social Problems.		
				Demography:Sex (Compulsory)		
				& Age distri-		
				bution, birth		
				and death ra-		
				tes, quantita-		
				tive & quali-		
				tative prob-		
				lems of popu-		
				lation - form		
				section.IV. of		
				Paper.VI.Social		
				Biology.		
				Demography.		
			M.A.Economics	B.A.Econo-	Problems rela- (Compulsory)	
				mics.	ting to Popula-	
					tion - part of	
					the Paper.III.	
					Indian Econo-	
					mics.	
				B.A.Geo-	Growth and dis-	
				graphy.	tribution of	
					Population -	
					part of the pa-	
					per IV. Princi-	
					ples of Human	
					Geography.	

1	2	3	4	5	6	7
50.	Sri Venkateswara University: Tirupati.		M.A.Economics		Two papers in the revised syllabus which will come into force from 1971-72 academic session.	1.Principles of Demography. 2.Indian Population problems.
51.	S.V.Vidyapeeth		M.A.Economics		Population Problems.	
52.	Udaipur		M.A.Economics	M.A.Geography.	Demography.	(Not teaching). Population Geography - forms part of Human Geography.
53.	Ujjain		M.A.Sociology M.A.Economics	M.A.Geography.	Population Problems. Population Problems. Growth & Distribution of Population - as part of the paper Human Geography.	

1	2	3	4	5	6	7
54.	Utkal	M.A.Economics	M.A.Socio- logy.	Demography. One section deals with social Demo- graphy - Pa- per entitled "Fundamentals of Sociology & social Anthro- pology".	(Compulsory)	
55.	Osmania	M.A.Economics		Demography.		

INSTITUTES OFFERING COURSES IN DEMOGRAPHY.

1. Indian statistical Institute,
Calcutta.

Started in 1932.
Introduced training in demography to students taking the Three-Year Statistics Examination. In the Third Year there is provision for taking an optional paper entitled "Population Studies and Vital Statistics", if the student wants. Demography is also one of the optional papers for the Diploma Examination in Statistics meant for Officers. The Institute holds a one year Diploma Course in Demography open for those who have M.A./M.Sc. or equivalent Honours Degree in statistics or Diploma in statistics of the Indian Statistical Institute. Demography is also taught as a subject in the degree and other courses at the general and specialization levels.

2. The Demographic Training &
Research Centre, Bombay.

Established in July, 1956.
The centre provides a one year certificate course and a two year Diploma course in Demography.
It also provides a two year Diploma Course in Family Planning Communication Action Research.

3. Institute of Economic Growth,
Delhi.

The centre provides a one year certificate course. In 1963, it organized an All Indian Summer Institute in Demography for the benefit of teachers in the various Universities.

4. I.I.T. Kanpur.

Provision of a paper (Paper.IV) entitled "Population and Family Planning" for the students of B.Tech.

For students enrolled for Ph.D., in Sociology, an advance course on "Population and Human Ecology" is provided for.

5. The University of Agricultural Sciences, Bangalore.

Included some aspects of demography as part of six courses offered for the B.Sc.(Agra) Degree.

6. Birla Institute of Technology and Science, Pilani.

Demography is taught as part of the course in Economics at the Undergraduate level.

N.B. A number of Family Planning Institutes are providing training in family planning.

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2. Agarwal, S. K. 'Evolution of Demographic Research in India.' State and Status of Demographic Research in the country: pp.81-83; Ed.by I.Z.Husain; Demographic Research Centre; Department of Economics, Lucknow University, Lucknow, 1970.
3. Bose, Ashish Demographic Research in India: 1947-69; Institute of Economic Growth; New Delhi, February 1970.
4. George, A (Miss) 'The Teaching of Demography in Indian Universities' Paper submitted to the United Nations World Population Conference, Belgrade, Yugoslavia; 30th August to 10 September 1963.
5. Philip, P. J. 'A Note on Courses in Demography offered by Indian Universities' statement submitted to National Conference on Population Policy and Programme, New Delhi, 19 - 23 December 1969.
6. Raina, B. L. Universities and Studies in the Field of Population. CFPI. Technical Paper No.5 New Delhi, Central Family Planning Institute, May 1969.

ORGANIZATION AND TEACHING OF DEMOGRAPHY IN THE
UNIVERSITIES IN INDIA.

Dr. C.M. Abraham.

The population problem is not just a clinical or a biological problem; it is at once a social, economic, political, moral, religious, cultural and psychological. Attitudes, motivation, beliefs, values, preferences and local cultural patterns are at the back of this hypersensitive issue.

Educational measures are useful in supporting several demogenic policy goals, including creation of socio-psychological support for **limiting the family size by accepting contraception and above all developing a realistic sense of urgency over the population problem.** It must also be used to generate the motivational force for creating the right attitude to accept the small family norm.

The Education Commission of India (1964-65) brings its report thus: "The destiny of India is now being shaped in her class rooms. This we believe is no more rhetoric. In a world based on science and technology, it is education that determines the level of prosperity, welfare and security of the people. On the quality and number of people coming out of our schools and colleges will depend our success in the great enterprise of national reconstruction whose principal objective is to raise the standard of our people." Today in India, about 47 percent of the population consists of children below the age of 16. The education of this age group is therefore of crucial importance to the country as these youngsters will be the citizens of tomorrow who would be shaping the future of this greatest democracy in the world. Education of these youngsters would help in fostering a scientific and rational approach to all problems, particularly the problem of population control and thus make the family planning programme more effective and purposeful.

P. T. O

PRESENT POSITION OF TEACHING OF DEMOGRAPHY IN
INDIAN UNIVERSITIES.

At present Kerala University is the only one in India, having an academic programme in Demography leading to M.Sc. Degree, but this programme is not organized by an independent Department of Demography. In 43 Universities courses in Demography are offered in the departments of Sociology, Economics, Statistics, Geography and Commerce, at the M.A. level. The details are as follows:-

Sl. No.	Optional or Compulsory	Departments offering courses : Demography at the M.A. level.				
		Socio-logy	Econo-mics	Statis-tics	Geo-gra-phy	Co-mmer-ce
		No. of Uni.	No. of Uni.	No. of Uni.	No. of Uni.	No. of Uni.
1	2	3	4	5	6	7
1.	Compulsory Paper.	1	-	2	-	-
2.	Optional Papers or Paper.	16	33	15	6	3

In some Universities at the Post-graduate and undergraduate levels, some elementary topics in demography have been incorporated in Sociology, Economics, Statistics, Geography and Commerce. But considering the urgency of the situation, the progress made in the teaching of courses in Demography in Indian Universities is not adequate. Moreover the gravity of the population problem vis-a-vis with social and economic development of the country, the social and cultural factors affecting the demographic variables and the demographic variables affecting the social order etc. are not given sufficient importance in the existing syllabus. The students of science, engineering, a large part of commerce and arts other than Sociology, Economics and Geography are not at all exposed even to the elements of Demography.

...

INDIAN CENSUS CENTENARY SEMINAR

October 23-29, 1972

XII DEMOGRAPHIC TRAINING & RESEARCH

SESSION :

Paper Code :

XII. 02

Some Considerations Concerning the Policy Matters
Affecting the Growth of Population with Reference
to the Demand and Supply of Demographers

By

A. K. Banerji

OFFICE OF THE REGISTRAR GENERAL, INDIA

Ministry of Home Affairs

New Delhi

Some considerations concerning the Policy Matters
affecting the Growth of Population with reference
to the Demand and Supply of Demographers.

A.K.Banerji⁺

1. It gives me a great pleasure when I find the census organization of India is holding a national Seminar on a pressing problems like growth of population which is again a big challenge before the mankind today. I am happy because of two reasons. First, an unit like census organization of India is probably the fittest body which could hold a Seminar like this, and Second, the conclusions and convictions of this Seminar would give its reflections in a manner we would be really able to counteract the rapid rate of population growth on a national basis.

2. Before coming towards the text of my paper I wish to express my thanks for the invitation I have received to write a paper and participate in its discussions and deliberations.

3. One of the present burning problems before the country is the rapid rate of population growth. If we do not go serious about it within the next few decades the problem would appear much more grave and serious accentuating the degree of other ancillary problems. These ancillary problems are becoming much more acute and chronic, we can appreciate the same if we reconsider the fact that the position of this country is second in terms of population numbers and seventh in terms of land area, when one compares the figures of ours on a global

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basis. And again, there is a definite relationship between the rapid rate of population growth and the extent or degree of malnutrition, protein deficiency, hunger, unemployment, etc. etc. Any effort invested to check the growth of population ~~would~~ *would* affect the above mentioned problems to a very great extent. Thus in other words we must appreciate high fertility, ~~its~~ increasing disparity between fertility and mortality and ~~gain a~~ *gain a* differences in fertility among regions of the country.

4. A deep rooted analysis of the above factors have led the social scientists to realise that it is one of the greatest crisis facing the mankind today. In fact no country can go negligent on this ~~x~~ issue.

5. For the country of ours it is absolutely necessary demographers should try their level best to check the birth rate, otherwise much of our efforts undertaken within the different plan periods would not bear any fruit.

6. Any discussion about the demand and supply of demographers can go really fruitful provided the same takes into consideration a scheme of administration and a frame of reference. Needless to mention that the prime aim of this scheme of administration, and the question of demand and supply of demographers is common that is to counteract successfully the rapid rate of population growth. For the purpose of this paper I have taken a hypothetical stand and I have tried to explain and expose a scheme of administration and a frame of reference wherein demographers are supposed to undertake a valuable task of rebuilding the nation, they should act in a manner so that their insight ,

experience and findings may help the nation to chalk out a programme of action to check the rapid rate of population growth. On the whole they must give sufficient focus on such important issues as fertility, mortality, internal migration, mood, beliefs and values of the people. The peculiar and particular features of the above in relation to different regions may help them to develop a different plan or policy to counteract the rapid rate of population growth, to control the chronic ailments of the larger society and to help in raising the levels of living of the general population.

7. To counteract the rapid rate of population growth I would like to have a scheme like National Demographic Organisation covering the whole of the country of ours. It should have three different tiers of administration to serve its objectives, at the national level, at the state level and at the regional level. At the national level it may be known as the National Demographic Organisation, at the state level it may be known as the State Demographic Bureau and at the regional level it may be known as the Area Demographic unit. The national demographic organisation with the assistance of demographers should chalk out programmes for constant and continuous researches on the sociological and economic factors of the growth of population. It may act in a manner as to help in the development and production of contraceptive methods which are safe, sure, reliable and inexpensive.

It may give financial assistance to the research cells and centres specialising on family planning and birth control techniques which may be located at different Universities or research institutes. The experience that is gained at these centres may be helpful besides others to train demographers, so that there is the availability of demographers who would be able to give a very good performance of themselves and again the same may help different agencies within the country to streamline their activities in a manner so that the same may give good results to counteract the growth of population.

8. A programme to award national scholarships to undertake research work and projects about family planning objectives may be implemented by the national demographic organisation. Students having a very good standard performance and a bright career in the disciplines like Sociology, Psychology, Anthropology, Applied Economics and Statistics may be considered for the award of this scholarship. In the long run they would be able to give a good display as demographers and their services may be rendered by the different units of National Demographic Organisation.

9. Those demographers attached to different units of National Demographic Organisation who are efficient and have established a good record of their activities may be considered to award a financial assistance to visit foreign countries so that they may work on research projects on such subjects, like birth control techniques, sterility, fertility and population control etc., etc.

10. The national demographic organization may provide financial assistance to the Area Demographic Units through the State Demographic Bureau so that they may undertake constant and continuous researches into the different beliefs, values and way of life of the people which helps in the rapid growth of population of the region. Through such researches the area demographic units would be in a position to prescribe a strategy to counteract the adverse effect of such values and beliefs.

11. The implicit idea is that certain beliefs and values if counteracted properly can check rapid expansion of population of the region. Some times these values and beliefs exist well among the poorer section of the population, among illiterates who are wedded to the idea of bad luck.

12. The national demographic organization should provide necessary finance and a well designed programme so that development blocks, panchayats and local bodies may contribute actively for the adequate control of population.

13. They should not in a manner as to make it one of their significant responsibilities to spread the idea of small sized family for the citizens of this country. In the long run the investment of effort in this direction would help in the development of particular values which would educate the people to go for less number of children.

14. These local bodies may inject the idea among the people to raise their levels of living by striving hard to earn more. The history of progressive countries gives us sufficient indication

that

they could reach a particular level of prosperity by working hard and raising the levels of living which has indirectly and inadvertently affected their growth of population.

15. The national demographic organization should provide finance to recognized institutes and centres of agricultural research so that they may undertake researches to find out hybrid variety of seeds and new methods of agriculture so that the total production of agricultural goods can be enhanced. The mass of population may be provided with an education not only in agriculture but in food economics and technology.

16. In fact nearly half the world's population is not fed properly or is suffering due to malnutrition. In India millions of people in the rural and urban areas are dominated by the scramble for food to stay on. These people are perpetually tired, weak and vulnerable to diseases, they are the prisoners of a vicious circle which keeps their productivity low and makes them helpless to feed their families adequately.

17. As they suffer due to undernourishment which starts with their birth, the same produces permanent depression and irreparable effects on the growth of population as a whole.

18. I am wedded to this conviction that much of the above mentioned malnutrition and weakness of the masses can go if the utilization of available food stuff is undertaken on a scientific and rational basis. It is equally necessary the processing of food should be undertaken at the farm. A scientific and rational approach towards the utilisation of available food stuff may decrease or even control to a very great extent the malnutrition and weakness of the people.

19. In tune with the above objectives the national demographic organization may provide necessary help and recognition to the two national institutes of food technology and applied nutrition as the same would go a long way to counteract the malnutrition, weakness and protein deficiency of the general population of our country.

20. The State Demographic Bureau should be in the middle maintaining a link between the national demographic organization and the area demographic units. Its functions should be to compare and develop a comparative picture of the findings of the area demographic units. The state demographic bureau after developing such comparative analysis and necessary reports should make it available to the opinion leaders belonging to different walks of life like business, education, public services etc., etc.

21. As it is necessary to have a solution to the rising trend of population growth these opinion leaders can present the people and convey their reaction to the state demographic bureau and the area demographic unit.

22. Any sanction of a grant by the national demographic organization to any agency within the country must go through the state demographic bureau. In such circumstances the state demographic bureau would be in a position to know what actually is being done by the national ^{demographic} organization and what findings are there to be given due attention by the people.

23. The area demographic units can work for the development of an integrated and well balanced courses for social education of the masses, well coming within its own jurisdiction. In fact,

any attack on illiteracy and ignorance can go a long way to serve the values of family planning and birth control programs. In case of these courses definite stress may be given on important themes as, levels of living of the members of the present and succeeding generations should be raised, a population not only creates problems of food and schooling, it checks the rising trend of progressive values, contentment and happiness can only come when there is health and wealth etc. etc. It would be really difficult to inject such ideas in the minds of the poorer section of the population, amongst others the area demographic units can collaborate with the planned parenthood clinics for the implementation of their programmes of action. They can get a definite success if they get the support of such agencies, short term refresher courses may be designed for the leaders representing the poorer section of the population. These short term courses should not be less than the duration of 45 days for each batch of people. The success of the course directors can be more if they can inject an idea amongst them that much can be done by the individuals themselves and the state is equally interested in their welfare.

24. The very design of the courses for social education will differ from region to region, its implementation and execution, should be the responsibility of a specialised agency like area demographic units. Since area demographic units would associate themselves with the growing knowledge about the people surrounding them, their customs, mood, habits and way of life. It would be proper if it is entrusted with the task of awakening the masses about the newer values and

25. The area demographic units can finance in the production of films and audio visual aids which may not directly depict the fact that small family is happy family, mothers' health can be protected if proper planning is done about the increase of family size etc. etc. It would be better in a round about manner these facts are served. It can also take the responsibility of screening such films in collaboration with the field publicity units of the state government. Short stories, interesting happenings, concrete reality about the family life and other social values may be incorporated in the production of these films. With the progressive implementation of such a programme a stress may be there to enhance the taste of the people. Though I am sure it would take a considerable period in this direction.

26. In case of urban areas where picture houses are located its screening may be ^{done} there with nominal charges for the visitors who would be exposed to such films. In case of rural areas field publicity units may undertake the job of screening them. The development block officials and the local panchayats may be influenced so that it can get the support of the local administration and can get a guarantee for a cross section of rural population getting interested in them. On the whole a proper education and information to the people can be given through such films and they may create ripples in the minds of the people with the result they may go for the progressive values and standards helping in the control of the growth of population.

27. I would like the planned parenthood clinics should inject the idea of family planning and birth control to limit the family size among the dwellers in the urban and rural areas. These planned parenthood clinics in consultation with the demographers can chalk out their programme of activities to serve the above objectives. These planned parenthood clinics must function under the area demographic units.

28. It would be better if the planned parenthood clinics chalk out their programme of activities in consultation with the area demographic unit. Demographers having complete information and experience about the people of the region can be really helpful in this regard.

29. It is advisable different elites and leaders from different walks of life like, government, health, education, business, administration, etc. may be invited to attend a well designed and balanced course running into a number of sessions at the planned parenthood clinics. So that on their return to their profession they can influence and inform their colleagues and co-workers about the need, necessity and urgency of birth control, family planning programme and demographic impact of rising trend of population growth.

30. The planned parenthood clinics should be so expanded and designed to run with a coordination so that it must reach the individual families with the result that none of the Indian women would be denied the assistance meant for her within this programme. In other words poverty should not be a bar for getting help under this scheme.

31. Here and there planned parenthood clinics should be opened in poverty stricken areas. Among other functions it should attract newly married women over and above those who are in need of new and readily available techniques of contraception.

32. The area demographic units may help by providing necessary finances certain agencies specializing in stageacting and dramas depicting certain values which may serve the objectives of family planning and birth control programmes. Popular stories, interesting themes and family happenings may be staged to entertain the masses and people among whom illiteracy and ignorance dominates. Any investment of effort in this direction may not give immediate result but in the long run it must bear fruits. Demographers having knowledge and information about the way of life, mood and habits of the local people can suggest how far these dramas and stageacting can go effective.

33. The exhibition of stage acting and dramas may be arranged in collaboration with the development blocks and panchayats and local bodies.

34. Short story books depicting a small family as happy family may be prepared and produced by the area demographic units. These short story books can serve the implicit purpose in two different ways. It can incorporate stories about small family as happy family and it can influence people to work hard to raise their levels of living, work against ^{worn} ~~worn~~ out customs and traditions and go for different sets of values which may bring about prosperity for larger community. It may be produced in original languages by different area demographic units.

35. Demographers working under the area demographic units may act as family planning ^{educators.} educators. As they would be armed with all the necessary facts and figures concerning the growth of population of their region, its peculiar features and special characteristics, they can work better and can think in a pragmatic manner to counteract the shortcomings in relation to the population of their region.

36. For this purpose demographers attached to different area demographic units should be associated with different clusters. They must maintain the contact with the people and should help ^{them} them in their need, they must influence and educate them how best individually they can plan their families, how the mothers health may be protected with proper spacing and how they can go happier with few issues of their own.

The End

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16.12.1970

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S U M M A R Y

One of the greatest challenge facing the mankind today is the problem of the growth of population. The country of ours is equally interested in this problem. During the different plan periods it had invested its efforts and endeavour to chack the rapid rate of the growth of population. For the purpose of this paper I have raised two important issues, Viz. the question of demand and supply of demographers in relation to a scheme of administration or a frame of reference and to seek a solution to the rapid rate of the growth of population. I have developed a hypothetical stand wherein I have conceived about the existence, continuity and functions of an organisation which would train and absorb demographers, develop an insight and experience about the rapid rate of the growth of population and follow a line of therapy to check it.

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A Developmental Strategy for Demographic
Research in India

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A Developmental Strategy for
Demographic Research in India*

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1. For developing the strategy, it is first necessary to appraise the present status of demographic research in India. In brief, the position is that of the two major sources of demographic information, registration of births and deaths in India is very deficient and the vital statistics thus produced are of little use. India has the proud distinction of having decennial censuses ever since 1872, which very few countries in the world can boast of. Census has never been thought of only in terms of counting of heads. The Census Commissioners have been alive to the need for producing statistics bearing on the social, economic and demographic characteristics of the population. With the march of time, there has been an ever-increasing demand on the census to produce more and more of such data but the Census Commissioners, alive to the limitations of the machinery and resources, have resisted attempts to increase its scope beyond what the bridge can bear. This is not to say that there have not been over-ambitious ventures with attendant reverses. The spasmodic analytical studies of census material, that have been made, have shown that all is not well with the census. A major overhaul is necessary. Besides, the census schedule can take up only a few straight-forward questions of a universal nature. For more complicated and detailed information, sample surveys are the answer. Annual National Sample surveys were designed to serve this need, but they have not succeeded creditably in the objectives. Various other surveys, big and small, have been carried out. There is a surfeit of them, but it is difficult to hold that a correct demographic picture of the country can be built from the results obtained there. This becomes all too painfully clear, when one sits down to write a book on Indian demography, as the writer tried to do. There are too many cobwebs, which make it difficult to discern a proper perspective. This kind of muddle is primarily due to the fact that demographic research in the country, on which the Government has spent huge sums of money, has not been guided on right lines after taking into account the talent and the material available. There is too much of following the Western practices. With this position in the background, this article first reviews developments in Indian demographic

*The views expressed in this paper are entirely those of the writer and in no sense involve the Pathfinder Fund

research and then proceeds to suggest a strategy, which should secure satisfactory results.

Till the close of the forties, there was only a scant recognition of a demographic problem in Indian and little research was done in the field of demography, which was a neglected subject. This is not to deny the occasional attempts at understanding the dynamics of Indian Population, notably in the Indian Census Reports Indian Census Commissioner, who were brilliant British members of the Indian Civil Service, set up a tradition of engaging eminent actuaries to prepare an actuarial report for each census. The first three reports, covering the decennial census of 1881, 1891 and 1901 are due to the eminent British actuary G.F. Hardy. In these reports, he discussed the peculiar distortions of census age returns and the defective vital statistics and their link with the census data and prepared life tables from the census data. This kind of analysis was carried out by Auckland for 1911 census. Mr. Meikle, who prepared the report for 1921, got entangled in the problem of distortions in the age returns and did not prepare any life table. The work of Meikle had a far reaching effect on 1931 Census in that based on his recommendations, the individual age returns of the next census of 1931 were straightaway sorted into ternary and septenary groups. The figures published in the usual quinary groups 5 - 9, 10 - 14 etc. were obtained by taking half of the total of these two successive ternary and septenary groups populations. For instance, population aged 15 - 19 was taken as half of the populations returned as aged 14 - 16 and 17 - 23 in the census count. There has been no proper study of the extent of damage this kind of manipulation of figures, has done. However, this artifice, meant to give group populations nearer the true figures was abandoned in the future censuses. The report for 1931 was prepared by the Indian Actuary, Mr. L.S. Vaidyanathan, who not only prepared life tables, but also gave an exhaustive discourse on the sharp distortions in the census single year age returns and the group totals based thereon in his quest for recommending an appropriate age grouping scheme, which would minimise distortions in group totals. There was no actual investigation for 1941 census due to exigencies of the Second World War. The reports of 1951 and 1961 censuses were prepared by the writer. In the report for the last two censuses, apart from the traditional studies on distortions in census age returns and preparation of life tables, birth and death rates by States estimated from census age data were given. This extension, which provides the widely used vital rates, was principally due to inspiration from Mr. R.A. Gopala Swamy, the Census Commissioner for 1951. There are some methodological contributions

in these reports. Due to certain personal factors, the method of preparing 1951-60 life tables, which had some new methods of attack on the problems coming up, could not be published. Apart from the above types of systematic investigations, the census reports give the results of certain enquiries on number of children born per woman. In 1951, the States were given an option to collect information on children born and surviving or on unemployment. The idea was developed further in 1961, when an independent fertility survey soon after the census was carried out in each State by the census organisation. There was a great pressure to include in 1971 census schedule questions on practice of family planning, but this was rightly resisted by the Census Commissioner. As a concession to the pressing demand, he included in the census schedule, question on age at marriage and birth in the last twelve months to currently married women.

3. The discussion in the preceding paragraphs marks the earlier phase of demographic research in India. The ten-yearly census was thought of as on occasion to look into the dynamics of population and know something about fertility and mortality as a point of side interest. In India, census with all its limitations and crudeness, is the richest source of information needed for demographic analysis. It is pity that its analysis is not as effective. Only in recent times, there is some recognition of this need, but action is still halting. Only a few research workers are attracted to it. It is to be hoped that some research scholar will get interested in reviewing the census material on fertility age distortion and life tables.

Upto 1951, demographic studies were carried out spasmodically by a few research workers. The First Five Year Plan in 1951 adopted a programme of family limitation and population control. Lack of the needed data and trained personnel to study population problems and their relationships with the social and economic factors was brought in the forefront. The Plan emphasised the need for demographic research specially in the fields of family planning and manpower planning. A Family Planning Research and Programme Committee was appointed in May, 1953 in the Ministry of Health to advise the Government of India, inter-alia, on initiating experimental and research programmes in family planning. The Committee appointed two sub-committees one on socio-economic and cultural studies and the other on biological and qualitative aspects of population. It was transformed into Demographic Advisory Committee in April, 1959 with the following terms of reference:

- (i) to advise on research and studies on inter-relationship between economic, social and population changes on the reproductive pattern, attitudes, and motivations affecting the size of family;

- (ii) to advise on programmes of training and research keeping in view that such training and research will assist the Government to take economic and social action and thereby facilitate the sound national programme of reconstruction
- (iii) to coordinate demographic research schemes receiving financial assistance from the Government of India;
- (iv) to review progress made in the centres receiving financial assistance from the Ministry of Health; and
- (v) to examine and recommend proposals which may be received by the Ministry of Health for financial assistance for conducting demographic research.

5. For some time, there was a separate committee for Family Planning Communication Action Research, but now it is merged with the Demographic Advisory Committee. The combined organisation is known as Demographic and Communication Action Research Advisory Committee, briefly DCAR.

6. As a result of the recommendations of an inter-departmental meeting, a Standing Committee for coordinating population and vital statistics was set up in 1956 in the Central Statistical Organisation. The Committee was meant to review the activities in the fields of census, vital statistics, morbidity statistics and demographic studies formulate a programme of work and advise on the formulation and execution of new schemes. In 1960, this Standing Committee was reconstituted to form the National Council of Population under the chairmanship of the Home Minister. Representatives of the concerned ministries and certain individual experts were members of the committee. Later on, it was decided that demographic Advisory Committee would function as a committee of the National Council. The constitution of the Council indicates that it was meant to be an administrative body and not a professional one. It is not surprising that it did not really function. For demographic research and training, DCAR is the only one that matter.

It is an unpalatable truth that demographic profession in India is as yet in an infant stage. There is hardly any

one, who has the necessary stature to take the leadership in guiding and developing research in fruitful channels. The result is that the charimanship and membership of the DCAR has gone mostly to people, who belong to other disciplines or are mere administrative and have only a faint idea of demographic research. Some of them are distinguish scholars in their own field but they do not have the necessary back-ground to be able to deliver the goods in the field of demographic research. The genesis of the

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Committee has acted as a drag on its development on right lines. It was conceived in the context of the needs of family planning, and hence it is in that field. It is more than doubtful if the money spent on researches even in this field has been of any use in the development of the family planning programme or has established true facts either on fertility levels pattern and controlling factors or on levels of knowledge attitudes and practice of family planning. There has been no real assessment of the work done. The best that has been done is by workers like Mrs. Kamla Gopal Rao, Mr. Krishna Kapil and a couple of others, who prepared a mimeographed bibliography of good and bad investigations made, but they do not bring out the contribution made to knowledge. What is stated about family planning is more forcefully true of the wider field of demography but the effort falls very much short of the need to separate the gain from the Chief.

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8. A major reason for the stunted growth of demographic research is the fact that research in family planning is more fashionable. A number of major field projects on fertility and K A P have been initiated at several centres. They have continued over so many years that by the time the results are available, they will be out dated and will only be of historical interest. There is money in field surveys. Anybody, who wishes to take up a research project without any previous experience in the line, finds it easy to secure finances from the D C A R or some other source. Quite naturally, the output is amateurish. D C A R is merely a grant giving body and has no organisation to identify research problems requiring urgent attention, fix priorities, find appropriate talent of it, and provide expertise. Whosoever applies for the grant is considered. If the project i.e. approved, the proposer is left to his own resource. At best the D C A R makes a post mortem study of the final report, when it is beyond repairs. At one time an effort was made to rectify the situation, but the move did not proceed any further, as various interests worked against it.

9. A sub-committee of D C A R was appointed to fix priorities of demographic research. It observed that there was a wide gap between collection of data and its adequate analysis. There is a plethora of basic data collected by field surveys and censuses, but their analysis has lagged far behind. It recommended that high priority should be given to analytical studies and field surveys should be discouraged for a while. It also made a very sensible suggestion that of the nine or more demographic Research Centres established by D C A R, each one should be assigned a specific area for analysing fully the available basic data. This approach will have provided a specific objective to each research centre and added very greatly to our knowledge. However, like many other good decisions the recommendation remains on the file. The worst sufferer is the census. The Census organisation was built on the premise that it should provide the basic data and that it is for others to analyse them to draw the demographic picture. In the absence of any machinery, analysis part of the work remains neglected. A few research workers, who venture to take up analysis of census data are balked by serious practical difficulties. In the first instance, previous census reports for India and States are hard to get. Even the Registrar General's library does not have a set of all India reports from 1872 and onwards. Age Tables for 1941 based on ~~Sample~~ are almost impossible to get. They were published in small pamphlet form and it has been nobody's business to keep a set available in a handy form. If by persistence one is able to get the reports, it is difficult to compile a comparable series over time. Concepts and tabulation schemes have undergone so many changes, more at the predilections of the Census Commissioner-in-charge than for scientific reasons, that the scope of studying time trends is seriously crippled. The furore, which definition of worker and other concepts adopted in 1961 census, caused to research workers interested in tracing changes in labour force since 1901 will be fresh in the minds of many. The census of 1971 has done one better. It has brought out females participation rate to about 5% in a number of States, whereas each one of the previous censuses showed it to be well above 30%. The funny part is that other States do not show any such violent drop. The new concepts affected some States and not others.

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10. As another example, changes in preparing age distribution may be mentioned. In 1901 and 1911 the grouping adopted was 0-5, 5-10, 10-15, 20-20, 40-60 and 60 plus. In 1921, twenty-year interval was broken into ten yearly i.e. 20-30, 30-40 etc. In 1931, as already stated, the five year group totals were obtained by taking half of the ternary and septenary totals of raw figures. In 1941, quinquennial group totals based on a 2% sample were prepared only for 10 States. In 1951, age distribution was

obtained from a 10% sample and the odd age grouping of 0, 1-4, 5-14, 15-24, 25-34, etc. to 75 plus was adopted. In 1961, age distribution in quinquennial age grouping based on complete count was given. It seems that 1971 will adopt some sort of sampling. As is well known, age distribution is invaluable for countries with defective and incomplete demographic data. By the application of model life-table and stable population techniques, it is possible to estimate vital rates. This playing about with the age distribution in the different censuses has seriously impaired the application of these methods. What is stated about age data is equally true of other census statistics. If they are analysed, not only will a plausible picture of the demographic situation in the past emerge, but also sound guidelines for collection and compilation of census data will be laid down and frequent changes in the tabulation plan will not be necessary. This will greatly enrich the quality of the census material.

11. The purpose of the discussion in the preceding paragraph is that the present situation requires that a major portion of financial resources should be allocated to analysis of existing data. The existing Demographic Research Centres should be harnessed to this work in a systematic manner. It will be recalled that Mr. A. Mitra, Registrar General for 1961 census, launched a scheme of preparing census monographs by individual experts, but it did not have much success, probably because few persons can take up a major project. The need seems to be to identify small specific topics with the ultimate objective of building up an integrated comprehensive picture. This requires an active brain call at the organisational level, which can suitably tap the available talent.

12. Several attempts have been made to fix priorities of demographic research, for which ad-hoc committees were appointed, but there was little success. The subject has been handled in these committees in a very casual manner with the result that nothing tangible emerged out of their deliberations. The task of identifying major research problems requires sustained work, which is possible only if there is a systematic whole-time machinery for it.

13. The need for a machinery to guide demographic research in India is felt from another important consideration. The easy availability of funds has drawn a number of research-minded persons, who have the desire to take up a project, but lack the necessary experience and expertise. There is need for reliable information on fertility pattern, levels of

birth and death rate and levels of K A P. This has encouraged field survey projects. However, the outcome is poor. Project reports do not advance the existing stock of knowledge, which is very low. The reason for the poor performance is that the project director starts on his assignments de novo, and naturally falls a victim to similar pitfalls as were experienced by his predecessors. When the finished product in the form of results becomes available, it is too late to make amends. It is, therefore, necessary that the project directors should be placed in a position to obtain expert advice at various stages of the project development—sampling design, drafting of questionnaire and field instructions, tabulation scheme and the like. The preliminary findings should be discussed with knowledgeable persons with a view to improving and enlarging the scope of analysis. Thus, this again points to the need for providing a brain cell, which can help project directors with advice without trespassing on their initiative and dynamism. Once the project objectives are approved in principle by a broad-based committee like the D C A R, the finalisation of details of operation and supervision should be left to project director and expert group of whole-time competent workers on the staff of the D C A R. There is too much of casual approach in the present functioning of the machinery for guiding demographic research in the country with the result that money spent on it is going down the drain.

14. Demographic research in India is receiving support from the Government in a fairly big way. It is being developed from three approaches. Firstly, centres and institutions have been set up with this specific function of research. It is no secret that the staff there is on a purely temporary basis, living on government sanction from year to year. It is hopelessly inadequate to play any major role in demographic research. There is an urgent need to reorganise the centre on a rational and continuing basis so that they can plan their activities on a long range basis. Their main function should be analysis of existing data. Their annual work plan should be discussed and finalised well in advance. As already mentioned, each centre may be assigned a special area of demographic research. The results of the studies should be published and not kept in mimeograph form as at present. An all India publication should give summary of the results of studies undertaken by the various centres. Such a course will attract public

gaze and comments, which itself will lead to reward of good work and disapproving of bad work. These centres may be permitted to take up field studies only with special sanction, when necessary additional staff may be provided, if the work can be taken up without determine to their primary function of analysing data.

15. In the next place, research projects are allotted to established research institutions, which are not primarily engaged in demographic studies, but by the nature of their main activities are well-equipped to carry out field surveys. Examples are State Directorate of Economics and Statistics, Statistical sections of Health Directorate and other private institutions engaged in social welfare work. At present, any organisation, which can pull the strings can get such projects, whether it has the know-how or not. Past record of survey work in allied fields must be an essential condition for a research grant for demographic surveys.

16. In the third category come individual research workers, university teachers and departments. In this category, there is a great need for finding talent and grafting it to demographic research. It is a hard fact that economists, sociologists, anthropologists and psychologists have not got involved in demographic research in India. They have a vital role to play in the understanding of fertility behaviour and processes of change therein from the economic, social and psychological angles. This kind of understanding is of immense practical value to family planning and population control movements. Instances are not wanting, when persons who occupy eminent position in the four fields mentioned above, give professedly expert opinion on these problems without a proper understanding of the issues involved. Well, that is their privilege, but this does not help the subject. If only research workers of some standing in economics, sociology, psychology etc. can be drawn to studies in demography, a big gap can be bridged. So far only amateurish interests have been drawn, because of the easy availability of fund, but a directed approach has to be made to draw good talent. Here again, the brain cell of D C A R should prove to be of use.

There is one abuse, which is responsible for the poor results in demographic research. Quite a number of projects are built up because of the type-writers, calculating machines, furniture cup-boards and last but not least the monetary honorarium that comes with it. It is a demoralising practice, which encouraging adventurists. The grants for such items should be an exception rather than the rule that prevails at present. Even when a grant for them is made, the articles whatever be their physical condition, must be returned to the central pool. The criterion for granting projects to individuals and university teachers should be their willingness, availability and competence to undertake a research of the kind proposed. If these conditions are satisfied, the project will not be looked upon as a source of income, but as a matter of academic interest. All that is needed is to give such persons secretarial and computational assistance. If right type of talent is not forthcoming on an honorary basis, the proper course would be to employ competent persons on payment basis, which will instil a sense of duty in the project director.

In conclusion, it may be stated that demographic research in India is facing a crisis of perspective. The powers that we should realise that they should organise the work on sound systematic basis, which can sustain itself. The most immediate and the simplest requirement is that there should be at least one reference library, where research workers can consult reports containing basic data produced by census reports, National Sample Survey and other important surveys as also research papers of value. The next is to harness the demographic research centres to analytical studies and to support the D C A R with a brain cell, which can stimulate and guide good research and render advice to research workers. A number of times the proposal to set up a documentation centre has been mooted from several organisations including the Pathfinder Fund and Population Council of India, but every time action is inhibited by the news that National Family Planning Institute is going to do it. To say the least, it is a dog in the manger policy. Let us hope that the Institute will some time be inspired by a sense of duty and devotion to the cause of demographic research in India.

A DEVELOPMENTAL STRATEGY FOR
DEMOGRAPHIC RESEARCH IN INDIA

BY

S. P. JAIN

S U M M A R Y

To start with, the paper traces the growth of demographic research in India beginning with the decennial census actuarial reports from 1872 to the emergence of Demographic Communication and Action Research Committee (DCAR), which is the only governmental agency for sponsoring research in the Field. It is held that research done so far has not been fruitful due to organisational deficiencies. The paper discusses the causes for this situation and makes a plea for (i) setting up a good reference library where census reports, research papers of value and national sample survey and other survey reports can be consulted, (ii) harnessing demographic research centres to analysis of the plethora of data produced by censuses and surveys and (iii) supporting DCAR with a brain cell, which can actively stimulate, guide good research and render advice to young research workers. The need for a documentation centre, which has been voiced from a number of platforms, is re-asserted.

INDIAN CENSUS CENTENARY SEMINAR

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SESSION : XII DEMOGRAPHIC TRAINING & RESEARCH
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XII. 03

Demographic Research : Priorities & Programmes

By

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DEMOGRAPHIC RESEARCH: PRIORITIES & PROGRAMMES

N. S. Bhatnagar*

&

T. P. Das**

INTRODUCTION

Demography as a subject has emerged recently and in the developing countries it has been realised a little late that the investment made in the conventional sectors of economic growth like heavy industries, transport and communication, agriculture, etc. etc. will never yield the desired standards unless the vital statistics provide the reliable estimates of rate of population growth to the planners and administrators. The economic condition of these countries has forced them to implement effective family planning programmes. All such measures are constantly increasing demand for improved population data and a team of trained personnels. The social and economic changes which are taking place also indicate that in future demand for population experts shall increase considerably.

2. Till thirties rare attempts were made in the field of population studies by the Indian scholars. The contributions of the eminent writers of those days like Dr. Radha Kamal Mukherjee, Prof. Gyan Chand and Prof. S. Chandra Sekhar served the purpose of presenting the picture of the growth and size of the then population.

SOURCES OF DEMOGRAPHIC DATA

3. The two basic sources of demographic data viz. (i) Census and (ii) Vital Statistics are being manned by the Registrar General, India. So far, Census is concerned it has been with the Census Commissioner since 1872, while the

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collection, analysis, inter-pretation and improvement of vital statistics was transferred to the office of the Registrar General, India, in 1958. Since then scientific efforts have been made to improve the birth and death data but "the civil registration system as it obtains today is deficient in regard to its content, accuracy and timeliness"¹. Hence this does not present the real picture of the rate of population growth.

CENSUS ORGANISATION AND DEMOGRAPHIC RESEARCH:

4. Prior to 1961, the Census offices were set up to conduct only the decennial Censuses and did not continue after the completion of the purpose. Ever since the Census Organisation in India has been declared permanent (1961) efforts have been concentrated to publish data on various demographic aspects which would prove of immense use to the researchers. The 1961 Census publication programme aimed to publish in all 1476 volumes comprising All India and State volumes, District Census Hand Books, Special Survey Reports and Monographs, Census Atlas Volumes and Census Monographs by some scholars. Besides "the publication programme has been carefully developed as to ensure that the data will be made available to the users as quickly as possible after it is processed. The 1971 publications will be made up of 30 series, the first series covering the all India publications and the remaining series one for each State and Union Territory"². "It is the Indian Census tradition that apart from the collection, processing and publication of the demographic data, the Census organisation takes up on its own initiative several ancillary studies in order to give a further picture of the life and economy of the people of the country. The early censuses gave very rich ethnographic accounts of the people and those reports still serve as of the most valuable sources of information on religion, castes, traditional occupation etc. In the the 1961 Census the main plank of the ancillary studies was the socio-economic survey of 500 and odd villages considering the fact that India is at present at an interesting stage of development, and in due course urbanisation on a large scale is bound to occur at the 1971 census the ancillary studies will be focussed on a survey of about 200 towns. Besides, various other types of projects such as a re-survey of a few selected villages previously covered

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to reflect the trends of change, ethnographic surveys of the Scheduled Castes and Scheduled Tribes will be undertaken. The Indian Census will try to justify its reputation of being the richest source of information on the people of the country³. Thus there will be an elaborate information on items like fertility, housing, migration, etc. For the first time sampling technique has also been introduced in tabulating the Census data. Besides, for ensuring promptness in bringing out the census results with more accuracy, a sophisticated mechanical tabulation system has been adopted by introducing IBM Electronic Computer. "As the experiment on Electronic Computer was first of its kind, it was considered appropriate to continue with the old system of tabulation involving manual sorting as well for the rural part of the data of Individual Slip from the point of view of ensuring timeliness in presentation of Census statistics. the main irritant in processing of the data on computer is of the input preparation and for a country like India even for a sample, however, small it may be, it amounts to a population of number of small countries of the world. It is also hoped that with the introduction of more sophisticated computer for the census work in future processing time would further cut down"⁴.

5. In addition to above the introduction of schemes like (i) Sample Registration, for providing quick and reliable estimates of birth and death rates at national and state levels and (ii) Model Registration in selected areas under Primary Health Centres to give the reliable cause of death data are the indications of improvement in the field of demographic research. The Registrar General is also thinking of studying the working of the Sample Registration Scheme. Releasing four issues of 'Indian Population Bulletin' "the Registrar General's Office was quick to recognise the need for a centralised publication or a periodical entirely devoted to the field of demography to serve as a convenient and effective vehicle for the collection and dissemination of knowledge on the latest researches and new approaches and also to highlight the various demographic problems"⁵. The above efforts made by the Registrar General, India in the capacity of the Chief repository of demographic statistics are remarkable contributions to support the development of the demographic activities in India. The later issue is being released shortly. Though it covers varied topics of demography yet the late release has considerably minimised the effect of the contributions. As a matter of fact the publication of demographic material needs a well built

arrangement comprising a team of devoted demographers having taste is journalism.

INSTITUTIONS AND UNIVERSITIES IN THE FIELD OF DEMOGRAPHY:

6. To meet the requirements of the demographic research and providing specialised training much has been done in the recent past. Besides, International Institute for Population Studies, Bombay, there are about a dozen "Demographic Research Centres and Institutes" in the country. They provide necessary training both to the Govt. staff and scholars and a few of these guide in research studies also. About thirty Universities have also come forward by introducing a paper at the graduate/post-graduate standard in Economics, Statistics or Sociology. Kerala University is much more far sighted in this respect. It has started teaching of 'Demography' at the post graduate level.

DEMOGRAPHIC RESEARCH - ITS PRIORITIES:

7. To implement any effective programme concerning demographic research, trained personnel are absolutely needed. Needless to state that the problem to meet with the demand of these who can train persons shall have to be tackled first. However, no single organisation can carry out programmes of such magnitude with effectiveness. Universities should necessarily introduce Demography as a subject at graduate and post-graduate levels. The present situation in most of the universities is that population studies form either a separate paper or a topic which is optional and depends upon the sweet/
/will of the students. In day to day affairs also persons dealing with economic, social, psychological and medical problems are the frequent users of population figures. Hence a proper co-ordination of the demographic data users in the country appears to be equally important.

8. The interest of the Govt. is constantly increasing for developing the demographic data. The considerable amount has been spent in the recent past would support this view. Most of our problems regarding co-ordinating the work of demographic institutes and centres and for conducting ancillary surveys and research are solved if at the national level

there is a "Bureau of Census and Demographic Research". There is only one organisation in view, i.e. the Office of the Registrar General, India which can be converted into this. It appears necessary to mention that the remaining shall share the additional responsibilities, since the function and scope of the Demographic Bureau would be much more. Even otherwise, the Registrar General, should start a 'Training Institute' to train the workers in the field of vital statistics, census and mechanical tabulation etc. Proper care is to be taken in selecting persons for training since every body cannot be expected to have an aptitude for research.

9. The Office of the Registrar General, India has got a good number of talented officers. They should be assigned specific research projects on which a report should be published within the specified time limits. The office should also conduct evaluation studies at the field level. In addition to these, much of the Census as well as vital Statistics data are yet to be analytically studied. For a able background some one would have to come forward for taking the responsibility of doing the analytical work using the data thrown up by census and several other projects. The demographic institutes can provide the maximum help in case for these talented officers hesitate to lift this additional burden. Even for this purpose a meeting of the heads of these institutes may be called by the Registrar General, India to seek their help in this regard.

RESEARCH STUDIES IN THE FIELD OF DEMOGRAPHY

10. In addition to what has been done, the following fields require additional attention of the demographers, professional research scholars, planners and administrators:-

- (i) analytical work on urban development and housing, migration, fertility, mortality and family planning;
- (ii) development of estimation techniques where basic data is erroneous and incomplete;
- (iii) use of the census data for developing mathematical models; and
- (iv) study of regional population problems, etc.

SOME PROGRAMMES:

11. Besides the above, time to time seminars, on various subjects related to population problems need to be organised. The need is more alarming in the field of vital statistics since the birth and death data is collected through a number of agencies. Considering this fact inter-departmental committees were formed in a number of states in 1960-61 with the hope that most of those problems which hamper the healthy growth of vital events in India would be solved. For some time a proper persuasion was made by the Registrar General's office on procuring the proceedings of such meetings and keeping a track for getting the decisions implemented. A full account of such committees appeared in the "Vital Statistics of India for the 1961"¹³. The later reports are almost silent on the progress of the functioning of such committees. For the proper understanding of the population problems in India regional seminars on this subject are absolutely necessary. For adequate co-ordination a Seminar may be arranged at national level as well.

12. The Indian Association for the Study of Population formed in 1971 due to the active interest shown by the renowned demographers of the country can play a very significant role in organising seminar on demographic subjects and by publishing a good journal concerning publication. The association in collaboration with the Institute of Economic Growth, Delhi thus organised a Seminar on first results of 1971 Census. It would be better if this association and the population Council of India do organise seminars and discussions jointly in future.

13. An important aspects of the programmes of demographic research is that there are hardly any incentives for the new entrants in the field of such activities. They are not offer any attractive remuneration and status. The entire machinery is to be greased for the satisfactory development of demographic research and training. The future of demographers in the country is very much linked with the future developments in the field of demography.

FOOT NOTES

1. V.K. Ramabhadran, Experience and Problems in the Creation of the Sample Registration System in India Symposium on Statistical Problems of Population Research, East West Centre, Honolulu, August 2 - 6, 1971, p.1 (Mimeographed)
2. A. Chandra Sekhar, "Paper I of the 1971 - Supplement Provisional Population Totals" Government of India Press, Faridabad, 1971. pp. (ii) and (iii).
3. Plans and Programmes - Census - India 1971, Registrar General and Census Commissioner, India, p.22.
4. G.K. Mehrotra, Evolution of Data Processing Technique in the Census of India, Institute of Economic Growth, (Mimeographed) p.12.
5. A. Chandra Sekhar, 'FOREWARD' Indian Demographic Bulletin, Vol.I, No.1 (1968), p.(i), Govt. of India Press, Nasik.
6. Vital Statistics of India for 1961, Office of the Registrar General, India, pp.xii-xiii.

SUMMARY

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In developing countries, investments on Public Sector Projects cannot yield the desired results unless the reliable rates of population growth are provided to the Planning and Executive agencies. Their economic condition has forced to implement effective family planning measures, which on turn increased the need of improved population statistics. Prior to thirties, rare attempts were made to exhibit the growth and size of the population. The major source of demographic data are (i) Census and (ii) Vital Statistics. The registration of vital events in the country is considerably incomplete and deficient.

The Census Organisation was declared permanent body only in 1961, prior to which it was a proverbial phoenix. Census is the richest sole mine of demographic information and in the 1971 Census efforts have been made to provide detailed information on fertility, urbanisation, and Housing and migration etc. etc. Sampling technique and IBM Electronic Computer have been introduced for the first time to bring out more accurate census data. To improve vital statistics scheme like i) Sample Registration for providing quick estimates and reliable estimates of birth and death and ii) Model Registration in selected areas under Primary Health Centres to furnish the reliable data regarding cause of death have been introduced. The idea to study the working of the SRS* is being mooted by the office of the Registrar General.

Four issues of Indian Population Bulletin were published by Registrar General's Office. The office later on, was quick to realise the need for a centralised periodical on demography to serve as soon as an effective search light of demographic knowledge. In fact, the publication of demographic material needs a well organised team of devoted demographers having a taste in journalism.

To meet the requirements of the demographic research and providing specialised training about a dozen institutes like International Institute for Population Studies, Bombay and Indian Statistical Institute, Calcutta have started imparting training to the scholars from govt. departments and other agencies. Moreover, about 30 Universities have also some forward to do so. Kerala University has started teaching 'Demography' at the post graduate level. To augment the need of demographers who in turn can train persons in demography, it is felt necessary that other universities, too should adopt such measures.

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*Sample Registration Scheme.

The Govt. is constantly increasing its interest to develop demographic data. Efforts are being made to coordinate the work of demographic institutions and centres. It is felt necessary to create a "Bureau of Census and Demographic Research". An organisation like Registrar General's Office can easily be converted into such a bureau. Even otherwise the training programmes in demography, vital statistics, Census and Mechanical Tabulation, can be taken up by Registrar General's Office. A good lot of talented officers in this Organisation can be assigned specific reaserch projects. The field of demography which need priority are (i) Analytical work on various demographic aspects like Urban Development and Housing, Fertility, Mortality, and Family Planning; (ii) Improvement of Estimation Techniques; (iii) Use of Census data for developing mathematical models and (iv) Study of regional population problems, etc.

To coordinate the work on Vital Statistics, certain inter-departmental committees were set up in 1961 in several states to solve the problems which retard the proper procurement of vital events in India but could not yield the desired results.

The Indian Association for the Study of Population in collaboration with the Institute of Economic Growth, Delhi organised a seminar on 1971 C ensus results. Its collaboration with Population Council of India may even be more fruitful.

The main bottleneck in the development of demographic Research is the poor and unattractive remuneration to the demographers whose perspective future depends upon the rapid advancement of demographic research.

INDIAN CENSUS CENTENARY SEMINAR

October 23-29, 1972

SESSION :
Paper Code :

XII DEMOGRAPHIC TRAINING & RESEARCH

XII. 05

Research in Population

By

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New Delhi

RESEARCH IN POPULATION

by

B.N.PAL*

Demography is in its infancy as regards research work, for most of the basic data is derived from the periodic enumerations and censuses, and little spade work as such has been done, until very recently. Unfortunately statistical data often conceal more than they reveal. Hence the importance of qualitative, rather than mere quantitative studies and analyses. The collection of data could hardly be given the status of research; more important is the analysis built upon it. The construction of hitherto ignored relationships and the re-interpretation of some old forgotten facts has to be attended to. Attention should be drawn to the statistical black-out in some neglected areas and regions, the need for the planners and policy makers on the one hand, and the census and survey organisations on the other. But more important still is the assignment of the demographically trained personnel drawn from the social, the behavioural, the medical, and the biological sciences. For instance the demographic compulsions of the economy have not been studied in depth, especially in the light of national priorities and goals of development. Similarly, some of the social phenomena (e.g. family stability) are better appreciated if demographically attacked.

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* B.N. Pal, Field Adviser in the NCERT, New Delhi, is essentially an economist. Born in 1919, he studied in Lahore, where after his M.A., he earned a postgraduate scholarship which was twice renewed. After teaching in the universities of Punjab, Delhi and J & K for about two decades, and at the same time conducting research into various economic, social and educational problems, he has published three books on agricultural economics and one on vocational economics - the last being a pioneer work. His interest in population problems stems from his first hand inquiries which he conducted in the villages of NWFP and the Punjab. His work on vocational economics, published in 1968, is the result of patient thinking in a virgin field. His books have been applauded by experts, critics and reviewers in Indian and foreign universities and press.

Contrary to popular belief, demography was known to India, much before the concept of political arithmetic was formulated, or the "natural and political observations" of John Graunt were made; as far back as the fourth century B.C., Kautilya in his Arthashastra made a mention of the population counts a measure of state policy, especially for the purposes of levying taxes. This guideline was traditionally incorporated into the Indian state administrative practices, for administrative records of the medieval Hindu and Muslim (particularly, the Mughal) governments give us a glimpse into the demographic structure of the country; several records were maintained and regularly revised and brought upto date. Still, the credit must go to John Graunt for giving us the modern concept of demography. Several masters worked on his ideas, and tried to impart precision to his research methodology in population studies. Special mention may be made of the well-known contributions of Riccoli (a Jesuit in Italy), Felix Platter (a physician in Switzerland), Edmund Halley (the great astronomer, who constructed the first empirical life table), Johann Süssmilch (a German clergyman) - to name only the founding fathers.

The beginning of the eighteenth century saw the first ever enumerations in Europe (Iceland, France and England), though some earlier counts had earlier been carried out in a secret fashion by the state. Regular census programmes were started in several countries, and became more comprehensive, specific, and complete. The registration of vital events was started and given official recognition by the Napoleonic regime. The nineteenth century may well be described as the era of demographic maturity, when census taking was spreading to all the modern states (though even now not more than half the world's population is being covered by enumerators), some specialised demographic institutions were born, and a few specialised treatises written. Some of the renowned demographers lived towards the end of the eighteenth century to the middle of the nineteenth - Malthus, Price Moheau, De Montyon, Laplace, Benjamin Franklin, Giannaria Ortes, Michael Sadler and Farr. It was left to the present century to perfect the research techniques for demographic investigations and interpretations. The phenomenon of fertility was probably the first to be attacked by several demographers, and the concept of differential fertility mooted by Dumont, Rubin, Westergaard, Korosi, Hertillon, Cogan, Kier, Heron, Newsholme, Stevenson, Willcox, Beneduce, March, Kortara, Hill and Yule. Studies were directed into the fields of population geography by Frederick Ratzel, and population history by Dietelici and

Julius Belock. Special references to migrations were made by Alexandre and Eugene Kulischer in the thirties of this century. Others who followed in the same stream are Walter Willcox and Imre Ferenczi (USA) Gustav Sandborg (Sweden). Mobility and internal migration have also been studied from the national census data in U.K. (Revenstein), Australia (Knibbs) and a number of American demographers. This, in turn, has led to the quantitative study of the social and sociological problems, particularly in the USA under Mayo-Smith, Giddings and Wright. In the field of analysis, Halley's life tables were the pioneering attempt; the Swiss Mathematician, Leonhard Euler developed the concept of the stable population in the end of the eighteenth century. This work lay dormant till rediscovered by Ludwig Moser and further developed by George Knapp (both of Germany) and Adolphe Quetelet (of Belgium). Several models were constructed by Zeunner, Becker and Lexis, and recently by Lotka and Sharpe. Mathematical methods of estimating population have been the targets of attack by Hajnal and recently by the United Nations Demographers.

John Graunt is acknowledged as the father of scientific demography, his book "Natural and Political Observations on the Bills of Mortality" (published in the second half of the 17th Century) opened up a new field. His friend, Sir William Petty, was another important researcher, Edmund Halley (the great astronomer) published the first life table. These three founded the science, which won enthusiasts like Richard Price, John Heysham and De Moivre, Rev. T.R. Malthus in his "First Essay on Population" (1798) gave it the form of a discipline. Though the first British Census was taken in 1801, it was left to William Farr to put it on a scientific and methodological basis. J.M. Duncan made a probe into the problem of fertility, while Edwin Cannan prepared a population projection and anticipated a decline in numbers. In the 20th century, considerable advances have been made. In the U.K., Karl Peasson worked on the problems of differential fertility followed by Ansell and Heron. Ethel Elderton would be long remembered for her monumental work on the British birth rate. Professor A.M. Carr-Saunders published "The Population Problem" in 1922; other renowned teachers of demography were Hogben, Kuczynski, Glass, Enid Charles and A.W.N. Ellis. In the U.K. major research work has been done by the Population Investigation Committee (1936) and the Royal Commission on Population (1943-49). The former studied the age-specific fertility, while the latter attacked the problems of population replacement, family census and limitation, and morbidity. Other investigations include maternity services, national intelligence, fertility and social mobility. Recently, much interest has been aroused over the problems of population development among the primitives, under the direction of

Professor Kuczynski. In sum, the British contribution in the field of demographic research relates to differential fertility, family limitation social mobility, and life table construction. But there are certain gaps e.g. the study of marriage, social class differences; differential mortality (especially with reference to social and cultural groups; fertility motivation and sexual behaviour). Research needs be extended to the border-land of demography, sociology and psychology.

By the end of the 17th century demography came into being in France through the efforts of Fenellon, Boisguillebert, Veuban, Belesbat, Meessance, Expilly and Moheau. The last three demographyc statisticians, worked in the end of the 18th century. The physiocrats, (e.g. Quesney) studied population in the context of economics. The nineteenth century saw a general eclipse of French demographic studies; despite the fact that the term "demographic" was coined by Guillard in 1855 it did not become a recognised academic discipline. Some statistical demographic researches began towards the end of this century, occasioned by a drop in natality. Bertillon, Dumont, and Dandry made some pioneer probes. The second world war served as an eye-opener; the Institut National D'Etudes Demographiques was founded, while the Institut National de la Statistique et des Etudes Economiques (the central statistical service) was much expanded. Hence basic data were improved. Progress was made in the interpretation of raw statistics, fertility behaviour (by Bourgeois-Pichat and Henry) and physiological stability (by Vincent). Infant mortality and that of the aged has been examined with special distinctions between the endogenous and exogenous mortality. The demography of the dependancies (e.g. Algeria and Madagascar) is another subject. Attention has been devoted to population projections, and inactivity. Statistically, the phenomenon of aging has been studied with reference to the economically active life. International migrations, (in relation to economic development), assimilation and adaptation have also attracted the researchers' attention (Girard and Suvy). Demographic, economic and social phenomena have also been viewed; social problems, like alcoholism, housing and education have been subjected to detailed analysis. Family life, and legislation with an eye on the work of the married woman have been scrutinised. The comparatively new science of population genetics has interested enthusiasts into studying the consequences of consanguinity. Some inquiries are afoot into the history of population in the prestatistical period. Experts are also interested in tracing out the history of population theories (Bourdon and Cemaehling), having been spurred by

Occupational distribution and migration and rate of activity

Spangler's famous work "French Predecessors of Malthus". But some areas are still neglected social factors in mortality, infant mortality, nuptiality, morbidity, internal migration (rural exodus), etc. There appears to be a lack of statistical data, and of liaison between administrators and demographers, and scientists and experts in other disciplines.

In Italy, Ortes was probably the closest to Malthus in ideas as well as chronologically. His 15th century predecessor are: Machiavelli, Botets, Painter, Zuccolo, Chisi-amarti, Denina, Algerotti Indini, Beccaria, Carlini, D'Arco, Ortes, Vasco and Verri. The Italian thinkers claim to have pointed out the difference between the potential rates of increase of population and the means of subsistence and the stated the geometric law of population (by Ortes, Cornaro, and Zuccolo). In the present century, sustained systematic study of the population problems was undertaken by Verhulst and Amoroso, whose theoretical construction was elaborated by Vinci, and further by Vianelli. Credit goes to Gini for having propounded the cyclical theory of population, and to Livi for his naturalistic conception of the social organisation. In the 18th century statistical methods began to be posed by P. Verri (1771) and G.R. Carli. Empirical demography was the subject of a short essay by Beccaria 1744. Further applications in the collection of data were made by Vastri (1775) and Zeviani (1774), and Toledo (1787) who published mortality tables. Cagnazzi (1828) and De Renzi (1844) carried this work further. In the 19th century, important researches were conducted by Boldrini (biometric phenomenon), Gioja (seasonal variations in sex ratio at birth), De Renzi (Selective effect of the sex on mortality, 1938), Mantegazza and Lombroso (anthropological demography), Ferri and Garofalo (applications of priminology), and Morselli (averages and variability, 1880). Numerous studies of an original nature have been conducted: classification of population by age, expectation of life, and seasonal patterns of birth and death. Interest in historical demography has been roused by the classic studies made by Castiglioni (1862) and Belock (1886). Recently, much attention has been focussed on biometric and anthropometric studies especially by the contributions made by Lombroso, Livi, Perozzo, Pagliani, etc. The "Principles of Demography" by Benini (1901), and similar works by Colajanni (1904) Zingalli (1930) and Savorgnan (1936) have distinguished demography from statistics. Natality, mortality and migration have been examined by Luzzatto-Fegiz (1951, naturalistic bases of social organisation by Lasorosa (1952), and bio-anthropometry by Boldrini (1956). Of considerable interest are the problems of differential reproductivity studied by Golzio and Battara (1934), and of natality and mortality. At the beginning of this century,

"constitutional demography" was founded by Achille de Giovanni who swept aside the etiological theories, and built up his thesis on morphological variations. Nuptiality and assortive mating are other subjects. Also have been discovered cycles in demographic phenomena, especially in births and deaths, by Bresciani Turrone (1912), Livi (1938), Vajani (1955) and others. Population projections have been made by Somogyi (1954) at the Institute Centrale di Statistica. Other problems relate to agglomerations, aggregates, geographic variations migratory movements, and legitimacy studies. But some gaps are still visible: little attention appears to have been devoted to the collection and improvement of data, its refinement and improvement.

In Germany, the master of population studies was John Peter Sussmilch (1707-67), known for his work, "Die Gottliche Ordnung in Den Verunderun en des Menschlichen Geschlechts". Heinrich Luden, originally an historian, did much to discuss and spread the Malthusian theory. But the improvement in the official statistics was brought about by the efforts of J.G. Hoffmann, the director of the Prussian Statistical Bureau. Caspar, Hoffman, and Moser worked on life expectancy, while Professors Bernoullie, and Nappaus analysed official statistics. Population theory was, however, popularised by the texts of G. Von Mayr, followed by Ratzel (who worked on population geography) and Riehl (who treated these problems in political, sociological and economic settings). In the 20th century, researches were influenced by state policies. Birth rates were examined by Burgdorfer and Grotjohn, and the phenomenon of overpopulation by Mombert, and Harmsen. Mombert developed a complete theory of population, especially from the economic angle, though Ernst Engel had earlier advocated the recognition of demography as an independent discipline. Mackenroth doubts the universal validity of a law of population; population problems have to be viewed in the total perspective of the society. The major researches in this field are summed by Von Ungern-Sternberg and Schuhnell, population theory has been re-examined by Charlotte Lorenz. A new relationship between population movements and cultural developments is visualised by Waggmann with "demodynamic" tools. Mathematical investigations were carried on by Knapp, Lexis, Becker, Sundberg, Borkiewicz, and Winkler. History of population was dealt with by Beloch, Abel, Keyser, Kirsten, Buchholz, and Fillmann. Anthropological perspective was attended to by Von Eickstedt and Ilse Schwidetzki. Other topics are: sociology of the family, refugee and migrant problems, commutation, and agrarian sociology. Elisabeth Pfeil worked on the occupational

and social assimilation of displaced persons, while Professor Harmsen studied social-hygienic problems. In 1952, the society for the scientific study of population was founded as also new associations of demographers and of statisticians. Some problems have still to be examined: process of aging, mechanisation of human labour, family planning problems and structure of families and households, social political stratifications, and the economic aspects of demography and the various inter-relations.

In the United States, the Constitution provided for the census to be a continuing assignment: the Census Bureau was made permanent in 1902. In the early days, the census officials were the pioneers: Lamuel Shattuck (1793-1859); James D.B. De Bow (1820-67), Francis Amos Walker (1840-97) and Carrol Davidson Wright (1840-1909). John Shaw Billings (1838-1913) would be long remembered for his invention of the punched card systems, which led to the modernisation of census record keeping and classifications. Probably, the USA was the first to have developed a national registration system. Immigration statistics were compiled by the Bureau of Immigration in 1892. Richard Mayo Smith (1854-1901) made sizeable contributions to demography in his texts on sociology and on economics, written from the statistical angles. Other important experts are Thomas Nixon Carver, A.B. Wolfe, H.P. Fairchild, and James A. Field, whose "Essay on Population" (1931), was published posthumously. Edward B. Reuter, and Warren S. Thompson are other famous writers on population problems. Towards the end of the 19th century and the beginning of the 20th Demography came of age. Walter F. Willcox published "The Divorce Problem" (1891), and "Introduction to Vital Statistical" (1933), and "Studies in American Demography" (1940). He is credited with having fathered the theory of demographic transition. In the USA, demography has been taken as the congregation of social problems, Thompson and Whelpton discussed the problems of population history; Lorimer and Osborn of differential fertility (1934); Me Kenzie of metropolitan growth (1933); L.I. Dublin and Alfred J. Lotka of "Length of Life" (1936); and Raymond Pearl, of "The Natural History of Population" (1939). Cultural demography was examined by Rupert B. Vance and Nadia Danilevsky in "All these People" (1945). Attention was diverted to problems in other countries: E.F. Penrose on the demography of Japan, (1934); J.J. Spengler on fertility in France (1938); J.W. Innes on fertility in England and Wales (1938) Dorothy S. Thomas on Swedish population movements (1941); Frank Notestein on European population projections (1944); Wilbert E. Moore on populations in South and East European populations (1945); Dudley Kiron on interwar period movements (1946); Kingslay Davis on Indo-Pakistani Censuses (1951);

G.W. Barolay on Taiwan's problems (1954); Irene Taeuber on Japanese demography (1958); Warren S. Thompson on the Pacific Area (1946); T. Lynn Smith on the cultural demography of Brazil (1946); J.C. Russell on historical demography (1948); and several experts on the population policies and practices in Puerto Rico (Hutt, Hill, Stycos, etc.). Raymond Pearl developed the theory of population growth in "The Biology of Population Growth" (1925), Whelpton and Thompson worked on the empirical method. Whelpton's "Cohort Fertility" (1954) was a path-breaking venture. Micro - and Macro - analyses were developed. Lorimer in his "Culture and Human Fertility" (1954) linked primitive macro - systems to fertility. Internal migrations were dealt with on the micro plans: C.W. Thornthwaite's work remains unbeaten. Experimental analysis has been pioneered by Gilbert B. Beebe (Contraception and Fertility in Rural West Virginia) in 1942. Still some important gaps remain; treatment of minority groups and studies in mortality. To the US experts goes the credit of detailed researches in labour force, gainful employment, urban problems and negro demography. The Population Association of American (estd.1931) has done tremendous work. While the population Reference Bureau has been publishing studies since 1945. The Scripts Foundation, The Millbank Memorial Fund and the Population Council, The Office of Population Research (Princeton University), the Population Centre (University of Washington), Population Research and Training Centre (University of Chicago) and some other specialised research institutes at the universities of North Carolina and Columbia have done good work. The Metropolitan Life Insurance Company has been supporting a research division staffed with distinguished scientists, demographers, and other eminent experts in the fields.

In the Latin American countries, Brazil appears to be advanced in the demographic research. The first (true) census (1872) gave very reliable information on the number and spatial distribution of population. The next censuses in 1890 and 1899 were however not complete, J.L.S. Bulhoes Carvalho conducted systematic scientific studies in Brazil. The growth of population was studied by J. Kingston (1920); biometry by J.P. Fontenelle (1934); and public health statistics by L.N. Briges (1933). Other distinguished names are: F.J. Oliveira Vianna "(Formation and Development of the Brazilian People)"; G. Freyre (Social Demography); and Roquette Pinto (Anthropological Demography). An event of national and academic importance was the census of 1940 for which preparations were made

under the direction of Professor J. Carneiro Felipe; the number of deaths, births and of people at different ages was calculated for the first time, as also the variations by the age of mothers. The technical section of the Census Service, under the direction of Professor G. Mortara, examined the data with the help of the Laboratorio de Conselho Nacional de Estatística - studies were conducted on the facts relating to sex, age, colour, marital status, nationality, place of birth, economic activity, education, mother tongue, religion, ownership, and time of settling in Brazil. Population dynamics were reconstructed, and detailed data on fertility and prolificacy collected and classed. Several experts examined migratory movements, data on death rates (cause-specific mortality and infant deaths, life tables and population growth). Similarly, for the census of 1950, several publications were prepared to follow the progress of urbanization, degree of literacy, new life tables, and population projections. The demographic characteristics of the people of Brazil have been detailed at length by several experts: Alves, De Roche, Andrade, De Car Valho, Kingston, Lyrd Madeira, and Thimoteo de Barros. Some scientific investigations have also come out. The first modern manual on demography and population policy was published by J. Lambert and L.A. Costa Pinto in their "Problemas Demographicos Contemporaneos" (1944). Next year, a summary of demography, "Nocoes de Bioestatística" was written by L. de Ereitas Bilho. Castro Barretto, in his "Estudos Brasileiros de Populacao" (1944), employed historical and social analysis to lay down the directives of population policy. E. Williams and M. Diegues analysed the process of cultural and social assimilation of immigrants. Demographic development in the context of economic evolution has been followed by J.F. de Camargo in his "Crescimento de Populacao no Estado de Sao Paulo a seus Aspectos Economicos" (1952). T. Lynn Smith has deeply studied the demography of the country in his famous "Brazil: People and Institutions" (1954), while from the United Nations "The Population of South America (1950-80)" is another monumental work. Some learned research articles have, from time to time, been published in the "Revista Brasileira de Estatística", the "Boletim Estatística", the "Conjuntura Economica", and the "Revista Brasileira de Geografia". Still some gaps are noticeable. There is inefficient registration of vital events: births deaths and marriages - municipal registers may help. Depth studies on the detailed aspects of demography are also lacking, e.g. on certain cultural, social and economic aspects of demographic developments.

In the rest of Latin America, demographic studies are as yet in their infancy. Except for government, or UN agencies, there is little private initiative in the collection, or even the interpretation of data, though phenomenal demographic changes are being witnessed in this region. Census operations have not been very well organised. This is an unexplored region for the demographer-researcher. Some very interesting developments are taking place in Chile, where probably the phenomenon of demographic transition, and continuing urbanization is on. Certain areas of the Latin America nations are very sparsely peopled, while others are dense; the possibilities of population redistribution need to be looked into by experts. In certain countries (e.g. Argentina) the process of rural depopulation is going on. Suburbanization, in all its aspects, has to be investigated fully. There is a remarkable growth of cities and metropolitan centres (e.g. Mexico City, Buenos Aires, La Matanza, Merlo, San Martin, Panama City, and Lima). How far this development could be steered to advantage has been very vaguely appreciated. Little attention is devoted to look to these aspects of the population problems, as all over the continent numbers multiply.

In Africa, where several nations have risen on the ashes of the colonial empires, demographic research is meagre except in the South Africa and UAR. Demographic information in some regions like Somalia, North Africa (except UAR) and tropical Africa is lacking. South Africa is sufficiently enlightened in the matter of census taking, and demographic statistics: same holds true of South West Africa. In other places, the UN estimates are the only reliable sources. Probably, the Economic Commission for Africa and the Organisation for African Unity might have taken some positive steps in collecting and providing reliable statistics. So far about one-third to two-fifty of the total population has ever experienced any enumeration. Vital statistics do not exist for the non-white population, or for some people on the Mediterranean coast. Mathematical and statistical projections have been used to estimate numbers. Group enumerations on a sample basis have been depended upon in certain regions. Estimates for the African population are at best conjectural and guess-work, e.g. by intrapolation or by extrapolation. The research problem in most of Africa would be that of finding out the methods by which the inaccessible areas could be covered by the census operation. In Egypt (UAR) though the census operations have dated from the end of the 19th century, little is known in details about the pressure of population (both in the agricultural and the urban sectors) the extent of emigration, and the prospects of family planning.

In Asia, Japan is most enlightened in respect of demographic research. The demographic transition has been completed, and the transformation to a modern economy effected. The slow growth of population has marked her economy; it was more due to the delayed decline in mortality, coupled recently with the curbs on birth rate. At the same time, there has been a rapid modernisation of her economy, especially in the twenties and thirties of the present century. The Eugenic Protection Act of 1949 provided for the inclusion of contraceptive measures in health clinics. Family size has been limited and near solutions to the problems of poverty and population achieved. Still, the demographic consequences of industrialisation have to be studied in details, as also those of the aging of the population, and its adjustment to modernisation processes. The case of China is a little different. She has the oldest population records in the world, but the total numbers living on the mainland have always been a matter of speculation. The results of three censuses between 1909 and 1928 were admittedly incomplete, inconclusive and inaccurate. The Communists claim to have carried out the first modern census in 1953. Households were the basis of count which was limited to some few queries about residence, sex, age and ethnic allegiance. The rate of the growth of population is a matter for conjecture. In short, it is very difficult to peep through the bamboo curtain, though the compulsory registration system is operative. In Indonesia, population estimates go as far back as the early nineteenth century colonial administration. Censuses have been regularly taken, and net increases calculated. There has been a marked increase in population and especially in local density. Some studies have recently been made by Professor Pelzer, with special reference to land utilization and agricultural colonization. Similarly, Boeche has attacked the problems from the colonial angle. The Central Bureau of Statistics has been conducting several investigations into the problems of population pressures. Population redistribution is another problem about which much factual knowledge is unavailable. The phenomenal rapid growth of towns (and consequential) severe economic and social dislocation and hardships of maladjustment have still to be factually analytical. That industrialization has provided a spur both to increase of population and urbanization needs be further substantiated. The relation of capital formation to population growth and urbanization needs be probed deeper. The family in Indonesia is facing a crisis - some sociological studies have to be made, with special reference to the feasibility of introducing family planning among the people. In sum, the various aspects of the population problem in the context of the transformation of the agrarian economy have to be attacked. In Ceylon,

there is sufficient data on population trends and vital statistics. The vast array of demographic data and quantitative documentation awaits patient research. In the Phillipines, there has been sufficiency of data, but demographic research is limited. In the erstwhile French colonies, political instability has discouraged research. In Burma census operations have been resumed, though they are conducted in stages. Pre-test census operations and sample surveys have been the sources of information. Formal research is conducted by the planning body or its affiliates. Much more information is required before large-scale research could be undertaken - the census operations have to be made more perfect and regular. In Australia and New Zealand, the census data are supplemented with registration, surveys, special field researches, and intercensal projections. The main problem is that of immigration policy, particularly advocated in New South Wales, and Victoria. Economic objectives are claimed for this policy, and social justification sought. Critics of this policy condemn it as stemming from a fear of the Asiatics, but it will need some objective research work before an impartial policy measure could be suggested.

In India, demographic research appears to have come of age. As pointed out above, the great Kautilya writing in the 4th century B.C. gave detailed instructions for taking censuses; the tradition continued during the Medieval periods (both Hindu and Moslem) till the Britishers arrived on the scene, and had the first formal census in 1872; since 1881 regular censuses have been taken once every ten years. To serve the needs of the colonial masters, the questions asked related more to antropological facts than to economic issues. Gradually, the scope of the inquiry has been extended, both qualitatively and quantitatively, so as to stand in comparison with the most advanced enumerations elsewhere. Still demographers feel the lack of reliable basic data; censuses suffered from inaccuracies and inflated numbers. Some surveys supplemented the information; noteworthy among these were those carried out by the Indian Statistical Institute, the Gokhale Institute of Economics and Politics and experts like Dr. Gyan Chand, Dr. Radhakamal Mukerjee, and Dr. N.V.Sovani. The recommendations of the Population Data Committee designed to improve the quality of censuses were also implemented. In 1951, the accuracy of the census count was rechecked. With the need for the evaluation of a national policy on population, the planning machinery has been geared to that end. Radical departures were made in 1961; the worker approach was adopted, economic questions were oriented to the agrarian economy, and enumerations greatly improved. In 1971 census, provision

has been made for principal and the secondary work, while data for the educated persons has been separately secured. Questions on the place and duration of residence are also included to provide data on internal migration. In the field of demographic research, the National Sample Survey has conducted a large number of KAP (Knowledge, attitudes, and practices) surveys. Other studies are equally significant - the Mysore Population Study, The Singur Study, the Harvard - Ludhiana Population Study and other fertility and socio-economic analyses conducted by several institutes and universities. Still some gaps are visible. Precise information is unavailable on unemployment and under-employment, especially in rural regions. Duplication in data collection is a well-known evil. The overall picture regarding the impact of family planning efforts is rather confused. The relationship between economic growth and population trends is imperfectly known, though Coale and Hoover have recently attempted an analysis. In pursuit of the recommendations of the Demographic Sub-Committee (appointed by the Research Programmes Committee of the Planning Commission in 1955) Demographic Research Centres have been established at Delhi, Calcutta, and Trivandrum, while a number of Communication Action Research Centres have been set up at New Delhi, Lucknow, Trivandrum, Baroda, Bombay, Calcutta, Gandhigram (Tamil Nadu), and Kanpur. Eight biomedical research centres have also been started. A Demographic Advisory Committee was constituted in 1959. Several other bodies are working on population research, the most important being the (Regional) Demographic Training and Research Center at Bombay, with assistance from the UNO. Several experts had studied the population problem; their contributions need not be recounted here. Suffice it to say that there is a growing volume of work on Indian demography. But more information is needed on fertility and mortality, migration and urbanization, better evaluation of family planning, and methodology to improve vital statistics; public consumption in education, health, transport, housing, agricultural and industrial services; and in motivation for family planning.

Having had a rapid view of the researches carried out in the various parts of the world in the demographic field, it is appropriate that another look may be had on the various topics usually discussed in this science, with a view to locating the areas which remain to be explored. In a survey, like this, it is not possible to cover the whole ground; still we may however get an idea of some gaps. Most of the areas are still virgin fields though some might already have been very fruitfully explored by quite a few demographers. Frankly, it is impossible to keep abreast of the latest researches, especially in a

subject which is still in the stage of concept formulation.

A start in the science of demography is best made with collection, sifting and analysis of data, which is usually done by the censuses, or the vital registers, etc. The data generally cover geographical distribution, urban-rural or other groups, migration, personal facts (age, sex, marital status), economic, educational, cultural and ethnic characteristics, nuptiality, fertility and mortality; and above all, household and family statistics. These are being constantly revised and more items added. Geographic distribution of births and deaths is significant, especially in countries wedded to welfare programmes. The quality of data is the most important variable for the purposes of research; this in turn depends upon the validity and consistency of replies by the respondents, and the ability of the enumerators to get correct information. Coverage of data suffers from three defects; omitted areas, omitted groups and incomplete coverage. Probably, the registration system, when extended would counter some of these deficiencies. At best, demographic data may remain only approximate. Heterogeneity in data collection, as among the nations of the world is unavoidable. The major sources of data are the census as, the registration systems, the international migration control systems, periodic surveys and various administrative operations. The census operations are refined; more perfections are being introduced to meet regional variations and needs. The civil registrations system has not been introduced in all countries; but vital registration has been made compulsory by several modern states. International migration controls are in a way very effective, though conditions of instability compel the neighbouring countries to relax border controls and suspend registration. The continuous population register has yet to find favour with all governments; there are the problems of its purpose, its design, and its unit of coverage, etc. Several other administrative measures and surveys also supplement, and recheck the census enumerations; these are common to several countries. Still, the fact remains that not more than half the worlds' population has so far been enumerated in one way or the other; in certain regions as low as about 10% of the population is covered. The real problem, therefore, is that of covering the people living in the inaccessible areas and regions of the world, as in large parts of Africa. Another problem area is that of vital statistics. The United Nations have outlined the "Principles for a Vital Statistics System" (1953) and have also issued a "Handbook" (1955); but these ideas have still to be put into practice. The World Health Organisation has also given considerable thought to the compilation of vital statistics, especially birth and death, their

circumstances and causes. The information collected is meagre and hardly covers about one-third of the total population of the world. Even for crude birth rates, the collection of data faces the problem of devising steps to extend coverage and enumerations.

The distribution of the population is an important area of research. In fact the two approaches - the aggregative and the distributive - are complementary. Explanatory research also must be used as a method and supplemented with mobility research. So far the emphasis has been on description, rather than analysis. Much of the research in population distribution has been confined to case studies. There has been little intensive analysis of population distribution. Greater emphasis has so far been on the urban side than on the rural. Small and medium-sized cities and towns are sometimes neglected. Few studies have been made of the distribution of mortality and fertility. And research in population distribution has at best been piecemeal, unintegrated and historico - descriptive. Environmental factors are rarely taken into account. In the delimitation of areas, there has been a controversy between the "homogenous" and the "Modal" school, but most of the data is being collected by the former method. In fact, actual research would have established the correctness of approach, and its applicability. In our opinion, with the greater progress in industrialisation and urbanisation, the economy conforms to the nodal model, but only research could prove the desirability of accepting this approach. Probably the "regional" approach combining the two may be more valid: this may cover the several socio-economic clusters and employ multiple variable analysis. In distributional fertility analysis, the stress should also be placed on why fertility differential occur in the socio-economic context, instead of answering merely how they occur! This may bring out the implications of the "carrying capacity" of a certain region. Few researches have been conducted into the ecological correlations of various regions, as also that of their proximity and contiguity. The utility of regional variables need not be minimised.

Among the other descriptive data, that relating to the composition of the population is elaborate enough to permit demographic comparisons. Census operations being the source, accessibility is an important determinant of the veracity of this information. To know population composition, practices differ from country to country, but some queries are common: sex, migration, age, marital status, education, nationality, and economic status. Underlying them all is the concept of "stable population", especially useful for

adjustment and correction of the data. Errors are common in reporting correctly such simple facts as sex, migration, age, marital status, education, nationality, and economic pursuit. For instance, the females are under-enumerated in certain cultures, while migrants are often hesitant to leak their place of origin. Age is seldom correctly given. The divorced or separated do not usually reveal facts. The literates are generally enumerated as "educated". Nationality is wrongly stated for political reasons. And the distinction between the employed, the partly-employed, the under-employed is mostly hazy. Demographers have yet to devise means to secure correct information on elementary, but essential data. Several innovations have been attempted; index of preference and digit distribution for age records; survival ratios, nuptiality tables, and cohort analysis. Standardisation procedures are usually adopted for ensuring veracity in enumeration and reporting. Still, the immediate task of improving the quality of the basic data remains. Even the concept of the "optimum composition of the population" has to be clarified. Much of the research must concern itself with the relevance and otherwise of the data; special requirements are equally important.

Closely related to the above is the estimation of the population, and its projections - both interrelated and intertwined concepts. Estimates are made for the inter-censal and post-censal periods, though pre-censal and provisional estimates are also valuable. Apart from the census and other enumerations, the role of population registers, annual tax returns and adhoc and sample enumerations is significant. Accuracy is at best only "reliability". The quality of the official data is sometimes variable and doubtful. Unavailable estimates have to be reconstructed. Thanks to the efforts of the UNO, scientific techniques are being developed to deal with these problems. An element of uncertainty haunts these estimates, which are fallible, and sometimes wrong. The demographers and researchers must be clear how far objectivity is attainable, errors rectifiable, correct generalizations possible, decisionmaking (based on these estimates) desirable. Thus population forecast is at best an expert opinion, and a projection, conditional. Probably successive and more frequent estimates and projections would invest the researchers with better insight into the most appropriate methods, best suited to a certain region. Errors creep into the basic data because of wrong information and the operation of several economic, social and cultural variables. Total dependance upon data is therefore not advisable: circumstantial evidence, qualitative information and suitable models should supplement. Specific methods have yet to be devised for different countries; this

simple fact is often forgotten or ignored. Experience has it that estimates based on a trend are more reliable, than one-time statistics. They are the result of patient trial and error. The larger the area, and bigger the population, the more accurate the estimates and projections. Consistency ensure reliability. Models are fruitful in regions having inefficient and inadequate statistical services, but may not represent actual conditions, except for short-period approximation within known limits. But mere quantification, without regard to qualitative improvement is useless; cultural and sociological phenomena are equally relevant and important for being studied.

Most of the projections and estimates about population are often upset by the movements of people. Though the international migrations are controlled, yet they assume the form of forced political transfers. Problems of assimilation call for sociological expertise. Statistics are recorded at control points, ports and land frontiers, passport registers, transport documents, and special papers and population registers. The impact of these movements on the economies of the two countries has not been carefully and specifically investigated, despite the studies made by Dr. J. Isaac (British Postwar Migration, 1954) and Brinley Thomas (Migration and Economic Growth, 1954). Analyses have been conducted by the historical, the theoretical and the empirical methods. The influence of the institutional factors on migrations is assessed by historians, Economists-statisticians build models on theoretical basis, while the deficiencies of the data are sought to be overcome by the empirical methods of sampling, projections, correlation and land analysis, especially of differential types. The effects of migration on demographic structures, occupational composition, and international monetary mechanism are topics of interest to the economist, but so far little studied. A few distinctions are relevant between: group and mass migrations, interregional and international movements; occupational, age and sex differentials, and seasonal, short-term and secular phases. Among the determinants of migration a distinction need be made between the how and the why of the movements. A theory of migration has still to be developed in order to account for consequential capital movements, resultant population pressures, and the aggregative income effects. An International Migration Institute may study this problem in rather details, and intensively analyse the role of the push and the pull factors, etc.

Internal population movements are politically little marked, and less noticed, but of special interest to the demographer and the sociologist-economist, as they

reflect latent social and economic tensions. Internal migrations bring about cultural diffusion and social integration. These movements may also have repercussions on crime, delinquency, illegitimacy, prostitution, broken homes, and a host of other social problems. Different classes of migrants have to be identified: nomadic or semi-nomadic groups, seasonal (agricultural) labour, itinerants, gypsy bands, and tribals. Local, short-distance, regional and inter-regional migrations have to be clearly distinguished. The methods of determining the migration intervals, the nature of differential migration and the reasons therefore, and the migration rates - these are not clearly understood. The extent to which the estimated net migration is residual remains to be precisely calculated. Net migration is at present estimated from vital statistics, and survival ratios birth-residence index in consecutive censuses. But these are all indirect methods; direct methods have still to be evolved. A continuous residential register may be helpful. The role of the push and the pull factors has not been appreciated. Knowledge of migration streams and differential migration is meagre. About pressure of population there has been loud talk but little clear understanding. This simple concept refers to the oldest equation. Man must have tried to solve, and is still unable to do so successfully. From the research angle resources have to be located, identified and defined. Their cultural-cum-technical exploitation has been meagrely assessed. The nature and composition of the social groups vis-a-vis the resources alone would give a clue to the real pressure of population. At the present time, there is a large concentration of population in a few regions and sectors. The resource-population relationship is further modified by technology, territorial extent, trade (internal and international), the institutional factors and forces and even water. This shows that this is not merely an economic problem, but more related to sociological investigations. Resources have to be evaluated in respect of their quality, productivity, durability and stability. Modern technological advances may make the life span of the resources longer, as also that of Man. The economic factors enter when the intensity of resource use and the consumption habits of the population are taken into account. The density of the population has to be matched with the management of primary and secondary resources. Further, dynamic relations have to be analysed: the resource exploitation and utilisation within the culture and its changing patterns, including the demographic trends. Obviously, little work has been done in any of these directions; and demographers need not be blamed for this lapse as the problems are more anthropological and sociological-cum-economic in content rather than merely demographic. Sociologists have to

inform us about the direction of change, scientists about the technical innovations likely, anthropologists about the impact of these on different cultures, and the economists about the future patterns of consumption and capital formation. Superficially, the prospect is gloomy in view of the upward trends of population in most countries of the world, deteriorating productivity, and a bid for higher standards of consumption, living and comfort. But it is too early to give a verdict, until the researchers have appraised the limits of resource development (at least in problem lands), likelihood of further development of resources, the fruition of the technical effort, complementarity of resources in neighbouring nations, and the possibilities of utilisation of the wasted resources materials and the other wastes, etc.

The concept of active population is of great relevance to demographic and manpower researchers. (Some experts have actually defined this science as the study of the actions of the populace, and the reasons for that) A high dependancy ratio may evidently burden the economy; this is an over-simplified statement of a well-known fact. But as a whole, employment may be related to fertility rates and geographical mobility. Active population and employment are interrelated and important variables for development patterns. In all censuses, some information is sought about the nature of employment and participation in work. But so far precious little is known about various classifications: active people, and others; and the employed and the unemployed, let apart the under-employed and the over-employed. New classifications may preferably be devised or the existing ones made more suitable for analysis. The motivational factors and forces compelling people to make occupational choices is another field for research. (In this connection, attention might be drawn to the author's pioneer book on "Vocational Economics", which seeks to discuss these problems in the economic context). In the census itself, the definitions and classifications change over a period of time - standardization of terms is yet another task awaiting the researcher. In the collection of data, there is room for immense improvement, while deeper and better understanding is required about the process of modernisation of subsistence economies. The demographers might as well address themselves to the inter-relations between active workers and demographic changes.

Fertility is a widely used but misunderstood term. Determinants of birth are not merely biological, or sexual, they are also cultural, social, sociological and even economic. But fertility data also suffer from over, non and under-registration; and also from mis - and non-classification.

And there is inadequacy of enumeration: hence crude birth rate may be miscalculated. Research needs be directed further into the nature of the relationship of temporal variations in the fertility parameters, and into the optimal means for assessing incomplete reproductive experience for cohorts. Confusion needs be avoided between marital status and its duration. The social variations in fertility, though important, have been little appreciated and less analysed, due to the limitations of data. Fertility differentials arise because of several known factors, whose relative importance and role is not identified. National fertility trends result from the interplay of several socio-cultural-economic forces - how far each affects fertility is yet to be discovered. Further, the distinction between fecundity and fertility is little recognised, even by the advanced students. Researchers may trace the determinants of fecundity in different climates and cultures. Another urgent area of research is the extent of fetal mortality, and fertility-limiting practices. The genetic and environmental influences on fertility have to be distinguished. Much work has been done on fertility regulation and control, but the socio-economic correlates have not been enumerated, as also the moral-psychological inhibitions about it. In short much more varied data are required about marriage and family.

Frankly speaking, family statistics are on a crude form. Even the number of households is incompletely and inaccurately known. Meagre is the data on the composition of the family, household relationships, on unwed mothers, and on divorces/separations. Clear-cut distinctions should be made between primary, nuclear, sub, joint and extended families. The vague ideas about their economic well being have to be concretised. In the face of several pressures, family dissolution is becoming noticeable in quite a few societies research needs be directed on this phenomenon and that of the formation and the nobility of the family. Family history and stability are unexplored fields, but the demographers have not yet given it as much attention, as sociologists have.

/Family remains the most important human institution,

Longevity and mortality are important phenomena in all populations, as they influence population composition and its future growth. The data which come from censuses, records, registers and life insurance, are proverbially deficient. Statistics relating mortality to socioeconomic status are not effective. Other data are inaccurate, inflexible, non-comparable confusing and deficient. Misstatements about age at death and its cause are common. Even the place of death is confused with residence and

home origins. Mathematicians, statisticians and demographers have attempted forecasts in mortality rates, but precision remains to be achieved. The correct reasons for the declining mortality have not been identified. Investigations about differentials in mortality do not yield correct information, especially in regard to sex, environmental conditions, and biological traits. Variations in mortality have to be explained, and reliable mortality statistics to be collected. Little is known about infant mortality, and precipitate cause of death in women. Analytical studies should be focussed on rural-urban, geographical occupational, socio-economic, age, residence and ethnic differentials. **Standardisation of data is another requirement.**

And last, but not the least is the problem of the growth of population, and its replacement. This statistical problem is being efficiently solved. Dependence upon reproduction rates have yielded to the new concept of replacement index, fathered by Thompson. Generation - and period-fertility rates are also being employed, alongwith the cohort method. On such selective rates calculation should not be based - a whole set of time series on fertility, nuptiality, mortality, preproduction, and replacement have to be analysed. But the problem is too mathematical to be discussed in details in the present paper. I only venture to suggest that the qualitative aspect of the growth of population should not be submerged in the quantitative data. Attention needs also be directed to the phenomenon of cultural pluralism, rurbanisation, aging of the population, demographic transition, the growth of population after and during the wars, demography of development, and standardisation of the systems of censuses, registrations, record keeping, etc.

S U M M A R Y

The paper aims at the recapitulation of some research work already done in the field of demography, and points out some areas of research, which have not received the attention they deserved. The earlier enumerations and censuses have been mentioned just to punctuate the narrative of research with which this paper is concerned. After a general survey of the activities of the founding fathers of demography, the story is told about the development of population research in the U.K., France, Italy, Germany, U.S.A., Latin America (with special reference to Brazil), Africa, Asia (with special reference to Japan, China and the Philippines), Australia and New Zealand, and India. The main trends of research work in these areas has been traced, with a view to locating the topics of neglect and perfunctory treatment. Some of the subjects suggested for further research might possibly have been intensively dealt.

In the second part of the paper, several researches have been reminded with a view to having an overall picture of the work done, and the lacunae and the gaps to be covered. The basis of demography being the collection of data, attention has in the first instance been devoted to the problems relating to enumeration, registrations, and compilation of other data. Different practices are noticed and some suggestions made. The concepts of distribution and composition of population are examined, next are estimation and projection. In all these the qualitative aspect is often ignored. Population movements - external and internal migrations - are also touched upon in this rapid survey. Contrary to common belief, the gaps in our knowledge are numerous and wide; interdisciplinary and multi-disciplinary analysis must attend to these issues. Active population is another concept, which is not clearly understood, especially with reference to the various forces responsible for the choice of vocations. (Having written a book on "Vocational Economics"; I am well aware of the difficulties of analysis in this field). The phenomenon of fertility is important in all demographic discussions; its socio-economic and other correlates have yet to be identified. Family, the basic unit in society as well as in demography, has not received the attention it has long deserved. Passing through a very critical phase, the family awaits detailed investigations from sociologists, anthropologists, economists - trained in some rudiments of

demography. Longevity, mortality and replacement of population are our last topics for discussion. While longevity and mortality have been the favourites, the phenomena of growth and replacement have been treated only statistically our plea is that the qualitative approach should not be sacrificed at the altar of numbers.

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Sunil

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Demographic Research in India & its Needs

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DEMOGRAPHIC RESEARCH IN INDIA AND ITS NEEDS

From P. Talwar*

1. INTRODUCTION

Rapid population growth and the problems associated with it have drawn the attention of many workers in India from the beginning of this century. Some workers highlighted the consequences of the alarming rate of population growth through their writings and some others concentrated on studies in localised areas on various aspects of the problem. Such efforts not only created awakening about rapidly increasing population but also fore-warned about its consequences. These did not go unnoticed by the planners of independent India who well understood the importance of population as a variable in the equation of economic development. The need for intensive training and research in demography was keenly felt in official circles as trained personnel to study inter-relationships between population and other variables was lacking. Hence one can say that the demographic research in general, and the population control

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The observations and views expressed in this paper are author's own without any reflection on agency with which he is associated.

programmes in particular received due attention and emphasis right from the very beginning of the First Five Year Plan. Since then, various Commissions have been appointed to study priorities and to guide research activities to make them more systematic and useful. The research became broad-based covering all aspects of demography with special emphasis on medical and social aspects of Family Planning and the requisite manpower.

1. This note attempts to present the existing system of Demographic and Family Planning research in India, bringing out some of its limitations. Some suggestions will be made to improve its quality and to make it more programme related. Some areas needing research on a priority basis will also be indicated. The research in Demography in India mainly centres around fertility and family planning without adequate emphasis on mortality or migration. Our comments in this paper will also be mainly related to research in Fertility and Family Planning (non-medical) though we recognize need of research in other areas.

2. CURRENT ORGANISATION FOR DEMOGRAPHIC RESEARCH.

The major source of demographic data in India is decennial population census conducted by the office of the Census Commissioner and the Registrar General of India. Some special surveys have also been conducted on various topics in demography such as migration and fertility. In addition demographic data are also being collected by the National Sample Survey Organisation and the State Bureau of Economics and Statistics also have Demographic Units. These Sections and many others located in other Ministries collect and analyse data related exclusively with evaluation and intelligence of their programmes. The Department of Family Planning has been mainly entrusted to coordinate and fund research related to Demography and Family Planning. Flow Chart I attempts to show Demographic Research Organization. Various international agencies like the Ford Foundation, UNDP, USAID, etc., besides providing assistance to the programme, also hire consultants who act as links between researchers in other parts of the world and the Programme in India. The Programme Evaluation Organisation can also be said to have shown interest in demographic research by conducting two studies on evaluation of the Family

Planning Programme. All these governmental and non-governmental agencies (shown in the first Plans) interact horizontally to know each others' needs and supplement the efforts.

2. The Department of Family Planning organises research activities mainly in two streams. One flow deals with programme related data and research which is carried out through the Regional Directors and his Central Family Planning Field Units at the regional level¹, State Family Planning Officers and their Demographic and Evaluation Cells (D & E Cell)² at the State level, District Family Planning officers at the District and the staff of Family Welfare Planning Centres/FHC at the peripheral level. (This stream is shown by a vertical system shown in Chart II).

3. The other flow is through autonomous bodies under the Ministry like National Institute of Family Planning (NIFP), International Institute for Population Studies (IIPS), National Institute of Health Administration and Education (NIEAE), Universities, Voluntary Agencies like the Population Council of India, the Family Planning Foundation, the Family Planning

Association, and International Non-Governmental agencies.

The last category includes some foreign universities where research activities related to India are also undertaken.

Non-Governmental agencies like Operations Research Group, Baroda, Indian Institutes of Management, Indian Marketing Institute, Indian Institute of Technology, Kanpur, have also shown interest in demographic research. Various Demographic Research Centres (DRC) and Demographic Communication and action Research Projects³ (DCAR) also conduct demographic and Family Planning related research and have become part of this flow. While the DRC's are engaged in research in Demography and Family Planning, DCAR's have been organized to carry out experimentation in effectiveness of various actions in Family Planning. The NIPP besides their own research activities has the responsibility of providing guidance and coordinating activities of various DRC's and DCAR's. The IIPS which started in collaboration with the V.H. as a Demographic Training Institute for South-East Asian countries has currently extended its activities in

various areas of demographic research with a good deal of emphasis on fertility and family planning.

3. CURRENT STATUS OF DEMOGRAPHIC TRAINING AND RESEARCH:

1. TRAINING:

The existing training facilities in India can be considered in four categories (a) Regular courses in Demography (Certificate, Diploma or Degree), (b) Fellowships for training in foreign countries, (c) One or more papers in Demography/Population as part of one of the subjects (Sociology, economics, statistics, etc.) at Master's level, and (d) A short term in-service training in Demography or Family Planning. The categories (a) and (b) provide full-fledged training in Demography which equips a candidate for demographic research career. The Demographic Training & Research Centre (DTRC) (now named IPT) was initiated in 1957 jointly by the Government of India and the United Nations to train persons of the South-East Asian Countries in Demography. All students who are enrolled hold a master's degree in one of the allied subjects. For Certificate course which is of one year's duration, they are exposed to (i) Principles of Demography and (ii) Population

problems in the world. They are encouraged to develop specialisation in one of the components of demography by preparing a paper under the supervision of one of the faculty members⁴. Successful completion of the Certificate course qualifies one to be admitted to Diploma course which extends to one more year. Besides a certificate and a diploma course some students have worked and some are working currently for the Doctor's degree by registering themselves in different universities. The Kerala University, Trivandrum, also started a Master's degree course in Demography since 1963, and have trained some students at Master's and some at Doctoral level. Only those could be considered for admission who had Master's degree.

4. Various international agencies like Population Council of New York, Ford Foundation and the USAID have been providing fellowships every year to the Government of India for higher studies - training and research. Quite a few people have been benefitted under these schemes and have secured Master's or Ph.D. degrees in some subjects with emphasis on population studies.

5. The Indian Statistical Institute, Calcutta, has also been training candidates in Demography at two levels. Some can offer Demography as part of their B. Stat. or M. Stat. Studies. Others can acquire additional qualification by undergoing one full year's course in Demography which is comparable to the Diploma course at IIPS.

6. The trainees in category (b) are introduced to Demography in a general way through a paper either in Demography or on population problems. Most of the universities provides such introduction as part of Statistics, Sociology or Anthropology course work. Those who get interested in the subject develop it through further training.

7. The category listed under (d) is mainly to make a person efficient in his work by exposing him to some aspects of demography related directly with his work. Such a short-term in-service training is conducted by C.S.O., ICI's office, Indian Statistical Institute or IIPS. Many institutions and even international agencies are prepared to arrange such in-service training on request. In the absence of adequate trained personnel, such in-service training here proved useful in bridging the gap and also in improving the quality and efficiency of the present workers.

There exist family planning training institutes at all levels to train family planning workers at different levels. Some are Central training institutes; others are Regional or State.

II. RESEARCH

It will be noted from the above that the training provided under categories (a & b) equips candidates to undertake independent demographic and Family Planning research. Other categories are only of introductory type and no research capabilities are generated except awareness of the subject and efficiency in the work. Currently the country is creating more research potential than what is being utilized. It should not mean that they cannot be absorbed but the fact is that many positions for demographically-trained personnel are occupied by insufficiently trained candidates.

Research activities, in general, can be divided into following categories:

- (A) Analysis of the secondary data
- (B) Data collection and analysis
- (C) Theoretical model building; (i) Simulation (ii) Mathematical
- (D) Methodological studies

All these research activities are necessary for a balanced research but as may be observed that research in India is very much unbalanced with almost total emphasis on the second category, listed above. This may be an indicator of inadequate coordination of the research activities. We shall consider each of the above category separately

and make observations about the current situation. Based on these observations, an attempt is made to list some of the limitations of the current research organisation.

(A) Analysis of Secondary Data:

Various sources of demography and family planning data are as follows:

- (i) Census
- (ii) R.G's office
- (iii) National Sample Survey
- (iv) Family Planning performance and related infrastructure statistics
- (v) Family Planning Survey Registers and Eligible Couple Registers which are of recent origin
- (vi) Case cards maintained for individuals receiving family planning services, and
- (vii) State Bureaus of Economics and Statistics.

The Census Organisation has been analysing the data and preparing their own reports. Many times they would contract out the research to leading research workers to prepare monographs on some important aspects of Indian life. Some of these monographs are of ordinary quality because the Census organisation do not seem to maintain close liaison with the research worker. Registrar General's Office is responsible for collecting vital Registration Statistics through Sample Registration Scheme. Recently, they have canvassed a small questionnaire on KAP in their sample areas. The National Sample Survey has been collecting heaps of demographic data which have never been analysed except on a very small scale. One step to get data analysed is by contracting out the research. The Department of Family Planning can also consider idea of contracting out the research based on data collected from their various sources (listed in sources (iv), (v) and (vi)).

B. Data Collection and Analysis:

Most of the research in India falls in this category since research in India is one man affair. An individual with a little training can plan a small study, secure a small financial grant collect data and prepare a report. It is not considered necessary to have a multi-disciplinary team of research workers. Staff in most of the research agencies except NIFF and IIPS is so small that one cannot expect a large study with elaborate design and analysis. Even at NIFF and IIPS, where the staff is relatively larger, there is no team spirit. Workers there also work at individual levels rather than in a team. Despite the fact that most of the studies in India are of a smaller scale without being representative of any areal unit or the population group there are also a few larger studies such as Migration in Greater Bombay, Family Planning through Clinics in Bombay, Fertility in Bombay and a Study on Lactation Amenorrhoea. The U.N. had collaborated in a large demographic study in Mysore State. Such larger studies are getting more popular. Currently two main studies on Fertility and Family Planning are under way - one in Delhi and the other in Calcutta. Recently there have been negotiations between the Government of India and various research organisations such as the Population Council of India, the Indian Institutes of Management (Calcutta and Ahmedabad) about undertaking some studies on fertility pattern and practices of family planning methods in each state of the country. Such studies are suggestive of the changing trend in research which focuses on the larger units. The Operations Research Group, Baroda has also recently undertaken a national survey of thirty thousand couples about their Family Planning practices.

C. Theoretical Models:

The models attempt to generate demographic phenomenon under a set of assumptions. Many complex processes can be understood and unknown

parameters estimated with the help of models which fit data well. Thus suitable model provides insight into the importance of variables included, their modes of action and their quantitative effects. In India many research workers mainly trained in Statistics and Economics have been developing mathematical models to assess various relationships. It is only for the last five years that simulation models are being developed at IIPS to experiment with various socio-economic policies. The lack of computer facilities is one reason why such models have not received adequate attention till today. There has been some effort to generate more interest in the model studies by organising seminars on 'Models in Demography' by various agencies and institutions.

D. Methodological Studies:

It is well known that various types of Non-Sampling Errors and biases creep into the data collected through various sources. This is the reason why it is necessary to give a close scrutiny to the data to improve the quality before its utilisation. The quality can be improved by right type of questions, right type of training to the interviewers and instructions to the coders. This involves good deal of experimentation with various techniques. The interpenetrating sub-samples and investigation on Recall Lapse Errors are some steps in this direction. The Mysore Population Study experimented with this type of methodology while conducting survey. Some Demographers at the IIPS and the RG's office have been working to adjust raw data received in the Censuses. These are only a few methodological studies carried out in India. In recent swing of KAP studies, there is need to develop scales to measure knowledge and attitudes of people towards various aspects of the family planning programme. Many workers attempted to develop such scales but they still need improvements in them.

4. LIMITATIONS:

Some of the limitations of the Demographic Research in India, based on observations made above, can be listed as follows:

- (1) Demographic research is not evenly spread over the four categories

listed above. Some aspects are over covered quantitatively (but of poor quality) and others are left without much emphasis. The balance is greatly lacking and this suggest need for setting up research priorities and adequate coordination for maintaining a balanced research.

- (ii) Much more data are collected than what is being utilised effectively. Most of the NCS data are left and presented, in the form of only cross-tabulations without any interpretation of them. The utilisation of Family Planning data are also not adequate. Whether more data are collected compared to what is required or the research workers are not interested in the secondary data? In the latter case it will be necessary to find out why research workers are not interested in the secondary data and how can they be motivated to utilise them more. One of the obvious reasons for its less-utilisation is its non accessibility to all the workers. One suggestion might be that these agencies should contract out the research and maintain a close contact to control the quality.
- (iii) Several KAP Surveys in Family Planning have been conducted but unfortunately they are deficient in many respects:

- (a) Sample represents a very small areal unit or a population group
- (b) Quality is not kept in all phases of the survey by working on it as a team, and
- (c) The design, questionnaire and analysis are not made comparable among various studies.

Such non-comparability fails to provide trend in the attitudes or in the KAP of Family Planning.

- (iv) Most of the XAP studies currently are on levels and differentials. There has not been any study which aims to understand 'whys' of the Family Planning Programme. Such studies are essential for their usefulness in the programme planning.
- (v) The quality of the research work has not been stressed as no consideration is given to the capabilities of the agencies to which project is granted. It would be essential to emphasize a team work for the project.
- (vi) There is no effort to have a periodic progress report of the project. This is one way of controlling quality of information and timely delivery of the results.
- (vii) Very few studies were done in a scientific way. The analysis limits itself to describing some tables without considering data from the viewpoint of the programme implementation. A few frequency distributions, cross tabulations, correlations and chi-squares are all that are available. It is obvious from these reports that analytical capability was not adequate. The attempt is to fulfill obligations by writing something in a methodical manner rather than fulfilling objectives of the study in a true sense.
- (viii) Research findings obtained from various studies have not been tested for its implementation. In fact there is no proper feed back loop for such findings. They are not absorbed in the programme.

5. NEEDS OF THE RESEARCH SYSTEM:

It will be obvious from the above section that research workers in India are mainly working in their own small way. A small study is undertaken and completed without assessing its priority, without comparing its results with other similar studies elsewhere and without attempting to feed back its results in the total system of programme implementation. In other words, there is need for:

- (a) Proper communication between researchers and programme implementers to suggest topics requiring research.
- (b) Supervision and guidance for research on a regular basis.
- (c) Communication with other researchers, and
- (d) Assessment and feed back in the programme planning.

Unfortunately in the present system the links are not strong. There is an urgent need to strengthen it to raise the status of demographic research in India and to make it more effective for the programme. This could be achieved by setting up strong research coordinating agency at the Centre which should be staffed by researchers as well as programme implementers. This agency should determine programme priorities, contract out research to outside agencies, maintain close contact with the program, arrange for a technical guidance if necessary and feed back research into the programme.

8. This suggests the need for two agencies - One or both at the Centre. First is that of 'linker' who can identify research needs, contract out research and keep supervision and then link findings to the main programme. Other is of a pool of technical people who can be available to provide technical guidance at the planning and/or at the analysis stage. This agency can also arrange short-term courses in basic statistics which can improve statistical skills of research workers. While discussing with research workers it is often felt that they need somebody with whom they can exchange their ideas and improve their research studies in contents and design. They would hesitate to seek cooperation from their colleagues and hence setting up of such agency might provide a solution to this isolation problem and also would improve the quality of analysis.

This group will be familiar with the on-going demographic research activities in the community and the world and thus not only provide the required assistance but also familiarises individuals with the current research activities in the other parts of the world. Also research workers should be aware of the existence of such a pool and seek its guidance and consultation whenever necessary.

9. There is need for creating effective coordinating agency which can scrutinize research proposals, assess the resources and then recommend proposal for funds. Such body can either be a part of the 'linker' agency suggested above or else it can have autonomous stature. In the latter case (as it exists today) there is need that the centre should have some control to ensure that the autonomous agency fulfills its obligations efficiently.

10. Recently the Government of India realised this sort of limitation in their coordination and planning capabilities, and is making efforts to reorganise the research activities by giving emphasis on Perspective Planning, Analysis of the Family Planning Performance Statistics and Research Management. The suggested unit will carry out the functions of the 'linker' as visualized above. The recruited staff will be such that they would feel at home with research workers as well as programme implementers.

11. Library facilities need be more easily accessible. Currently most of the workers do not have easy access to such facilities. More books and journals should be secured in universities in larger cities; other users should have upto-date list of the available publications for inter-library loan facilities. All DRG and DCAR Centres should be supplied a set of reference material which consists of all the basic material like the U.N. publications. It is fortunate that NIPP will have a Documentation Centre which will be of great help to the research community. There is need to develop some system so that not only larger institutions (but others outside) take advantage of these

facilities.

12. Analysis of data collected through various surveys is generally so poor that one is tempted to analyse it again. It is unfortunate that the agency who had collected the data does neither exploit it fully nor let anybody else exploit it. As a solution it should be stipulated in the contract that one deck of the data cards would be provided to the general research community after lapse of a certain period. Such stipulation will provide full worth of the money since either survey conducting agency or some other agency is likely to exploit data fully. It is high time to generate feeling of healthy competition among the research workers. Such data deck should be available in Data Bank which could be a part of the Documentation Centre discussed above. Efforts should also be made to inform research workers about the type of data available and extent of its utilization through various papers and reports based on the data.

13. India is a vast country with numerous researchers working on different types of demographic problems. It is very necessary that there should be an adequate and effective communication between the community about varied activities. Monthly or bi-monthly newsletter should be printed to familiarize the activities of various research workers. It should include description of the on-going researches and summary of those which have been completed.

14. There is need to extend the use of computers in demographic analysis. Currently such facilities exist in only big cities; there is need to extend it in other places also. The advantage of its wider use is that one need not know the steps in the calculation of various statistical measures; it is enough to understand their meaning and know their interpretations. The ready-made programmes are generally available and can be utilized to analyse data effectively. This will

bring more flexibility in statistical analysis.

15. At present there is need for a good demographic journal which can compete with other international journals. The introduction of such a journal is likely to create healthy competition among the research workers in India who would vie to prepare standard papers for publication.

16. A rethinking would be needed to reorganise staffing pattern in various research institutions. Except IIPS and NIPP, the staff in other places are so scanty that their total time is spent in fulfilling routine obligations without any left for developing and experimenting new ideas. The Government should be more liberal in sanctioning core staff to the DRC's which are main fountains of demographic research activities. Reconsideration is needed for staffing pattern even at IIPS and NIPP. An adequate staffing scale need be developed and different agencies should be sanctioned staff accordingly. A review of performance, in quality and quantity, of each institution should be made periodically and changes in the staff be recommended. Such incentives (or disincentives) might raise the level of research.

17. There is also a need to change emphasis in the fertility surveys. So far they have been emphasizing the study of levels and differentials. It is time that we should understand some 'whys' of acceptors or non acceptors. The respondents can be grouped in the four groups:

- (i) Those currently practising family planning methods.
- (ii) Those never practised so far.
- (iii) Those dropped out from family planning and
- (iv) Those who switched over from one method to the other.

A separate questionnaire for each of these groups should collect information on 'why' they belong to that particular group and what

are the reasons. Such studies will have great relevance in the programme planning.

6. NEEDED RESEARCH PRIORITIES:

The Government of India has been setting up some committees to look into areas of research from time to time. This list needs modification with the passage of time. We shall list some areas which should require attention of the research workers in the family planning programme:

(a) **Methodological research into the process of collection of data.**

One should know the type of biases which creep into the information collected through various sources. The extent of non-sampling errors need to be reduced. This all is possible only if systematic studies in reporting is undertaken.

(b) **A more careful look need be given to the data already available through various sources such as Censuses or National Sample Surveys. This might provide leads to areas where further research is needed.**

(c) **A bench-mark survey for collecting information on demographic and socio-economic characteristics of areal units (districts or even smaller ones) need be conducted through various existing agencies. The collected information should be of comparable nature. Such surveys will be helpful in studying differentials in family planning performance. Also they can be used for stratification needed for other sample studies.**

(d) **A series of sample surveys need to be conducted to understand factors responsible for family planning acceptance/non-acceptance/switchover/dropout. The studies should not only cover levels of KAP but also 'reason why' for their behaviour. These surveys should also collect information on some of the biological factors like sterility, amenorrhoea, foetal losses etc.**

- (e) Simulation studies should be encouraged to assess effects of various social policies.
- (f) Follow-up of family planning acceptors
 - (i) trend in characteristics
 - (ii) satisfaction and dissatisfaction with on-going publicity and service facilities.
- (g) A study of differential performance in various districts so as to identify factors which accelerate or de-accelerate the acceptance of the family planning programme.
- (h) A good deal of emphasis need be placed on experimental projects which can answer problems of the type:
 - (i) Clinic vs Camp approach
 - (ii) Individual incentives vs community incentives
 - (iii) Optimum media mix
- (i) A detailed study should be done in the areas where family planning programme has shown good results. There is need to prepare case studies of these areas so that factors responsible for achievement could be identified and attempt could be made to replicate this in other areas.
- (j) Some attempts need be devoted to develop sensitive indices to measure short term changes in fertility due to family planning programme.

SUMMARY

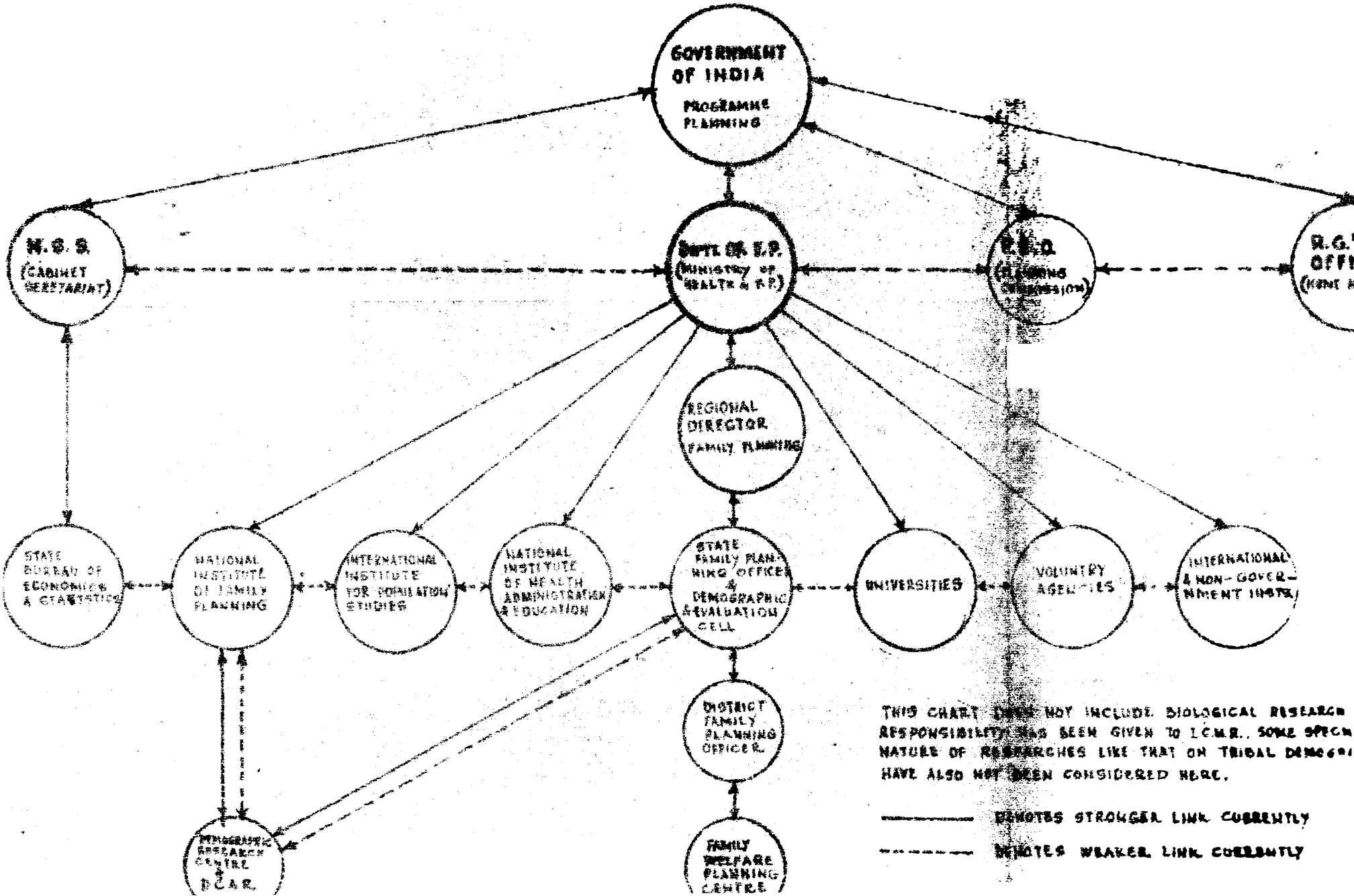
This paper has attempted to discuss the existing system of Demographic and Family Planning Research in India, bringing out some of its limitations. Some suggestions have been made to improve its quality and to make it more programme related. Some areas needing research on a priority basis have also been indicated. The emphasis has been on research related with fertility and family planning since most of the demographic research in India centers around these two important areas.

After introduction, the first section of this paper describes the existing organisation for research which flows in two streams. One flow deals with programme related data and research which is carried out by the governmental agencies; the other flow is through autonomous institutions. The second and third sections discuss the current status of the demographic training and research. Various types of training and research activities have been considered and observations are made on their weak and strong aspects. Based on the weaker aspects, the next section emphasises needs of the reorganised research system which would overcome some of the limitations of the current system. In the end, a list of the priority areas of research has been given in the hope that research workers can assess their own work and change their emphasis if they are working on different areas.

FOOTNOTES

1. The whole country has been divided into six Regions - Eastern, Northern, North-Western, Central, Western and Southern.
2. D & E Cells have been introduced in each State for the last one year to perform a better job of evaluating the progress of P.P. Programmes and understand some of its 'Whys'.
3. Some DRCs and DCAR Centres are located in the Universities but we do not include them under universities, but consider them separately.
4. There has been some change in Curriculum recently.

DEMOGRAPHIC RESEARCH ORGANISATION



THIS CHART DOES NOT INCLUDE BIOLOGICAL RESEARCH RESPONSIBILITY HAS BEEN GIVEN TO I.C.M.R. SOME SPECIAL NATURE OF RESEARCHES LIKE THAT ON TRIBAL DEMOGRAPHY HAVE ALSO NOT BEEN CONSIDERED HERE.

————— DENOTES STRONGER LINK CURRENTLY
 - - - - - DENOTES WEAKER LINK CURRENTLY