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**NATIONAL FERTILITY
AND MORTALITY SURVEY
MAHARASHTRA 1980**

K. Sivaswamy Srikanthan
Vaijayanti Bhat

P00160

Gokhale Institute of Politics and Economics
Pune-411 004.

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FOREWORD

The Gokhale Institute has played a pioneering role in conducting demographic surveys in India. In keeping with this tradition, the Institute agreed to undertake a comprehensive demographic survey for Maharashtra State as a part of the National Fertility and Mortality Survey (NFMS). This series of comparable demographic surveys was planned for all major states of India on lines similar to the World Fertility Survey. However, the survey has been conducted so far only in Maharashtra State in the comprehensive manner as originally envisaged.

A grant-in-aid for field work and data processing was given by the Ministry of Health and Family Welfare, and we are thankful to the Ministry for the same. The survey was designed, conducted, analysed and the report prepared by the Population Research Centre of our Institute.

Regional and social demography has a crucial role to play in evolving population policies and programmes. Hence the major objectives of NFMS, Maharashtra were to estimate the levels and differentials in fertility and mortality rates among the three rural regions and two urban zones of the State and by various socio-economic characteristics; to examine the effect of proximate determinants of fertility like age at marriage and contraception; and to assess the prevalence of family planning and its impact on fertility decline.

Data were collected from a well designed sample of about 7,500 families spread over 100 villages and 104 urban blocks of the State during 1980. A mimeographed report on the survey was released in 1982. Since then 1981 Census results for Maharashtra State have become available and several special studies have been completed using NFMS data and incorporating the latest methodology. Taking into account these various sources, the report has now been revised for publication.

The Report brings out the differentials in birth rates, death rates and the rates of natural increase among different communities, regions, occupations, levels of incomes and between rural and urban areas within the Maharashtra State. A definite preference for the two-child family was observed in the urban but not in the rural areas. The study also recorded preference for sons over daughters, which was sharper in rural areas. It is further observed that, on the whole, the ideal age at first marriage for brides was above the actual age at first marriage and there was less variation, by community, in the ideal than in the actual age at marriage.

It is hoped that these and other findings from this report will provide a useful basis for planning and programme administration in Maharashtra and that the report will stimulate interest in regional demography in other states of India.

Gokhale Institute of
Politics and Economics,
Pune 411004 (India).
May 1989.

V.S.Chitre
Director

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Pune 411 004

CORRECTIONS

<u>Page</u>	<u>Paragraph</u>	<u>Line</u>	<u>Error</u>	<u>Correction</u>
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7	6	7	Standardising	Standardizing
11	3	5	methods	method
13	1	8	ws	was
16	4	6	number	numbers
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22	6	6	1982	1980
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181	Table 7.2	Col. heading	No. of children	No. of sons

PREFACE

Social demography has a crucial role to play in evolving a population policy and in setting up feasible long-term demographic goals. Such goals depend not only on the programme infrastructure and performance but also on social values and institutions. A socio-demographic survey, such as the National Fertility and Mortality Survey (NFMS), would provide the basis for the development of human resources.

The study of regional demography is important for a large, populous and heterogeneous State like Maharashtra in the throes of urbanization and modernization. There are wide socio-cultural variations within the State that lead to differentials in fertility levels, in contraceptive use, in the age at marriage, in family size values and other associated factors. The health and social infrastructure varies from one region of the State to another. Unless the relevant facts were established and analysed to reveal such regional differences, it might not be possible to achieve the aggregate goals of a population or health policy formulated for the State as a whole.

The National Fertility and Mortality Survey (NFMS) was originally planned to be conducted as a series of comparable demographic surveys in all the States of India. In the first phase six States were to be covered. However, the survey has been conducted so far only in Bihar, Maharashtra and Rajasthan. Moreover, in Bihar and Rajasthan the objective has been changed to conducting bench-mark surveys in selected districts for evaluating special population projects. Thus Maharashtra is the only State for which the National Fertility and Mortality Survey has been conducted as envisaged by the Population Research Advisory Council.

The major objectives of NFMS, Maharashtra were to estimate the fertility levels and differentials among the three rural regions and two urban zones of the State; to examine the linkages between fertility and its proximate variables such as age at marriage and contraception; to identify and assess the importance of socio-economic factors affecting fertility; to find the attitudes towards family planning and its prevalence by methods; and to estimate mortality levels and differentials by rural regions and urban zones, giving special attention to infant and child mortality. The report is addressed towards these objectives and presents relevant findings.

The Population Research Centre (PRC) of the Gokhale Institute of Politics and Economics undertook to conduct the survey, analyse the data and prepare a report for the State of Maharashtra. The Ministry of Health and Family Welfare of the Government of India provided a grant-in-aid for this survey. This grant was used for field work, data preparation and computer tabulations. The survey design, questionnaire construction, recruitment, training and supervision of the field staff, preparation of code-books and the tabulation plan, analysis of data and the preparation of this report were done by the staff of the Population Research Centre in addition to their normal duties.

In the National Fertility and Mortality Survey, Maharashtra, data were collected from about 7,500 families spread over 100 villages and 104 urban blocks of the State. The field work was conducted during June to December 1980. The conduct and analysis of this large-scale survey required the cooperation and skills of many people to be completed successfully. The Director of the Gokhale Institute and the administration extended their support in all stages of the survey. Professor Kumudini Dandekar developed the questionnaires and shouldered the onerous responsibility of organizing and supervising the field work. My coauthor, Smt. Vaijayanti Bhate was associated with all stages of the work from sample design to analysis. Smt. Sanjeevane Mulay assisted in developing the scrutiny and consistency checks. Smt. Surekha Nikam and Smt. Smita Bhawe contributed greatly to scrutiny, coding and analysis of the data. Shri Damodar Sardesai and his colleagues generated the computer tables needed for the analysis. Kumari Vidya Athalye coordinated the computer output while Kumari Swati Saxena summarized the computer tables and also prepared mortality estimates by indirect methods. Our thanks are especially due to the rural and urban respondents who patiently and courteously gave the information that was sought.

The Gokhale Institute has played a pioneering role in conducting demographic surveys in India. It is hoped that this report on a state-wide fertility and mortality survey for Maharashtra would encourage other States to undertake comparable demographic surveys that would reveal regional differences within the State and provide a basis for socio-demographic transformation.

It is not possible to cover all aspects of social and regional demography in one report. This report is intended to summarize the main findings from the survey. It is, no doubt, necessary to examine these findings in greater depth. Special studies based on NFMS data have been taken up, from time to time, by the Population Research Centre and are published elsewhere. Some of the relevant findings from these studies are included in the first chapter. It is also necessary to explore the implications of these findings for the population policy and programmes which is done briefly in this report.

The mimeographed version of this report was released in 1982. It has taken a longer time than anticipated to bring out the printed report due to several reasons. The report was revised in the light of comments received from researchers in this field. The chapters were rearranged to improve the readability of the report and to transfer the more technical aspects to the appendices. Advantage was taken of the social and cultural tables for Maharashtra State from the 1981 Census published by Registrar General of India only in 1986. These Census reports were used to examine the representativeness of the sample and the comparability of the survey results for the 1980 with the 1981 Census figures. Relevant findings from some of the in-depth studies completed using NFMS data are also included in this report. The reports of the evaluation surveys conducted by the PRC on the family welfare, and maternal and child health care programmes are utilized to assess family planning statistics. Although the publication of this report has been delayed, it is felt that the findings and their policy and programme implications

will prove useful for planning and programme administration since the issues discussed are of current importance.

Deccan Gymkhana, Pune

25th August 1988.

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Professor-in-Charge
Population Research Centre of
the Gokhale Institute of
Politics and Economics

NATIONAL FERTILITY AND MORTALITY SURVEY,

MAHARASHTRA, 1980

MAIN REPORT

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CHAPTER 1

MAIN FINDINGS, METHODOLOGICAL ISSUES AND POLICY IMPLICATIONS

MAIN FINDINGS

Introduction

In this chapter, the main findings of the National Fertility and Mortality Survey, Maharashtra 1980 are summarized. The methodological issues involved in the conduct of such a survey are examined and finally the policy implications of the findings are discussed. This chapter is intended to provide a overview of the survey while the subsequent chapters present the methodology, the detailed results and demographic analysis of the data.

Survey Objectives

The National Fertility and Mortality Surveys (NFMS) were originally planned to be conducted as a series of comparable demographic surveys in all the states of India. In the event, Maharashtra is only the state for which NFMS has been conducted so far as envisaged by the Population Research Advisory Council.

The major objectives of NFMS, Maharashtra were to estimate fertility levels and differentials among the three rural regions and two urban zones of the state; to examine the linkages between fertility and its proximate determinants such as age at marriage and contraception; to identify and assess the importance of socio-economic factors affecting fertility; to find the attitudes towards family planning and its prevalence by methods; and to estimate mortality levels and differentials by rural regions and urban zones, giving special attention to infant and child mortality.

In this survey data were collected from about 7,500 families spread over 100 villages and 104 urban blocks of the State. The field work was conducted during June to December 1980 and the draft report was ready by the end of 1982. The field work, preparation of data and computer tabulations cost just under Rs. 3 lakhs. The analysis and preparation of report was undertaken by the staff of the Population Research Centre of the Gokhale Institute of Politics and Economics, Pune in addition to their normal duties. The main findings of this survey are summarized in the following pages. The details of the analysis and the results are described in the following chapters.

Socio-demographic Profile

The socio-demographic profile from NFMS, 1980 was compared with the 1981 Census profile for Maharashtra State in order to examine the representativeness of the NFMS sample, and to find the differences in the definitions used in the Census and the survey. The distributions by the following characteristics were compared: age-sex, marital status, community (caste-cum-religion) and educational level.

This comparison showed that the NFMS sample is broadly representative of Maharashtra State population. The definitions employed in the survey and the Census are generally comparable but there are a few exceptions. Both NFMS and the Census covered the household population on a *de jure* basis. The Census population included, additionally, persons staying in institutions or without a fixed abode. All the persons following the religion of *Navaboudha* were included in Scheduled Castes in NFMS while the Census practice is somewhat ambiguous. The educational levels of persons at school and not at school were obtained separately in NFMS but not in the Census.

While the NFMS followed the 1971 Census definition of Scheduled Castes and Tribes in terms of nomenclature and area restrictions, in the 1981 Census, the area restrictions in defining Scheduled Castes and Tribes had been removed for Maharashtra State.

The demographic profile from NFMS was also compared with that from the 1971 Census in order to establish the trends in demographic variables. Since the Census and survey definitions broadly correspond, it is valid to examine these trends.

Significant demographic trends emerge from this comparison. The age distribution suggests a decline in both the fertility and mortality levels between 1971 and 1980 in rural regions as well as urban zones. The child-woman ratio confirms the decline in fertility among both married women and all women. The age at marriage has risen and the percentage married in younger ages has declined in all the domains of study.

The percentage of Scheduled Castes and Tribes, and Muslims in the population of each domain has been compared between NFMS and the 1971 Census. The percentage in each of the three groups was slightly higher in NFMS as compared with the Census due to various reasons. While the Scheduled Castes were more evenly distributed, the Scheduled Tribes were concentrated in the rural regions of Vidarbha Division and Western Maharashtra and the Muslims were concentrated in the rural region of Marathwada and in the two urban zones. Comparison of the educational level by broad age groups showed an improvement in the literacy and educational attainment of both sexes in NFMS 1980 compared to the 1971 Census.

Background Characteristics

Demographic, social, economic and health characteristics showed significant differentials among the three rural regions of Marathwada, Vidarbha and Western Maharashtra and the two urban zones of Greater Bombay and other urban centres. Marathwada appeared to be backward among the rural regions as judged by the social indicators of percentage ever married in younger age groups, literacy and educational attainment, and school enrolment rates by age group. These indicators revealed a rural to urban continuum. Again, in some of the economic indicators, Marathwada was backward compared to other rural regions.

Indicators of health and environment included type of housing, source of drinking water, access to latrine, and the prevalence of

disabilities and incidence of illness. Housing condition in Greater Bombay was worse than in rural areas in terms of over-crowding and sanitary facilities. In Greater Bombay about 24.0 per cent of families did not have access to either an independent or a common latrine. Urban areas had a smaller proportion disabled compared to rural areas.

Using electric lighting and ownership of certain expensive consumer durables as indicators of modernization, a systematic gradient was found from Marathwada (least modern) to Vidarbha to Western Maharashtra to other urban centres to Greater Bombay (most modern). The observed differentials in the several background characteristics among the three rural regions and two urban zones provided the necessary social and economic context to the study of differentials in fertility and mortality levels.

Current Fertility and Mortality Trends and Differentials

Consistent with the levels of other socio-economic and modernization indicators presented earlier, among the rural regions, Marathwada had the highest fertility and mortality rates, Vidarbha had intermediate rates and Western Maharashtra had the lowest rates. Other urban centres had birth and death rates below the rural rates and Greater Bombay had the lowest rates. The rates of natural increase did not vary widely, rural rates being slightly above 2.0 per cent and urban rates slightly below 2.0 per cent. For Maharashtra State, the birth rate for the year, April 1979 to March 1980, was 28.5, the death rate 8.3 and the rate of natural increase 2.0 per cent before adjusting for non-sampling errors. The differentials by various characteristics are compared below using the unadjusted vital rates on the assumption that the errors are similar for all categories. The adjusted vital rates for rural and urban areas are presented at the end of this section.

By communities, the birth and death rates were lowest for advanced Hindus. Muslims had the highest birth rate but a low death rate. Scheduled Castes and Tribes and backward Hindus had high birth and death rates. Intermediate caste Hindus had birth and death rates between the rates for advanced Hindus and those for Scheduled Castes and Tribes and backward Hindus. Muslims had the highest rate of natural increase. Among the regions/zones, Marathwada had the highest birth and death rates within each community.

By family occupation, families engaged in professions and administration had the lowest birth rate and a low death rate. Families engaged in agriculture and allied activities and those engaged in processing, manufacturing and transport had the highest death rates and high birth rates. The rates for families with other occupations fell in-between. Contrary to expectations, in rural areas, families engaged in agriculture and allied pursuits had low birth rates compared to other occupations. In urban areas, the professional and administrative class had the lowest natural increase rate while other occupational classes had a rate just below 2.0 per cent. In rural areas the rate of natural increase was above 2.0 per cent for all occupational classes.

For Maharashtra State, birth rate by income group showed an inverted U-shape, with the highest rate for the middle income group.

Urban areas showed a similar pattern but in rural areas, there was direct, but weak, relationship between income and birth rate. An inverse relationship was found between income and death rate, both in rural and urban areas. An inverted U-shaped relationship was observed between income and the rate of natural increase in urban areas, but in rural areas and for the State as a whole, the relationship between income and the rate of natural increase was direct due to the larger differentials in the death rate.

Age-specific marital fertility rates followed the usual pattern, rapidly reaching a plateau in ages 20 to 29, and falling off at higher ages. The general marital fertility rate for married women aged 15 to 44 (GMFR) for other urban centres was 88.7 per cent and for Greater Bombay 77.4 per cent of the rural GMFR. These differentials could be attributed to differential fertility and family planning within marriage.

The summary measures indicated that, within marriage, the fertility level was about the same in Marathwada and Vidarbha while it was slightly less in Western Maharashtra. But when the fertility level of women of all marital statuses was considered, Marathwada had the highest fertility followed by Vidarbha while Western Maharashtra had the lowest fertility.

Compared to SRS, 1972, the rural total fertility rate (TFR) had declined by 16.8 per cent and the urban TFR by 26.2 per cent in NFMS, 1980. The declines at younger ages were due to a rise in the age at marriage and the declines in older ages were due to the use of family planning methods by couples.

The urban age-specific fertility rate (ASFR) was less than the rural ASFR in all age groups except ages 15 to 19. This reversal was, perhaps, due to the higher fecundity of women who married young in urban areas and a quicker pace of family formation.

By comparing the age-specific marital fertility rate (ASMFR) schedule for married women with that for the non-contracepting married women, the impact of family planning on fertility was assessed. It was found that there was a reduction in the GMFR of married women aged 15 to 44 by 29.5 per cent in rural areas and 37.5 per cent in urban areas compared to the GMFR of non-contraceptors among them. Since almost all rural women and most urban women accepted family planning methods from the programme, all the reduction in marital fertility, by the year 1980, in rural areas and most of the reduction in urban areas could be attributed to the programme in Maharashtra State.

The age-specific mortality rates followed the typical J-shaped curve in rural and urban areas for males and females. While the death rates for rural and urban males were at reasonable levels, the death rate for urban females was unusually low even after standardizing for the age distributions. This low rate clearly indicated response and other non-sampling errors in reporting deaths occurring to urban females and was confirmed by further analysis using indirect methods of estimation as discussed in Chapter 8. The rates were adjusted for such errors and male and female life tables constructed. The life expectancy

for males was estimated at 58.1 years and for females at 56.9 years after suitable corrections of the survey data.

Family Formation and Cumulative Fertility

Family formation and cumulative fertility and their proximate determinant of age at marriage were examined from the survey data for trends and differentials. The mean age of the currently married women aged 15 to 50 showed a gradient within the rural regions and between rural areas and urban zones. Marathwada had the lowest mean age for these women while Vidarbha and Western Maharashtra had higher mean ages. Urban areas had a higher mean age and Greater Bombay had the highest mean age for currently married women aged 15 to 50. The same gradient was observed among the percentages of women aged 15 to 19 and 20 to 24. The distribution of currently married women by marital duration was fairly similar in all the domains. Again a rising gradient was found in the mean age at first marriage from Marathwada to Vidarbha to Western Maharashtra to other urban areas to Greater Bombay. In the last 25 years, the mean age at marriage has risen by age cohorts of women 25 years and over.

Women's educational attainment was far below that of their husbands'. There was a sharp rural-urban difference in the educational attainment of these women as well as their husbands. Among rural regions, Marathwada had the highest percentage illiterate and the lowest percentage in each of the other educational levels both for the women and their husbands.

By domains, no clear pattern was discernible in the mean number of live births per currently married woman since the age composition varied among the domains. Currently married women in Maharashtra had, according to NFMS, 1980, on the average, 3.21 conceptions, 3.07 live births and 2.60 living children. These averages were the result of both the pattern of cumulative fertility and the age compositions of currently married women.

The mean parity per currently married woman aged 45 to 50 was greatest for rural Maharashtra and least for Greater Bombay. The same pattern was repeated for ages 25 to 29 and above. Currently married women aged 30 and above could be regarded as constituting age cohorts since few first marriages take place above this age. The mean parity increased with the age of the cohort in all three rural domains. The increasing mean parity was due both to increasing family size with advancing age and to a larger completed family size for older cohorts. Age standardized mean parity for currently married women aged 15 to 50 also showed a rural to urban gradient.

The mean parities per ever married and all women were estimated indirectly. The mean parity of ever married women was slightly below that of currently married women and the difference between the two increased with age group since the proportion of time spent in currently married state by the ever married women was near unity in the youngest age group and declined steadily with age. The mean parity for all women came closer to the mean parity for ever married women for age group 25 years and above since the proportion of ever married women was nearer

unity for these age groups. The mean parity of all rural women in age cohorts 30 years and above increased steadily with age. This steady increase may be attributed both to the progress of family building and to the increasing level in the completed family size with the age of the cohorts. Compared to rural Maharashtra, the pace of family building was slower and the completed family size for age ages 45 to 49 smaller in other urban areas. Similarly, the pace of family building was found to be slower and the completed family size smaller in Greater Bombay compared to other urban areas.

The cohort of women aged 35 to 39 had nearly completed their family size. The mean parity of this cohort was compared with that for the cohort of women aged 45 to 50. It was found that there was a fall in the mean parity of the younger cohort in all three domains. Thus a significant decline in the completed family size of the cohort of women aged 35 to 39 may be expected in the next ten years in both rural and urban areas.

The age standardized mean number of living children for Greater Bombay was below that of the other two domains. The same relationship holds good for age standardized mean number of sons and daughters. Similar relationships are seen in the means for currently married women aged 45 to 50. Since the numbers of living children, sons and daughters are affected by both differential fertility and differential mortality, the rural to urban gradient is not as large for these variables as for live births.

For the oldest marital duration cohort, the mean parity for Greater Bombay was substantially below that for the other two domains, while for the next marital duration cohort of 20 to 24 years, both the urban domains had mean parities below that for rural areas. The rural-urban differentials in the mean numbers of living children for the two oldest cohorts were reduced because of the counteracting differentials in the mortality levels of children. For the same reason, the duration standardized mean number of living children in rural areas was below that in urban areas.

For the State as a whole, the mean parity was lowest for advanced caste Hindus, highest for Scheduled Castes and Muslims, and intermediated for other castes. This was generally true of the age standardized mean parities in rural Maharashtra, other urban areas and Greater Bombay. The range of variation by communities in the standardized mean within rural areas was less than within the two urban zones. The effect of urbanization on fertility was felt mostly by advanced and backward caste Hindus. The mean parities, standardized for marital duration, gave more or less the same ranking of communities as that obtained by standardizing the mean for age. The range of variation in the duration standardized mean was also of the same order, within each domain.

There was a gradient, in all three domains, in the mean parity by the educational attainment of currently married women. However, the urban differentials were larger than those for rural areas and the mean parity of women with the same educational attainment did not vary much over the three domains. It may be inferred that the effect of education

was, perhaps, stronger than the effect of residence.

The pattern of the duration standardized mean parity by women's educational attainment and place of residence was different from that for the age standardized mean parity. This is because, in standardizing for marital duration, the effect of age at marriage is removed to some extent. In rural areas, the duration standardized mean parity did not show a steady decline with higher educational attainment. In urban areas, the most significant decline in the duration standardized mean parity occurred among women with an educational attainment of or above VIII standard compared to lower educational levels.

The mean parity, standardized for age, showed a gradient, within each domain, by husband's educational level also. This gradient was steeper than the rural-urban gradient in standardized parity within each educational level. However, the range of variation in the age standardized mean by husband's educational level seems to be less than that by the woman's own educational attainment. Hence the currently married woman's educational attainment appears to have a larger effect on her cumulative fertility than that of her husband.

From the distribution of currently married women by their age at first marriage, it is evident that the age at first marriage was less in rural than in urban areas. The mean parity shows a sharp gradient by the age at marriage. These differentials cannot be attributed solely to the age at marriage, since each group of women could be at different stages of family formation and their distribution by duration of marriage could be different. Comparison, within each domain, of the cumulative fertility of women with the longest marital duration revealed a difference, by their age at marriage, in their mean parity. The range of variation in the mean parity, by the age at marriage, was smaller in rural compared to urban areas. Higher age at marriage and urban residence jointly appeared to reduce the mean parity by more than the sum of the separate effects of these two factors.

The percentage of women who delivered their first child after reaching 22 years of age was lowest in rural areas, somewhat higher in other urban areas and highest in Greater Bombay. This indicates the earlier start of family building in rural compared to urban areas.

The mean parity of women married for the first time before age 15 was larger than for women married between ages 15 and 18 which in turn was larger than the mean parity of women married above age 18. These differentials were also true for each community. There are no consistent differentials in the mean parity by community within each age at first marriage group. This lack of pattern might be due to the small sample size on which the mean parity is based. Standardising for the age at first marriage, the mean parity was lowest for advanced and intermediate Hindus and highest for Scheduled Castes and Tribes and Muslims. The differentials in mean parity by community persist even after controlling for the age at first marriage. So these differentials arise from other social and cultural factors and not solely from the age at marriage.

There was a definite preference for the two child family in the

urban but not in the rural areas. The mean ideal numbers of children, sons and daughters showed a downward gradient from rural areas to Greater Bombay. These figures showed also a preference for sons over daughters, which was sharper in rural areas.

The large percentage of currently married women in both rural and urban areas, who already had as many or more children than they wanted, showed the contradiction between the actual and desired number of children. However, this percentage cannot be readily interpreted as the unmet need for family planning since the decision to have an additional child may rest with the whole family, contingent on prevailing social norms and values.

Among the rural regions, Marathwada had the lowest mean ideal age at marriage for both brides and grooms. The rural-urban pattern in the ideal age at marriage was similar to the actual age at marriage but the mean ideal age was higher than the actual mean age at first marriage for brides.

In rural Maharashtra, the mean ideal age at marriage for brides was highest for other religions and lowest for backward Hindus. In other urban areas, advanced Hindus and other religions had the highest and Scheduled Castes and Tribes the lowest mean ideal age. In Greater Bombay, other religions had a higher ideal age at first marriage than all other communities. For each community, the ideal age at marriage was lowest for rural areas and highest for Greater Bombay. On the whole, the ideal age at first marriage for brides was above the actual age at first marriage and there was less variation, by community, in the ideal than in the actual age at marriage.

Rural women did not have high educational aspirations for their daughters compared to women in other urban areas and Greater Bombay. Among the rural regions, Marathwada was more backward, in this respect, than the other two regions. Educational aspirations for sons, reported by currently married women, was naturally higher than that for daughters and the variation by domains was less for sons than for daughters.

Family Planning Knowledge and Use

In this survey, extensive data were collected and analysed on family planning knowledge and use and the socio-demographic characteristics of acceptors and non-acceptors of modern contraceptive methods of condom, oral pill, IUD and sterilization.

In Maharashtra State, 24.1 per cent of the women knew of condom, 18.0 per cent knew of oral pill, 15.5 per cent of IUD and 79.0 per cent of sterilization. The percentage knowing each method was much higher in urban compared to rural areas and highest in Greater Bombay. Among rural regions, Marathwada had the lowest percentage knowledge about each method.

In terms of the number of modern methods known, 18.7 per cent women had knowledge of no method, 52.9 per cent knew of one method only and 28.4 per cent knew of two or more methods. Most of the women in rural areas knew only about sterilization.

As regards the usage of modern methods, 65.0 per cent of the women had never used any method, 33.3 per cent had ever used one method and 1.7 per cent two or more methods. There was not much difference in the percentage of couples sterilized between rural and urban areas. As for the other methods, the percentage of couples using them was rather low in urban areas and negligible in rural areas. The direct estimate of the percentage of eligible couples sterilized in rural areas from the survey was close enough to the indirect estimate made from the programme statistics by the method of attrition due to mortality, widowhood and aging. The corresponding estimate for the urban areas from the service statistics was, however, higher than the direct estimate from the survey. Only about 0.7 per cent of the rural and 5.0 per cent of the urban women had used multiple methods or shifted from one method to another.

The pattern of differentials for current use was similar to that for ever use of contraceptive methods. In the State, 30.9 per cent of the couples were sterilized, 0.5 per cent women were currently wearing IUD, 0.6 per cent women were taking oral pills and 1.4 per cent couples were using condoms while 66.6 per cent of the couples were currently using none of these methods. The percentage of current and ever use of condom, oral pill and IUD was negligible in rural areas but somewhat higher in urban areas.

The percentage of non-users of modern methods of family planning by marital duration showed a decrease upto 20-24 years and then increased slightly for couples married for 25 years or more. This is consistent with the increasing practice of family planning with increasing marital duration except for the oldest cohort, who might have had larger family size values and who were not exposed to the programme during their prime child-bearing years. Urban women accepted family planning earlier in their marital life than rural women did.

Among women aged 35 years or more, the percentage with no knowledge of contraceptive method was nearly twice as large for women wanting more children compared to those wanting no more children. The percentage of couples currently using a contraceptive method was consistently higher for wives wanting no more children compared to those wanting more children. This percentage steadily increases with age and the difference in the percentages for the two groups of women also increases with age. Reproductive desires were more closely linked to contraceptive use than to contraceptive knowledge.

About one-fifth of the condom users in urban areas and two-fifths in rural areas had obtained it free of cost. Among women using the pill, one-fifth of the urban women and three-tenths of the rural women had obtained it free of cost. About ten per cent of pill users complained of nausea, headache, etc.

About 60 per cent of the IUD's were fitted by private doctors in urban areas, whereas in rural areas very few IUDs were inserted. A higher percentage of rural women reported bleeding as an after effect than urban women did. The IUD, both as a limiting method and as a reversible spacing method, was used sufficiently early in their life cycle by younger women at a lower parity. The percentage of women

shifting from IUD to sterilization was larger in rural than in urban areas.

The percentage distribution of sterilized couples by years since sterilization tapered off in the earlier years of the programme somewhat because of attrition due to mortality and marriage dissolution but more because of the constant tempo of the programme up to the time of Emergency. The percentage of couples sterilized was higher in urban areas than in rural areas. Further, Marathwada lagged in this percentage in earlier years and picked up during the Emergency as compared to the other two regions. Immediately after revoking the Emergency, the percentage of sterilized couples fell due to the backlash effect on the programme.

The average age of wife at sterilization was 30.4 years in rural areas and 28.9 years in urban areas. A somewhat larger percentage of couples in urban compared to rural areas was sterilized when the wife was 25 to 29 years old. The average age of husband at sterilization of the couple was 36.6 years for the State against an average age of wife of 29.9 years. The corresponding average age of husband was 36.9 years in rural areas and 35.9 years in urban areas. A larger percentage of couples was sterilized in urban than in rural areas when the husband was 30 to 34 years old. A reverse rural-urban differential was observed for couples sterilized when the husband was 40 to 44 years old.

In urban areas, only 3.1 per cent of the couples were sterilized at a camp against 23.6 per cent in rural areas. But 28.2 per cent of urban couples were sterilized in private hospitals or dispensaries against only 9.0 per cent for rural couples. There were significant differences among rural regions in the distribution of couples by the place of sterilization. In Western Maharashtra, a higher percentage of couples was sterilized in private hospitals or dispensaries compared to the other two regions. Mostly the sterilizations were performed in PHC or government hospitals. Sterilization camps played a more important role in Vidarbha and the percentage sterilized in government or work-place hospitals was less than that for the other two regions.

The percentage of couples who had four or more living children at the time of sterilization was 68.3 for Marathwada, 65.8 for Vidarbha, 62.9 for Western Maharashtra, 62.7 for other urban areas and 60.6 for Greater Bombay. The percentage of couples sterilized with two living children was slightly higher in the urban zones than in the rural regions. Compared to urban areas, a larger percentage of rural couples underwent sterilization with three or more living sons, while this relationship was reversed for couples who were sterilized with only one living son.

Among men undergoing vasectomy, 82.0 per cent did not report any trouble after the operation. The after effect of frequent physical pain was reported for 5.6 per cent of vasectomies performed in the State and sepsis or swelling that was successfully treated was reported for 1.8 per cent of vasectomies. A higher percentage of men reported after effects of the vasectomy operation in rural than in urban areas.

The percentage of women reporting no trouble after the tubectomy

operation was higher than the corresponding percentage for vasectomy operation in both rural and urban areas. For the State of Maharashtra, 87.5 per cent of the women reported no trouble after the tubectomy operation, 4.3 per cent reported minor troubles, 2.3 per cent reported general weakness, 1.1 per cent reported serious backache most of the time, 3.5 per cent reported menstrual trouble and 1.3 per cent reported sepsis or other serious complications.

The mean parity and mean number of living children of women, by their contraceptive knowledge and method used, showed the usual life cycle variation by age. Considering rural women aged 35 years and over, the mean parity of women who knew about family planning was 5.24 against the mean parity of 3.99 for women who did not know about family planning. This difference could be attributed to some extent to the selectivity of sub-fecund and sterile women in the group with no knowledge of contraceptive methods and to breast-feeding and other practices accounting for longer birth intervals and smaller parities in this group. However, the large mean parity for this group of women certainly indicates the potential for further spread of family planning knowledge and use. The differentials in the mean number of living children were similar and could be accounted for by the same factors. For women aged 35 and over in other urban areas and Greater Bombay, similar differentials were found between women who wanted additional children and those who did not.

As regards the family planning method used, there were differentials in the mean parity and mean number of living children among women aged 35 and over. In rural areas, the mean parity of sterilized couples was 5.52, for couples using other methods the mean parity was 4.46 and for couples using no methods it was 4.49. The lower mean parity of the last group may be attributed to selective factors such as sub-fecundity. Those using other methods also had a lower mean parity than sterilized women because these methods were reversible and were used for both spacing and limiting the family size. The figures clearly reveal the scope for further family planning practice among women using no method since their average parity was high. The figures on mean number of living children support these findings. Similar differentials were found for other urban areas and Greater Bombay.

A gradient, by the educational level of the wife, in mean parity was clearly seen among the two groups of women with and without knowledge of contraceptive methods in rural and other urban areas and Greater Bombay. The range of variation in the mean parity by educational level was substantial for both groups of women.

For sterilized couples in rural areas, the mean parity showed sharp and steady gradations by the educational level of wife. There was a significant fall in the mean parity with increasing education, with the sharpest drop between education up to SSC and education above SSC. The mean number of living children presented a similar gradation by level of education, although the range of variation was less. This was due, perhaps, to the decrease in the mortality risk for children borne by women having a higher educational level. The number of couples using other methods were too few to yield reliable findings. Rural couples not using any method of contraception showed the expected gradient in their

mean parity by the educational level of the wife although the range of variation was less than among sterilized couples. A similar pattern of gradation in the mean parity and mean number of living children by the level of education of women was found in other urban areas and in Greater Bombay, for both the groups of sterilized couples and those not using any method of family planning. The range of variation in the mean parity was, however, less for the latter group. In urban areas, the decrease in the mean parity by the educational level of wives of sterilized couples was more evenly spaced than in rural areas but the range of variation was about the same.

The mean parity of sterilized couples by community was compared as these couples had completed their families. In rural areas there were no sharp differences except that Hindu wives belonging to advanced castes had a slightly lower mean parity. In other urban areas, advanced caste Hindu couples had the lowest mean parity, couples belonging to intermediate caste Hindus and other religions except Islam had somewhat higher mean parities and all other communities had distinctly higher mean parities. In Greater Bombay, among sterilized couples, women belonging to other religions and advanced caste Hindus had the lowest and Muslims the highest mean parity. By community, sterilization was accepted at a somewhat lower parity by advanced caste Hindu couples in rural and urban areas and, in urban areas, by women belonging to religions other than Hinduism and Islam whereas Muslim couples accepted it at a higher parity in both rural and urban areas.

Fertility and Mortality Levels of Maharashtra State

The fertility and mortality levels in rural and urban Maharashtra and in the State were estimated using indirect methods and the reinterview data. After applying Brass and Preston Methods, the correction factor for under-reporting of deaths in ages 10 and above in NFMS was placed approximately at 1.25 for males and 1.85 for females. For males in ages 10 and above, the corrected NFMS death rate was 9.0 against 8.5 from SRS for 1980 while for females the NFMS rate was 10.5 against 7.4 from SRS 1980. The discrepancy between the corrected NFMS rate and the SRS rate could be attributed to two sources having opposite effects. The SRS rates could be lower due to under-counting of deaths while the corrected NFMS rates could be higher due to over-correction by the indirect procedure. By age groups, the SRS rates for males are slightly below the corrected NFMS rates in the first seven age groups but in the succeeding ages the SRS rates exceed the corrected NFMS rates. A possible explanation for this could be that as a major proportion of deaths occur in older ages, especially over age 45, the under-reporting would affect these ages to a greater extent, whereas a uniform factor is used to correct all ages in NFMS. The corrected female age specific death rates from NFMS were above the SRS rates for all age groups indicating, perhaps, over-correction of the NFMS rates by the indirect procedure.

Age-specific mortality rates for males and females in ages 10 and over were corrected by indirect methods. Infant and child mortality rates were estimated by the method of exposure years using the birth histories of women collected in NFMS. Taking the population under 10 years of age, the number of years exposed to the risk of dying was

calculated separately from birth to exact age 1, from exact age 1 to 2, from exact age 2 to 3, from exact age 3 to 4 and from exact age 4 to 5. The death rates between exact ages 1-2, 1-3, 1-4 and 1-5 were obtained from data on the number of deaths and exposure years in these ages. Then the corresponding infant mortality rate (q_0) was estimated for each of these age groups using the West Model Life Tables. The median value among these was chosen as the best estimate of q_0 . For both sexes, for rural Maharashtra the estimate of q_0 was 120, for urban Maharashtra 73 and for the State it was 104. The method of exposure years also provided child mortality rates between exact ages 1 to 5 for males and females which were used for constructing life tables. The mortality rates between exact ages 5 and 10 were taken from the West Model Life Tables.

Male and female life tables were constructed on the basis of these estimates of infant and child mortality rates and corrected age-specific mortality rates in ages 10 and over. First the age-specific mortality rates for each sex were graduated graphically. To these graduated values of central death rates, the Reed-Merrell formula was applied to get the probabilities of dying between corresponding exact ages. Abridged male and female life tables were prepared from these probabilities.

Life tables have been published by SRS for the periods 1970-75 and 1976-80 by sex for rural and urban areas. The SRS figures of life expectancy at birth may be compared with NFMS estimates for 1980 as shown below :

	Rural		Urban	
	Male	Female	Male	Female
SRS, 1970-75	51.1	52.8	58.8	58.8
SRS, 1976-80	53.4	54.7	60.9	63.7
NFMS, 1980	56.1	55.1	62.1	60.7

The expectation of life shows a steadily rising trend for males in rural and urban areas and for females in rural areas over the last decade. The only figure, out of place, is the life expectancy for urban females from SRS, 1976-80, which shows too rapid a rise in five years. Hence, the independent SRS estimates appear to confirm the estimates of life expectancy obtained from NFMS, after adjustment of the mortality rates.

The life expectancy in Maharashtra State, circa 1980, was 58.1 years for males and 56.9 years for females according to NFMS. From the Population Censuses, the life expectancy during the decade 1961-71 was estimated to be 48.6 years for males and 49.0 years for females in Western Zone consisting of Gujarat, Maharashtra and Goa. During the fourteen years from 1966 to 1980, the gain in life expectancy was 9.5 years for males and 7.9 years for females. In urban areas the male life expectancy was 62.1 years compared to 60.7 years for females whereas in rural areas the male life expectancy was 56.1 years against 55.1 years for females. Although male life expectancy was about a year more than female life expectancy in both rural and urban areas, the urban life expectancy exceeded the rural life expectancy by over five years for both sexes.

The male mortality rate below age 10, from the life tables based on NFMS data, was 18.6 compared to 14.0 from SRS 1980 and for females the corresponding rate was 19.1 from NFMS against 16.2 from SRS. For both sexes combined, the mortality rate below age 10 was 18.8 from NFMS and 15.0 from SRS, 1980. Thus the 1980 NFMS rates were clearly higher than the 1980 SRS rates of mortality below age 10.

For all ages, the death rate for males was 11.6 from NFMS against 9.9 from SRS, 1980 and for females it was 12.8 from NFMS against 9.6 from SRS. For both sexes combined, the NFMS death rate was 12.2 against the SRS rate of 10.0 averaged over 1979-81. The difference observed between the two rates could be ascribed to under-reporting of deaths in SRS and also to possible over-correction of the NFMS rate by indirect methods.

The weighted birth and death rates from family cards were slightly adjusted for the more complete information in the individual cards. To this a term was added to correct for response errors between the interview and the reinterview. This correction term was obtained by comparing the rate based on the original interview with that based on the reinterview from a sub-sample of 3,047 families.

The rural birth rate from NFMS, corrected for response errors, was 33.1 against an average rate of 29.8 from SRS for 1979-81. By the reverse survival method, applied to NFMS data, the rate was 33.9. Since the correction for response errors is unlikely to over-correct the NFMS data, the lower rate from SRS may be attributed mainly to non-sampling errors and sampling fluctuations in both sources. For urban areas, the birth rate from the two sources did not differ much. The NFMS birth rate, corrected for response errors, was 25.5 and by the reverse survival method it was 25.1 against an average of 25.0 from SRS for 1979-81. Compared to SRS, the higher rural birth rate in NFMS resulted in a somewhat higher birth rate for the State. The State Birth rate was 30.4 corrected for response errors (30.8 by the reverse-survival method) against an average birth rate of 28.3 from SRS for 1979-81.

Corrected for response errors, the NFMS death rates were 11.9 for rural areas, 6.5 for urban areas and 10.0 for the State. The corresponding death rates from SRS, averaged over 1979-81, were 11.2, 7.5 and 10.0. The NFMS death rate was above the SRS rate for rural areas. However, the NFMS death rate, even after correction for response errors, was below the SRS rate for urban areas, possibly because of other sources of under-reporting of deaths, especially female deaths, in the family survey.

Based on the several alternative estimates by indirect procedures and from reinterview data, limits can be set to the level of rural, urban and State birth and death rates from NFMS. Weighted birth rates from NFMS, corrected for response errors and the rates obtained by the reverse survival method were 33.1 and 33.9 for rural areas; 25.5 and 25.1 for urban areas and 30.4 and 30.8 for the State. These provide fairly narrow limits to the birth rate that are unlikely to be over-corrected. Weighted death rates from NFMS, corrected for response errors and obtained by indirect methods were 10.0 and 12.2 for the State. The weighted death rates, corrected for response errors, were 11.9 in rural

areas and 6.5 in urban areas. The indirect estimates of death rates were 11.6 for males and 12.8 for females. In a family survey, deaths are likely to be under-reported for reasons other than response error. By contrast, the indirect methods might have over-corrected the death rate, specially of females. Hence the range for the death rate of Maharashtra State obtained by the two procedures extended from 10.0 to 12.2.

For the State of Maharashtra, taking the average of the limits, the birth rate may be placed at 30.6 while the death rate may be placed at 11.1. This would yield a natural increase rate of 1.95 per cent per annum. Since the reference period for reporting vital events in NFMS was the two years preceding the date of interview and the field interview extended from June to December, 1980, the reference period for these rates may be taken as the year, April 1979 to March 1980.

From the Census, the mean geometric growth rate for the State over the decade 1971-1981 was 2.2 per cent. The NFMS natural increase rate was slightly below the Census growth rate. This is reasonable since NFMS rates relate to a reference year about 3 years later than the mid-year of the intercensal period and since the Census growth rate includes net in-migration to the State during 1971-1981.

The demographic parameters estimated from NFMS were checked for mutual consistency using the stable populations published by United Nations (1982). These stable age distributions and population parameters were generated for South Asia and other developing regions based on regional morality patterns and life tables. The male life expectancy from NFMS was 58.1 years. Assuming a rate of natural increase of 2.0 per cent, this would correspond to a stable birth rate of 31.0 and a stable death rate of 11.0 according to the United Nations Stable Population Model. The female life expectancy from NFMS was 56.9 years. Again assuming a rate of natural increase of 2.0 per cent, this would correspond to a stable birth rate of 31.9 and a stable death rate of 11.9. The average stable birth and death rates for both sexes are 31.4 and 11.4 respectively which come rather close to the NFMS birth and death rates of 30.6 and 11.1. Thus the demographic parameters estimated from NFMS appear to be mutually consistent with the stable population model for South Asia.

METHODOLOGICAL ISSUES

The experience gathered in conducting and analyzing this large-scale state-wide survey provides important lessons regarding the field organisation, data collection techniques, quality of data and methods of analysis. The more important findings in these respects are highlighted in the following paragraphs.

Field Organisation

This large-scale survey required *ad hoc* recruitment of 41 investigators. A substantial part of the data related to maternity and contraceptive histories. Therefore, in preference to men, women investigators were recruited since they could establish better rapport with women. Several problems were faced in the recruitment of women investigators. As a major part of the interviewing was done in rural

areas, the investigators had to work in villages. For interviewers normally resident in other villages or towns, making special arrangements for a week's stay in each of the sample villages proved a difficult task. Hence recruitment of local women, or residents of nearby villages, was preferred as they would be able to make their own arrangements for staying in the sample village during the investigation.

Strenuous attempts were made to locate suitable women investigators in or around the sample villages by contacting schools and social service agencies in the chosen talukas. Married and educated women were preferred to others. In these circumstances, the minimum educational requirement was relaxed from graduate level to S.S.C. level, provided that the woman had some experience in social or survey work.

Sampling Frame

As most of the women recruited for this survey had no prior experience in interviewing, a short-term training programme was arranged. The sampling design and sample selection procedures were tailored to interviewers lacking in sampling skills. Hence the selection of the rural and urban centres was made by the staff of the Population Research Centre and the selection of the sample families from each chosen centre was made by the supervisor from the electoral rolls of registered voters kept in the District Collector's Office.

In this survey the voters' list served as the sampling frame at the ultimate stage of selection of households. This sampling frame was used since it provided a more recent listing of households than other sources like the Census house list. However, with this type of sampling frame, the sampling design ceased to be self-weighting because there were not equal number of voters in all households. Model sampling experiments, conducted by utilizing the survey data, showed that the deviation of estimates based on unequal weights from those based on equal weights was not large. So unweighted averages were used for calculating means and proportions in most of the analysis. This simplified procedure helped to reduce the load on computer tabulations.

Reference Period

An innovation in data collection techniques was the use of a two year reference period instead of the usual one year reference period, for reporting current births and deaths. This period was recent enough to obtain fairly reliable data and, at the same time, it doubled the number of births and deaths reported by the sample families.

In special studies of cohort and current fertility patterns using NFMS data, suitable formulae were developed for estimating the annual age-specific fertility rates from the data collected for the two year reference period. These formulae were based on cubic curves fitted locally to the age-specific fertility rates.

Quality of Data

The quality of age reports and response errors in some key characteristics were assessed. The data revealed marked preference to

ages 12 months and 24 months, and among those aged 10 and over, to multiples of 5 years. This age rounding-off was more drastic in older ages among both sexes. Both Myers' index and Whipple's index of digital preference were high with the largest preference for digit "0" followed by digit "5". Contrary to expectations, the female index was lower than the male index because the male head of the family generally reported the ages with his own age as pivot and because the ages of currently married women were checked for consistency on the basis of their reproductive histories. The rural indices of digital preference were somewhat larger than the urban indices.

The gross and net response errors were assessed by comparing the answers given in the original interview with those given in the reinterview which was conducted for a sub-sample of 3,047 families. The number of births reported for the family in the interview was compared with the number reported in the reinterview. The percentage of identical responses decreased with increasing number of births reported. This relationship suggests that the error in the perception of the reference period might increase when more events are reported. A similar pattern was observed in the reporting of deaths.

The percentage response error was calculated using an appropriate index. Family composition by sex and by whether adult or not had the least response error. The number of births to usual members of the family in the preceding two years had a larger response error and the number of deaths to usual members had the largest response error.

The NFMS shows that while the respondents tend to under-report births only slightly, they tend to under-report deaths to a much larger extent for various reasons. People are often reluctant to report a death in the family or they may not readily recall a traumatic event like an infant death. Sometimes the death is not reported because it is considered to be outside the family unit included in the sample. If a death leads to the break-up of the family into smaller units, then too the death may not be reported. Infant deaths are more likely to be forgotten than deaths to adults. Where a culture has a social bias against females, female deaths may be less completely reported than male deaths. All these factors make data on deaths gathered from a household survey less reliable than data on births.

Modelling : Determinants of Fertility and Family Planning

Special studies of NFMS data have been undertaken to identify and assess the importance of various social, economic and demographic determinants of fertility and family planning. Generalised linear models have been used for this purpose and a hierarchy of parameters of main effects and interactions estimated by the method of maximum likelihood.

In the generalised linear model there is a systematic component and an error function. If fertility is measured by the number of children ever born then it is a counting process. A Poisson error function would be most appropriate for such a process. On the other hand, contraceptive prevalence is measured by the proportion of current users of family planning methods. For this proportion, a suitable error function is the binomial distribution.

The systematic component is specified by a hierarchy of main and interactive efforts. This hierarchy is connected to the parameters of the distribution by a link function. For fertility, as measured by children ever born, the suitable link function is logarithmic. For the proportion of contraceptive users the link function is the logit.

The method of estimation is by maximum likelihood. Iterative procedures have been computerised by us, for both types of error functions to estimate the main and interactive effects, the separate and joint effects, etc.

Special studies of fertility and family planning have been carried out, utilising these generalised linear models on NFMS data, to identify the determinants and to assess their impact on fertility and family planning.

Indirect Estimation

Various indirect procedures are now available for the estimation of demographic rates from information on concomitant variables like the age distribution of deaths. These procedures can also be used for checking the consistency of the demographic parameters among themselves. Usually such procedures are based on either stable or quasi-stable population assumptions. These are not, therefore, particularly suitable for parameter estimation of a population in demographic transition. Also where age returns are subject to special patterns of digital preference, these methods are not appropriate.

Based on the several alternative estimates by indirect procedures and from the reinterview data, limits have been set to the level of rural, urban and state birth and death rates from NFMS as described earlier. In a family survey, deaths are likely to be systematically under-reported for reasons other than response error, as mentioned earlier. By contrast, the indirect methods may tend to over-correct the death rate, especially of females. Hence the range for the death rate of Maharashtra State obtained by the two procedures extends from 10.0 for NFMS to 12.2 by the indirect method.

Utilisation of Survey Findings in Programme Planning and Evaluation

The results of demographic surveys and studies would provide important inputs to analytical models and the estimation of births averted and couples protected by family planning methods, especially at state level. The parameters that enter the calculation of couples protected are :

- (1) Age distribution at acceptance of sterilization and IUD;
- (2) IUD continuation rates;
- (3) For conventional contraceptives, factors for converting number of pieces distributed to the number of couples using contraceptives; and
- (4) Mortality, marriage dissolution and couple survival rate.

In addition, the calculation of births averted requires the following parameters :

- (5) Use effectiveness of IUD and conventional contraceptives; and
- (6) Base (potential) age-specific fertility rates.

The NFMS provides information on the age distribution at acceptance of sterilization and IUD. Since the users of specific methods such as IUD and conventional contraceptives were few, it was not possible to calculate from this survey, IUD continuation rates and prevalence rates for these methods. Couple survival rates could be revised on the basis of the life tables given for males and females from NFMS. The percentage of currently married women by age groups would permit the calculation of attrition due to marriage dissolution. Also the 1981 Census age distribution of marital status provides information for the 20 per cent sample on some of these parameters. Special surveys have been carried out on IUD prevalence and use effectiveness. There is no generally agreed methodology for obtaining the potential age-specific fertility rates to be used in the calculation of the fertility impact of family planning. In this Report, the non-contracepting women have been used for obtaining the potential age-specific fertility rates. This procedure is open to the objection that the non-contracepting population might have lower fertility rates, since it includes sub-fecund and sterile women.

From 1979 the Ministry of Health and Family welfare has been using estimates of these parameters obtained from different sources relating to different dates. Parameter (1) is based on data relating to 1973-74, (2) and (3) to earlier empirical studies, (4) to Raghavachari's projection published in 1974, (5) to earlier studies and (6) to *circa* 1961. These parameters are estimated for India as a whole and not for each State individually.

It is necessary to up-date these parameters since the programme coverage, thrust of various methods of family planning and the age and parity composition of acceptors have changed radically over the years. In view of the wide variations in the parameters among the States it is also essential to generate these estimates, specifically for each major State with a population of over 10 million.

The post-censal projection of eligible couples for the major States of India requires Census tabulation of females by age and marital status. Since these tables from 1981 census were available only in 1985, upto that year, the projection of eligible couples was based on 1971 Census tabulations and was, therefore, out of date. These post-censal estimates now need up-dating at state level using the 1981 Census tabulations. Similar tabulations at district level have been published in 1986 relating to 1981 Census data. This is based on the 20 per cent sample of enumeration blocks. Analysis of these data would provide district level information for direct study and evaluation of family welfare activities.

The indirect method of estimation of IUD users needs continuation rates calculated for this method. Since few couples used this method in Maharashtra in the past, it is difficult to obtain the necessary data for calculating IUD continuation rates. For instance, in NFMS only 42 women were found, in this large sample, to be using IUD. The statistics for conventional contraceptives relate to the number of pieces distributed rather than the number of current users. There is no

reliable basis for converting the number of pieces distributed to the number of users. Hence, for both these methods, a periodic contraceptive prevalence survey should yield more reliable and direct estimates of the percentage users. The Population Research Centre of the Gokhale Institute has been conducting annual contraceptive prevalence surveys in selected districts.

In Maharashtra State, there is now a major thrust in the programme on inserting the Cu-T device. With high targets set for Cu-T acceptance, the health and family welfare workers are required to bring in a certain number of acceptors every month. When it is not possible, they may report some cases where insertions are not made at all or cases where the Cu-T is removed soon after insertion. Consequently, the service statistics maintained by the Primary Health Centres show high figures of acceptance while the effect of this method on fertility may be negligible because of the large drop-out rate.

The current policy of the Government tends to promote other methods of family planning besides sterilization and to encourage greater participation of voluntary and non-governmental agencies in family planning activities. Surveys have a greater role to play in the evaluation of the fertility impact of public and private sector activities in family planning and to assess the prevalence of methods other than sterilization such as the oral pill, condom, abortion and IUD.

POLICY AND PROGRAMME IMPLICATIONS

Relevance of Survey Findings to Policies and Programmes

The broader aspects of the use of demographic knowledge for policy formation, implementation and evaluation have been receiving continuing attention by various national and international committees. Some major themes relevant to survey research that have emerged from these discussions may be summarized.

Demographic knowledge can be used at a conceptual level to create awareness of population problems and to identify and define these problems. For this purpose information and knowledge need not be detailed.

Instrumental use of demographic knowledge in formulating and evaluating policies and programmes would, however, require more detailed knowledge about the dimensions of demographic processes and their socio-economic determinants and consequences.

Dissemination of demographic knowledge encourages critical assessment of scientific findings and helps to inform public opinion on population trends and consequences.

To achieve the long run objectives of population policies, it is necessary to generate public awareness and commitment through open discussion of population problems in a pluralistic environment. Such an approach would also provide opportunities for the Government to assess the acceptability and effectiveness of such

policies and the programmes.

Formal channels of communication should be established between population and other social scientists and policy makers and programme managers so as to obtain maximum returns from investment in population research.

From this broad perspective the implications of the survey findings are assessed in this section for population policy and programmes.

There have been many local demographic surveys in Maharashtra and elsewhere in India. The Gokhale Institute was the first to initiate demographic surveys in India. It is, therefore, fitting that the Institute should have taken the lead in conducting the first statewide fertility and mortality survey in India.

Regional demography is important for many reasons. As NFMS, Maharashtra has shown, there are socio-cultural variations within a state that lead to differentials in fertility levels, in contraceptive use, in age at marriage, in family size values and other associated factors. The health and social infrastructure might vary from one region of the state to another, aiding or hindering the implementation of health and family planning programmes. Unless the relevant facts are established and analysed to reveal such regional differences, it may not be possible to achieve the aggregate goals of a population or health policy formulated for a state or the country as a whole.

Social demography has a crucial role to play in evolving a population policy and in setting up long-term demographic objectives since such goals depend not only on the programme infrastructure and performance but also on changing social values and institutions. For instance, it is social change that generates a demand for family planning and promotes the utilisation of health and other social services. A socio-demographic survey such as NFMS is an essential instrument for the study of social demography and in the evolution of long-term population and social policies.

The major thrust of the population policy and programmes in India is currently on fertility reduction and the control of population growth. Hence the present section is mainly limited to the implications of the findings of this survey to fertility control and the family welfare programme. The implications of this survey to mortality and health policies and programmes are not examined here.

In assessing the policy and programme implications to fertility and family planning, use is made not only of the survey findings but also of other relevant information and analyses carried out by the Population Research Centre. This gives a broader perspective to the discussion of policy and programme issues.

To begin with the long-term fertility trends in Maharashtra State, in the post-Independence period, are broadly assessed in the next section. The impact of changes in nuptiality practices, family planning within marriage and the effect of the family planning programme on fertility are summarized as a background to the discussion of policy and

programme issues.

Long-term Fertility Trends in Maharashtra State

To assess the long-term effects of the Family Welfare Programme and contraception in Maharashtra State, it is necessary to ascertain the fertility levels and trends before 1965, when there was no programme for fertility control or the programme had not been implemented on a large-scale effectively. No systematic bench-mark surveys are available for this period.

The information available on fertility levels for the period before 1965 is rather limited and localized. In this period, it may be presumed that almost stable population conditions prevailed, with a very slowly declining trend in fertility and a fluctuating but stable mortality level. A series of five rural demographic surveys conducted in Maharashtra State by the Gokhale Institute of Politics and Economics, *circa* 1955, yield a total fertility rate (TFR) of 5.17. The 1951 Poona City survey gives a total marital fertility rate (TMFR) of 6.55. From the present survey, we estimate a TMFR of 4.97 and a TFR of 4.21 for rural areas in 1980. Thus the decline in rural fertility over the period, 1955-1980, could be placed roughly at 21 per cent in TMFR and 19 per cent in TFR.

For rural Maharashtra, the National Sample Survey (NSS) gives an estimated TFR of 5.69 for 1959, while the Sample Registration System (SRS) gives a figure of 5.06 for 1972. On this comparison, the percentage decline in TFR is 11.1 over 1959-1972. The declines in the general fertility rate (GFR) and general marital fertility rate (GMFR) over this period, on comparing the two sources, are 8.1 per cent and 16.1 per cent respectively.

The crude birth rate (CBR) for Maharashtra *circa* 1950, may be placed in the range of 40 to 45 per thousand population on the basis of Census data and with the assumption of an almost stable population. The adjusted CBR from NFMS for 1980 works out to about 30.6. Therefore the decline in CBR during the period 1950-82 may be about 28 per cent.

Assuming an annual population growth rate of 2.0 per cent, the crude death rate may be placed in the range of 20 to 25 per thousand population, *circa* 1950, according to the stable population model and using census data. From NFMS, the CDR is estimated to be about 11.1 after the necessary adjustments, showing a decline of over 50 per cent in the period 1950 to 1982.

Comparing the general marital fertility between SRS (1972) and NFMS (1980), a decline of 17 per cent is observed in rural areas and 26 per cent in urban areas in this period. In chapter 5, the NFMS data have been used to estimate the fertility decline due to family planning. The potential fertility utilized for this purpose is that of the non-contracepting population found in the present survey during 1980. Usually the contracepting population is found to be more fecund than the non-contracepting population for obvious reasons. Moreover, the composition of the non-contracepting population at any time depends on the progress of the family planning programme. Its fertility cannot,

therefore, be simply equated to the level of fertility of a pre-contracepting society. None the less, the impact of family planning could be roughly assessed by comparing the fertility of contracepting with non-contracepting couples. This comparison shows a decline of 31 per cent in rural areas and 38 per cent in urban areas in the general marital fertility rates of currently married women aged 15 to 49 as calculated in Chapter 5 of this report.

Taking a broad view of the impact of family planning on fertility in the post-Independence period from 1947 to 1980, it is fair to conclude that there has been a reduction in fertility within marriage, at least of the order of 20 per cent in rural areas and 30 per cent in urban areas in Maharashtra State. The reduction in the overall fertility, however, depends both on changes in nuptiality customs as well as the control of marital fertility.

The figures given earlier show that the decline in the overall fertility is about the same order as for marital fertility. This decline may be of the order of 20 to 25 per cent in rural areas and over 30 per cent in urban areas of Maharashtra State in the post-Independence period up to 1980.

The decline in the fertility of all women has not been much larger than in that of married women due the effect of countervailing factors relating to nuptiality. The percentage of married women has shown the largest decline in ages 15 to 19 between the 1961 and 1981 Censuses. This decline has led to a marginal increase in the age at marriage. At the same time, the percentage couples surviving has also increased considerably in ages 40 to 44 and 45 to 49 as seen from Table 1.1.

Table 1.1 : Percentage Currently Married Women in Maharashtra State : 1961 and 1981 Censuses

Age-group	Rural		Urban	
	1961	1981	1961	1981
15-19	81.0	45.7	49.1	25.4
20-24	95.0	90.9	83.1	72.6
25-29	49.6	95.6	91.7	90.8
30-34	90.9	94.8	90.8	93.3
35-39	85.6	93.0	87.1	92.3
40-44	75.6	88.2	76.1	86.7
45-49	65.6	82.3	65.9	81.0

While a nuclear family might have a smaller family size norm, the traditional constraints on co-habitation and intercourse are removed in such a family situation. Also the breast-feeding interval is shortened in a more modern context. Therefore, it is not surprising that changes in nuptiality practices have not, by themselves, brought about a substantial decline in fertility as yet.

As mentioned earlier, there has been a substantial decline in

marital fertility in Maharashtra State in the post-Independence period. Most of this decline has been brought about by the adoption of family planning by the older cohorts of married couples. Family planning methods were initially provided by the programme. In rural areas, where there has been no spontaneous motivation for adoption of these methods and the service infrastructure has been developed by the programme, almost all family planning acceptance could be attributed to the programme. In urban areas, however, non-programme sources are also used, especially for obtaining spacing methods such as the pill, condom and even the intrauterine device (IUD). But in both rural and urban areas the prevalence of spacing methods is not considerable compared to sterilization. It is, therefore, important to examine the progress of the family planning programme. As a preliminary step, the validity and reliability of contraceptive prevalence rates, calculated from service statistics, are discussed in the next section.

Validity of the Estimates of Couples Protected from Service Statistics

The progress of the family welfare programme and its impact on fertility are currently assessed by the Ministry of Health and Family Welfare on the basis of the family planning service statistics collected in the course of programme administration. Indirect procedures of estimation are used to convert the figures of family planning acceptors to 'current users' and 'births averted'. These procedures are based on several assumptions and relevant parameters of the model have been estimated from scanty data relating to different dates.

The results of these indirect methods have not so far been carefully validated with the help of survey data and other external estimates. Since the emphasis of the programme has been broadened now to include reversible spacing methods such as IUD (Copper-T) and the oral pill, it is necessary to examine and improve the methods of estimating current users and births averted so that the official source continues to provide a reliable guide for the programme and for assessing the fertility impact. In this section the validity of the official estimates of contraceptive prevalence are assessed against survey estimates to the extent they are available.

The impact of the family welfare programme on fertility is assessed by the Government mainly in terms of two indicators, the percentage of couples effectively protected against the risk of conception and the number of births averted in a year due to the family planning methods supplied by the programme. The procedures of estimation of couples protected and births averted have been described in official publications. The validity and reliability of the couple protection rates are examined in this section by using the data from NFMS and other evaluation surveys, conducted in Maharashtra State.

The indirect estimate of couples currently and effectively protected as calculated from the service statistics should correspond to the current prevalence of contraception. This estimate is a cumulative rather than current measure of programme performance.

The estimation procedure is indirect and is based on the contribution of each annual cohort of past and current acceptors by

contraceptive methods. There have been few opportunities to validate the procedure by comparing it with direct estimates obtained from surveys. The NFMS, Maharashtra 1980 provides direct estimates of the percentage of contraceptive users among eligible couples by method, which are compared in Table 1.2 with the indirect estimates of couples currently and effectively protected as obtained from the service statistics for Maharashtra State.

Table 1.2 : Percentage of Couples Currently and Effectively Protected in March 1981 from Service Statistics Compared with Percentage Current Users from NFMS Maharashtra, 1980 : by Method by Rural/Urban

State/Rural/Urban	% currently and effectively protected in March 1981, service statistics ^{1,2}	% current users of contraception, NFMS 1980
Maharashtra		
Sterilization	33.2	34.5
IUD	0.5	0.5
Other methods	0.8	2.2
All	34.6	37.2
Rural		
Sterilization	30.6	33.5
IUD & other methods	0.2	1.0
All	30.8	34.5
Urban		
Sterilization	39.5	36.6
IUD & other methods	4.2	6.8
All	43.7	43.4

Sources : 1. Ministry of Health and Family Welfare, Government of India, *Family Welfare Programme in India Year Book, 1980-81*.

2. K.S. Srikantan and K. Balasubramanian, Demographic Evolution of India's Family Planning Programme, *Artha Vijnana*, Vol.25, No.3, pp. 205-230.

There are various factors that limit the comparability between NFMS and service statistics estimates. All-India parameters for past periods are applied to Maharashtra for 1980 in the service statistics method. The NFMS estimate is subject to sampling and some non-sampling errors whereas the service statistics method is based on various assumptions and also subject to non-sampling errors. The NFMS figures include both programme and non-programme users and for this reason should be somewhat higher than the indirect estimate from service statistics. But in spite of these differences, the indirect estimate of the percentage contraceptive prevalence rate was fairly close to the direct estimate, 34.6% against 37.2% from NFMS.

The percentage of sterilized couples in Maharashtra was slightly higher in NFMS (34.5) than from the service statistics (33.2). The larger percentage in NFMS might be ascribed to sterilizations taking place outside the programme. In rural areas 33.5 per cent of the couples were sterilized according to NFMS against 30.6 per cent from service statistics while the corresponding figures for urban areas were 36.6 against 39.5. The difference arises because the survey figures are by place of residence, whereas in the service statistics, some rural couples who got sterilized in urban areas might have been reported as urban residents.

The percentage of couples protected by IUD is about the same (0.5) from both sources. This percentage is very small compared to that for sterilization and, for this reason, only 42 IUD users were found in the large-scale NFMS sample of Maharashtra State.

In rural areas only 0.2 per cent were using IUD and other methods while in urban areas this percentage was 4.2 as calculated from the service statistics. For NFMS the corresponding figures were 1.0 per cent and 6.8 per cent respectively. Thus other methods were used mostly in urban areas and the figures from the survey were higher than those from service statistics since the former figures included non-programme users of methods other than sterilization. The divergence between the estimates from the two sources was not large for Maharashtra because most contracepting couples were sterilized and the non-programme sector was relatively small even in urban areas. However, with the expansion of the programme to other methods of contraception from 1982 onwards and the larger involvement of non-governmental agencies in family planning activities, only surveys can now yield reliable estimates of the prevalence of reversible and spacing methods in the population.

Another independent validation of the procedure used by the Government to estimate the couple protection rate is provided in Table 1.3. In this table the percentage of eligible couples protected, as estimated from various evaluation surveys conducted in Maharashtra State, by the Population Research Centre of the Gokhale Institute, is compared with the corresponding figure available from service statistics. The percentage from service statistics refers to the district as a whole and hence the weighted average for rural and urban areas from the survey is used for comparison.

This comparison has the same limitations mentioned earlier. The survey figures, based on a small sample size, are subject to large sampling variations. The service statistics figures are for programme performance and hence do not cover the non-programme acceptances which may be sizeable in urban areas.

As regards sterilization, the survey and the service statistics are more or less comparable because most of the sterilizations are done in the programme. However, for methods other than sterilization, it has been generally found that educated couples in towns and cities practise spacing methods efficiently by buying contraceptives from the market or using non-appliance methods. They would not be included in the programme nor reported in the service statistics. When the proportion of the urban population is large, (e.g., Nagpur district with about 50 per cent

Table 1.3 : Comparison of the Percentage Contraceptive Prevalence Rate Between Survey and Service Statistics

Year	District	Sterilization		Other methods	
		Survey	Service statistics	Survey	Service statistics
1979-80	Ratnagiri	23.5	19.3	Negligible	0.9
1979-80	Kolaba	21.9	24.7	Negligible	0.8
1981	Aurangabad	27.1	26.5	2.0	1.0
1981	Bhir	29.1	33.5	0.9	1.0
1982	Nagpur	41.2	33.5	8.8	1.4
1982	Yeotmal	32.9	34.2	1.3	1.8
1983	Satara	37.7	37.3	2.1	10.2
1983	Sangli	42.6	45.3	3.4	8.6
1984-85	Nasik	41.4	41.0	2.5	10.2
1980	Maharashtra State (NFMS)	34.5	33.2	2.7	1.3

Source : Vaijayanti Bhate and K. Sivaswamy Srikantan, Family Planning Behaviour in Maharashtra, *Artha Vijnana*, Vol.29, No.1, pp.82-106.

population in urban areas), the weighted prevalence rate from the survey data should be larger than the prevalence rate from the service statistics since some couples obtain contraceptives from non-programme sources.

It may be broadly observed from Table 1.3 that service statistics and surveys give comparable and close estimates of the contraceptive prevalence rate for sterilization. For other methods, the comparability between the two data sources is subject to various considerations. If non-programme acceptance is high, the service statistics will underestimate the actual level of use. On the other hand, the contraceptive prevalence rate may be over-estimated by the service statistics if the users, as defined in service statistics, are not necessarily continuing users.

All survey figures upto 1982 given in Table 1.3 are prior to the heavy emphasis placed on IUD (Cu-T) in the programme and do not deviate much from the service statistics figures. The reasons for the large deviation for Nagpur district have already been noted. The survey estimates for 'other methods' are far below the service statistics figures from 1983 onwards. The discrepancy is very large for Sangli, Satara and Nasik districts where the surveys were conducted in 1983 or later. For example, for methods other than sterilization, the service statistics for Nasik district gives the estimated percentage of couples protected as 10.2 compared to the survey figure of 2.5 only. The gross over-reporting of Cu-T insertions, with a shift in programme emphasis towards IUD from 1983 onwards, is probably the main reason for such large discrepancies. This discrepancy is further examined below.

The evaluation survey in rural areas of Nasik district (Bhate and Srikantan, 1987) was a complete household survey in 12 sample villages with a total population of about 12,000. It is expected to give reliable estimates of contraceptive prevalence rates. The survey and service statistics, when compared for these villages, showed that out of 96 cases of Cu-T insertions recorded in the service statistics for these villages, only 17 women could be traced in the villages to have actually had a Cu-T inserted. Twelve out of these 17 had it removed in a short time leaving 5 women as 'current users' at the time of survey. Many of these current users were recent acceptors and it is possible that they might get the Cu-T removed. The service statistics for condoms and pills also show similar limitations. Even if the number of contraceptives distributed appears large, continuous regular users are few, especially in the rural areas. The large prevalence rates for Cu-T and other spacing methods, as given by service statistics, are not often observed in the field.

Since some fudging of the reported number of IUD insertions is suspected, the cases of insertion have to be carefully followed up for incorrect address, missing person, etc. In these circumstances, the continuation rates calculated from traceable cases might be expected to be higher than from non-traceable cases. With the adoption of temporary methods by a large proportion of eligible couples, frequent and well conducted contraceptive prevalence surveys appear to be the most dependable source of information on current use.

To sum up, until 1982, the official figures of family planning performance, calculated from family planning service statistics, appear to provide a satisfactory basis for assessment, since most of the couples had chosen sterilization as the preferred method. However, in future, with the rapid promotion of spacing methods, the official procedure of estimation has to be improved and periodic contraceptive prevalence surveys conducted.

As the official figures of family planning have proved satisfactory so far, these figures are used in the next section to construct family planning programme performance accounts for Maharashtra State. An analysis of these accounts reveals the major problems likely to arise in maintaining and increasing the use of family planning methods.

Family Planning Programme Performance

Using the official estimates of the distribution of eligible couples by method and contraceptive practice status, it is possible to construct family planning performance accounts for each financial year as the official estimates have, so far, been found to be valid and sufficiently reliable. Such accounts serve several purposes. They can be used for setting up realistic family planning targets. The annual replacement needs of the programme, by method, arising from death, marital separation and menopause could be reckoned using these accounts. The gross and net achievement of the programme could be calculated from these accounts. These accounts also reveal the major limitations of the official procedure of estimation.

The family planning performance accounts for Maharashtra State for

1981-82 are given in Table 1.4 and for 1984-85 in Table 1.5. According to official estimates, on 31st March 1981, there were 107.3 lakh eligible couples of whom 35.6 lakhs were sterilized, 0.6 lakhs were wearing IUD, 1.7 lakhs were using other methods and 69.4 lakhs were non-users of family planning. By the end of the financial year, as on 31st March 1982, these figures had changed as follows : 38.1 Lakh sterilized couples, 0.7 lakh IUD wearers. 2.7 lakh couples using other methods and 68.1 lakh non-users, adding to a total of 109.5 lakh eligible couples.

During the year 1981-82, 5.0 lakhs sterilizations were done and 0.4 lakh IUD's were inserted. Comparing with the year-end figures it is seen, therefore, that the replacement, needed for the year for these two methods were 2.5 lakh sterilizations and 0.3 lakh IUD insertions, just to retain the number of users the same. For 'other methods', all the 1.7 lakh couples using these methods at the beginning of the year had to continue use or had to be replaced at the end of the year. When once the replacement needs are estimated by method of family planning, the net achievement of the programme after providing for replacement may be calculated as shown in Table 1.4.

From Table 1.4 it is seen that in 1981-82 the net number of sterilizations, after allowing for the attrition of couples due to aging and menopause, widowhood and mortality, was only 2.4 lakhs although 5.0 lakh sterilizations were carried out in this year. Similarly the increase in the net number of IUD wearers as on March 31, 1982 was only 11,000, after allowing for discontinuation and loss of device due to expulsions and removals. The number of IUD insertions in 1981-82 however, amounted to 41,000. The other two methods, condom and contraceptive pill, are treated in the accounts as requiring complete replacement since supplies are to be provided to the current contraceptors if they have to continue using the method. Thus, the replacement needed for other methods is 1.7 lakhs. The gross achievement during 1981-82, for the number of users of methods other than sterilization and IUD, was 2.7 lakhs and the net achievement, after deducting the replacement needed, was only 98,000.

The nature of programme service delivery is different for sterilization, IUD's and other methods. Sterilization calls for a surgical procedure with suitable hospital or clinical facilities. The requirements for IUD insertions are somewhat less and delivery of pills and condoms is the easiest form of service. However, the continuing attention/supply makes different demands for each method. While sterilization requires post-operational follow-up care, IUD requires less attention after insertion and pills and condoms need the least attention. By contrast, sterilization lasts over the entire reproductive span, IUD for a shorter period, depending on its continuation rate, whereas pills and condoms need continuous resupply. Thus, user replacement is least for sterilization, partial for IUD and complete for other methods. These method specific requirements have to be taken into account in building up the infrastructure for a family planning service delivery system.

Until 1981-82, the main emphasis in the programme was on sterilization. In fact, as on 31st March 1981, 33.2 per cent of the eligible couples were sterilized, but only 0.6 per cent were IUD wearers

Table 1.4 : Family planning Performance Accounts, Maharashtra 1981-82

	Number in 1000	% to EC	% to NU	% to (NU+RN)
Eligible Couples (EC) as on 31st March 1981				
Sterilized	3564	33.2		
IUD wearers	60	0.6		
Other methods	170	1.6		
All methods	3795	35.5		
Non-users (NU)	6936	64.6		
Total eligible couples	10730	100.0		
Replacement Needs (RN) for 1981-1982				
Sterilized	253	2.4	3.6	3.5
IUD wearers (IUD)	30	0.3	0.4	0.4
Other methods (OM)	170	1.6	2.5	2.4
All methods	455	4.2	6.6	6.4
Replacement need (IUD + OM = RN)	200	1.9	2.9	2.8
Gross Targets for 1981-82				
Sterilized	296	2.8	4.3	4.1
IUD wearers	58	0.5	0.8	0.8
Other methods	231	2.2	3.3	3.2
All methods	585	5.5	8.4	8.2
Gross Achievements in 1981-82				
Sterilized	495	4.6	7.1	6.9
IUD wearers	41	0.4	0.6	0.6
Other methods	268	2.5	3.9	3.8
All methods	804	7.5	11.6	11.3
Net Targets for 1981-82				
Sterilized	43	0.4	0.6	0.6
IUD wearers	28	0.3	0.4	0.4
Other methods	61	0.6	0.9	0.9
All methods	130	1.2	1.9	1.8
Net Achievements in 1981-82				
Sterilized	242	2.3	3.5	3.4
IUD wearers	11	0.1	0.2	0.2
Other methods	98	0.9	1.4	1.4
All methods	349	3.3	5.0	4.9
Eligible Couples (EC) as on 31st March 1982				
Sterilized	3806	34.8		
IUD wearers	71	0.6		
Other methods	268	2.4		
All Methods	4144	37.8		
Non-users	6806	62.2		
Total eligible couples	10950	100.0		

Sources : PRC, Gokhale Institute of Politics and Economics and Ministry of Health and Family Welfare.

Table 1.5 : Family planning Performance Accounts Maharashtra 1984-85

	Number in 1000	% to EC	% to NU	% to (NU+RN)
Eligible Couples (EC) as on				
31st March 1984				
Sterilized	4493	39.4		
IUD wearers	665	5.8		
Other methods	619	5.4		
All methods	5776	50.6		
Non-users (NU)	5628	49.4		
Total eligible couples	11404	100.0		
Replacement Needs (RN)				
For 1984-1985				
Sterilized	315	2.8	5.6	4.8
IUD wearers (IUD)	364	3.2	6.5	5.5
Other methods (OM)	619	5.4	11.0	9.4
All methods	1296	11.4	23.0	19.6
Replacement need (IUD + OM = RN)	983	8.6	17.5	14.9
Gross Targets				
for 1984-85				
Sterilized	565	5.0	10.0	8.5
IUD wearers	600	5.3	10.7	9.1
Other methods	748	6.6	13.3	11.3
All methods	1913	16.8	34.0	28.9
Gross Achievements				
in 1984-85				
Sterilized	552	4.8	9.8	8.3
IUD wearers	602	5.3	10.7	9.1
Other methods	663	5.8	11.8	10.0
All methods	1817	15.9	32.3	27.5
Net Targets				
for 1984-85				
Sterilized	250	2.2	4.4	3.8
IUD wearers	236	2.1	4.2	3.6
Other methods	129	1.1	2.3	2.0
All methods	617	5.4	11.0	9.3
Net Achievements				
in 1984-85				
Sterilized	237	2.1	4.2	3.6
IUD wearers	238	2.1	4.2	3.6
Other methods	44	0.4	0.8	0.7
All methods	521	4.6	9.3	7.9
Eligible Couples (EC) as on				
31st March 1985				
Sterilized	4730	40.8		
IUD wearers	903	7.8		
Other methods	663	5.7		
All Methods	6297	54.3		
Non-users	5310	45.7		
Total eligible couples	11607	100.0		

Sources : PRC, Gokhale Institute of Politics and Economics and Ministry of Health and Family Welfare.

while 1.6 per cent were protected by other methods. This had changed substantially by 1984-85 due to the greater emphasis placed on spacing methods in the programme in the intervening years. As on 31st March 1985, 40.8 per cent of the eligible couples were protected by sterilization, 7.8 per cent were wearing IUD and 5.7 per cent were using other methods of contraception (Table 1.5). This increase in the percentage of couples protected and the greater emphasis on spacing methods led to a new pattern of replacement needed by methods.

During 1984-85, 3.2 lakh sterilizations were required by way of replacement for attrition of couples due to various reasons compared to 2.5 lakhs for 1981-82. The replacement needed for IUD had jumped from 30,000 in 1981-82 to 3.6 lakhs in 1984-85 and the replacement for other methods had also increased substantially from 1.7 lakhs in 1981-82 to 6.2 lakhs in 1984-85. The shift of the method mix towards spacing methods increases the infrastructural commitment towards regular and continuous delivery of such methods.

The family planning performance accounts provide a realistic basis for target setting in terms of eligible couples who were not protected by any method of family planning. For instance, on 31st March 1981, there were 69.4 lakhs such couples. To these may be added 2 lakh couples using spacing methods who are to be replaced or re-supplied during the year. By 31st March 1985, their number had been reduced to 53.1 lakhs in spite of the growth in the total number of eligible couples from 107.3 lakhs to 116.1 lakhs during this period. The percentage of unprotected eligible couples had been reduced from 64.6 as on 31st March 1981 to 45.7 as on 31st March 1985. For setting up realistic programme targets, it is necessary to know the available pool of unprotected eligible couples. It is also necessary to know the replacement needed, for maintaining intact the number of couples currently protected. This aspect of the programme has been discussed earlier.

The family planning performance accounts, analysed in a standard framework, help in setting up realistic targets by methods, in evaluating the programme performance and in assessing the replacement needs for family planning services. These accounts are reliable only if the post-censal projection of the number of eligible couples and the method of converting the annual family planning acceptors to current users are valid. As discussed in earlier sections, contraceptive and fertility surveys, like NFMS Maharashtra, provide a basis for validating and evaluating the methods and estimates based on service statistics.

To be operationally efficient and to meet the local needs of people, target setting for family planning and other welfare programmes has to be decentralized to regional and district levels. The current prospects for such decentralized planning are examined in the next section.

Regional and District Level Planning and Target Setting for Welfare Programmes

Regional and district level planning requires a detailed inventory of material and human resources. Socio-demographic data provide such a

base for human resources. In all societies age and gender are the bases for division of labour. While provision of necessities of life depend upon population size and distribution, socialisation, gainful employment and care of the old depend on the age composition of the population. Improvement in the condition of minority groups and weaker sections of the population again requires information on their size and distribution. Thus the organisation and development of the human community is based on the distribution of socio-demographic resources. It is possible to design and implement development plans at the sub-state level only if the socio-demographic data base at this level is sound and up-to-date.

In this report, the analysis of fertility and mortality in Maharashtra State has been carried out for the three rural regions of the State, viz., Marathwada, Vidarbha and Western Maharashtra, and the two urban zones consisting of Greater Bombay and urban areas other than Greater Bombay. The demographic profiles and the proximate determinants of fertility and mortality have also been presented for these regions/zones. The socio-demographic characteristics of the population at district level have been published in 1986, from the 20 per cent sample of every fifth block enumerated in 1981 Census.

The differentials and trends at district level, of demographic indicators such as population growth and sex-ratio from 1901 to 1981, child-woman ratio, percentage of urban population and singulate mean age at marriage for rural and urban areas for 1981 and earlier censuses are now available. The percentage of Muslim population and Scheduled Castes and Tribes are also available. However, it should be noted that there have been changes in the definition of Scheduled Castes and Tribes consequent to the Scheduled Castes/Scheduled Tribes Order (Amendment) Act, 1976, removing "area restrictions".

Percentage literacy from censuses, by sex and rural/urban residence, is an indicator of the trend in social change over the past eight decades. Similarly the percentage of "main workers" in the population by major industrial categories by sex in 1971 and 1981 is an indicator of economic development. However, the differences between the definitions of "main worker" in 1981 and "worker" in 1971 should be kept in view in assessing the trend. The age-sex profiles of each district for the 1981 and earlier censuses are available. This information is essential for human resource planning and welfare programmes at district level. There are district level tables giving marital status distribution in rural and urban areas for women in reproductive ages. These data are required for planning and setting targets for the family welfare programme at district level.

For each district, the distribution by educational level in rural and urban areas are given for school-going age groups and for all ages for 1971 and 1981. These basic data are needed for educational planning and the implementation of the policy of universal primary education.

Data are available on the cumulative performance of the family planning programme in terms of the number of eligible couples protected by method by district on an annual basis. The percentage of eligible couples protected by all methods is also given.

Specific programmes like the family welfare programme, health and immunization services, maternal and child health care, education of rural females, supplementary nutrition and tribal welfare programmes have to reach the targeted groups of beneficiaries. Hence it is necessary to know their numbers and spatial distribution. For instance, beneficiaries of the family welfare programme are eligible couples, i.e., married women in ages 15 to 44 and their husbands. It is, therefore, necessary to know the number of eligible couples, their distribution by number of children and whether they are using family planning methods or not. Such data for the whole population would not be available from family planning service statistics. The data from 1981 Census relating to the distribution of these variables were published only in 1986. Upto this time, the 1971 Census figures were being projected to the post-censal period beyond 1981. This is the current basis for target setting at district level for family planning activities. Similarly, for family welfare activities relating to health and education, the 1981 Census data at district level, became available only in 1986.

The Population Research Centre of the Gokhale Institute has compiled and published the available socio-demographic data at district level as a Hand-Book for Maharashtra State to be used for human resources planning and for implementation and evaluation of social programmes.

For decentralized planning it is often found necessary to supplement the Census figures by data from relevant surveys like NFMS, Maharashtra. The success of development and welfare programmes depend not only on aggregate goals set up by the government and the infrastructure built for these programmes but also on people's motivation, participation and demand for such services. Information on latter aspects about individual behaviour and motivation can be obtained only from surveys. In the next section, therefore, the proximate socio-demographic determinants of fertility and the demand for family planning are examined in the light of results from analytical studies based on NFMS data.

Proximate Socio-Demographic Determinants of Fertility and Demand for Family Planning

Apart from the programme, there are several demographic and social factors that affect the fertility level. The proportion of women in reproductive ages, the age structure of reproductive women, the proportion of married women and couple survival are the more important demographic parameters affecting fertility. Among the social factors which contribute to fertility decline, the more important ones are education, age at marriage, roles and status and work participation of women, marriage and family structure, and kinship pattern. These social variables motivate couples to control their fertility, create a demand for family planning and provide the necessary social infrastructure for the successful implementation of the programme. Studies of this proximate determinants of fertility and family planning are, therefore, important for policies and programmes.

Several studies have been conducted on the basis of NFMS data to assess the importance of various socio-demographic indicators in explaining individual fertility such as the mean parity of women. Analysis of these data have shown that the age of women accounts for about 90 to 95 per cent of the total variation in parity and that linkages between social factors have distinct relationships in rural areas, other urban centres and Greater Bombay. Hence, the analysis has been generally restricted to women aged 35 and above and it has been carried out separately for rural areas, other urban areas and Greater Bombay. Socio-demographic indicators such as education, age at marriage and community have been identified as the major determinants of fertility in the present context. The relevant findings from these studies are discussed below (Srikantan et al., 1988).

Education leads to more knowledge, widening the horizon of choice and enhancing the status and individual decision making authority. This leads to the adoption of modern values. The other important variable is the community of birth which is based jointly on religion and caste. The constraints placed by the community often give rise to conservative norms and traditional values.

Caste and religion are the most constraining influences on individual behaviour in this country. The fertility behaviour of the women is determined both by the community in which she lives and her education that makes her aware of the available choices and gives her some freedom to make independent decisions. It is commonly believed that increasing the educational level of rural women is an effective way of reducing the family size norms and creating a demand for family planning. In this context the relationship of education with mean parity was examined for rural areas, Greater Bombay and other urban areas separately.

It was observed that the contribution of education is not significant for rural fertility. This is contrary to the common belief that education is a universal panacea for fertility reduction. The social milieu in rural areas is traditional and hence the influence of the older kin and the community on women's behaviour is stronger compared to their own individual inclinations. On the other hand, in urban areas, the social milieu is somewhat more congenial for individual choice and decision making. Hence, education may not be as effective in controlling fertility in rural areas as in urban areas. This has led to an examination of the part played by the community of birth in determining the parity. The model was applied to the three zones (rural, urban and metropolitan) and, somewhat unexpectedly, it was found that the community variable did play an important role in determining parity in all the three zones. This finding deviated from the general expectation that the community variable, reflecting traditional values, would be predominant only in rural areas but not in urban area.

It was anticipated that the variables mediating between community and fertility would be the age at marriage and the pattern of family formation. The analysis showed that, in rural areas, age at marriage was not closely related to the community and also that it does not have a significant effect on parity. On the other hand, in urban areas, this linkage was stronger. The other path from community to parity is by way

of the process of family formation which is largely influenced by contraception. Surprisingly, the level of contraception does not vary much between communities (with the exclusion of Muslims) since Maharashtra State has reached a stage where large segments of all communities are using contraceptive methods. The only difference between them was that backward castes had adopted family planning methods, mostly sterilization, later in their reproductive life than the rest. This also implies that individual adoption might be at older ages and at higher parities for these women.

Examination of the data on parity at acceptance confirm that fertility and community variables, particularly in rural areas, are related through the parity at acceptance of contraception, while age at marriage does not seem to have as much importance.

The major findings from micro-level analysis regarding the linkages between fertility on the one hand and, on the other hand, community, education and rural/urban place of residence have been summarized above. They shed some light on the probable fertility impact of social policy interventions relating to family planning, education and age at marriage. The community of birth appears to be a basic factor conditioning not only fertility values and reproductive behaviour but also all other acquired socio-demographic traits like education, especially of women, age at marriage, the pace of family formation, contraception and modernisation of values. This relationship appears to hold good in both rural and urban areas. In formulating policy interventions, it is necessary to recognise the primacy of the community of birth in inculcating certain basic values that override other acquired traits.

Education, especially of females, is conditioned by the basic values of each community. Hence intervention in the field of female education cannot be regarded as completely independent of the social milieu. The analysis shows that the linkages between education and fertility are different in the rural and urban milieu. In urban areas education has a stronger association with fertility than in rural areas. Hence, the effect on fertility of State interventions in the field of education would be felt more strongly and immediately in urban areas as compared to rural areas.

Age at marriage affects parity to a greater extent in urban areas than in rural areas. This could be due to several reasons. There is a threshold value only above which age at marriage may be expected to have an effect on reproductive behaviour. The average age at marriage in rural areas is currently far below this threshold for an increase in this age to have an immediate effect on fertility.

In present day Indian society, age at marriage can be regarded as a social indicator reflecting social status, the educational level of the woman and the freedom to practise responsible parenthood. In urban areas a higher age at marriage could mean a favourable position in all these social indicators. Statutory regulation of the minimum age at marriage has to contend with social customs and traditions. Enforcement of legislation regarding this minimum age has to take account of the customs and traditions governing it. The results from 1981 Census show

that the law prescribing 18 years as the minimum age at marriage for brides and 21 years for grooms is not strictly followed in many States in India.

Contraception and sterilization have gained acceptance in some States of India and are widely prevalent among all communities. However, their impact varies by community and by the level of education of the wife, and to a lesser extent, that of her husband. This may be attributed to differences in parity at acceptance, which in turn depends on family size values.

Analysis of the proximate determinants of family planning acceptance shows that in rural areas, the social factors have a limited effect in increasing the family planning acceptance after a certain level of contraception is attained. Where there is an unmet need for family planning, the demand for such services would increase. When once this need is satisfied, additional demand for these services would be generated only if the family size norm is brought down. In rural Maharashtra this demand seems to have been largely satisfied at present. Further increases in the contraceptive protection rate would depend on social changes that would lead to the adoption of a small family norm. In urban areas this norm is, perhaps, falling already due to social and institutional changes.

Changes in family size values cannot be brought about merely by mass propaganda. Basic changes are required in social values relating to gender equality and son preference. The social structure and institutions determining the status of women, property ownership and management by women, women's participation in gainful activities outside the household and outside agriculture and economic security and social protection of women are the other institutions that have to be changed to bring down family size norms. These changes are slow to occur.

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CHAPTER 2

DESIGN OF SURVEY

Introduction

The Population Research Advisory Council of the Government of India in its meeting held in October 1978 recommended the conduct of a fertility and mortality survey in seven selected States of India on lines similar to the World Fertility Survey. The states to be included in the first stage were, Bihar, Kerala, Maharashtra, Madhya Pradesh, Rajasthan, Tamil Nadu and Uttar Pradesh. However, the survey has been so far conducted only in the three States of Maharashtra, Bihar and Rajasthan. The Population Research Centre of the Gokhale Institute of Politics and Economics undertook to conduct this survey, analyse the data and prepare a report for the State of Maharashtra. The Ministry of Health and Family Welfare of the Government of India provided a grant-in-aid towards conducting the National Fertility and Mortality Survey (NFMS) in Maharashtra.

Major Objectives

There were five principal objectives behind the NFMS conducted in Maharashtra during 1980.

- 1) The fertility levels and differentials among major rural regions and urban zones and for Maharashtra State were to be estimated.
- 2) The relationships with fertility of variables proximate to it, such as age at marriage and family planning practice, were to be examined.
- 3) Fertility differentials by socio-economic factors were to be identified and assessed.
- 4) The practice of family planning methods and attitudes towards them were to be ascertained.
- 5) The mortality level and mortality differentials among major rural regions and urban zones and for Maharashtra State were to be estimated, giving particular attention to infant and child mortality.

The NFMS has two rather distinctive objectives compared to other demographic surveys such as those sponsored by the World Fertility Survey. Not only fertility differentials but also current fertility levels including the crude birth rate are to be estimated in NFMS. Moreover, in NFMS, mortality data are also to be collected and analysed for levels and differentials.

Empirical study of these major aspects of fertility and mortality has provided important findings of relevance to the national health and family welfare programme and the country's population policy. These

issues are discussed in the first chapter of this report.

Domains of Study

To study the differentials among the geographical divisions three rural regions and two urban zones were demarcated, taking into account broad ecological, demographic, social, cultural, historical and economic features. The rural area of the State of Maharashtra was divided into the three regions of Aurangabad Division (Marathwada), Nagpur Division (Vidarbha) and Western Maharashtra. Aurangabad Division consisted of the rural areas of the five districts of Aurangabad, Bhil, Nanded, Parbhani, and Osmanabad. Nagpur Division consisted of the rural areas of the eight districts of Akola, Amravati, Buldhana, Chandrapur, Bhandara, Nagpur, Wardha and Yeotmal. Western Maharashtra consisted of the rural areas of twelve districts of Ahmednagar, Dhule, Jalgaon, Kolaba, Kolhapur, Nasik, Pune, Ratnagiri, Sangli, Satara, Solapur and Thane. The cities and towns included in the sample from the urban areas other than Greater Bombay were Alore, Aurangabad, Badnera, Dombivali, Ichalkaranji, Nagpur, Pauni, Pune City and Cantonment, Satara, Shirgaon, and Solapur. Greater Bombay was preferentially included in the sample. These rural and urban divisions are characterised by rather distinct ecological, social, demographic and economic features.

Size and Scope of the Survey

The survey was conducted in a sample of 100 villages by interviewing 50 families in each selected village in rural Maharashtra and in 104 urban blocks by interviewing 25 families in each selected block in the chosen urban centres of the State. Map 2.1 shows the distribution of the sample villages and urban centres over Maharashtra State.

In this survey, 4,993 rural families and 2,661 urban families were interviewed giving a total of 7,654 sample families from which data were collected and are analysed in this report. Data were obtained by the direct interview method, on socio-demographic characteristics of families and of individuals. Information was collected regarding births and deaths occurring in the interviewed families during a period of two years preceding the date of interview. More detailed information for all married women aged 15 to 50, regarding their age at marriage, maternity history, knowledge and practice of family planning, as well as their attitudes and ideals on such matters as family size, education of children and age at marriage was also obtained.

From the data collected in the survey, estimates are given for the crude birth and death rates, age specific fertility and mortality, and contraceptive acceptance and prevalence rates including sterilization. Fertility and mortality differentials specific to geographical divisions and socio-economic classes are also examined.

Concepts, Definitions and the Questionnaires

In this survey the family was defined on a *de jure* basis as the usually resident members related by blood or marriage. However, all families in the chosen dwelling unit using a common kitchen were to be

interviewed even if such families were not related to each other by blood or marriage. For instance, the family of a servant staying in the dwelling unit should also be interviewed, if that family had not made separate cooking arrangements.

Every member who was normally residing with the family was included in it even if he/she was absent temporarily on the date of the interview. For instance, if a daughter-in-law was visiting her parents' home and had delivered a baby there, she and her new born baby were listed as members of her husband's family. On the other hand, a married daughter visiting her parents' home was not included as a usual member there. A son or daughter studying away from home was not counted as a usual member of his/her family if he/she was away for a year or more.

Since fertility and mortality rates were to be estimated from the survey data on the basis of the population and women distributed by specific characteristics such as age, the *de jure* (usual) family appears to be the more appropriate unit of enumeration.

Two questionnaires were used in this survey. The family questionnaire consisted of seven pages arranged in three blocks. In Blocks I and II, information was obtained on the general characteristics of the family such as caste and religion, principal and subsidiary family occupation, approximate annual income, migration status, condition of the house, household amenities and possession of modern objects. In Block III, data regarding social and demographic characteristics and the migration status of all the members of the family were collected. Detailed information regarding births and deaths that occurred during a period of two years preceding the date of interview was also collected in Block III. Births to usual residents and to visitors were to be noted separately as also the deaths of usual residents and visitors.

The second questionnaire was complementary to the family questionnaire and information was to be filled in for all currently married women aged 15 to 50 in the sample families. If there were more than one eligible woman in the family, a separate questionnaire was to be filled in for each eligible woman. On the average, 1.2 complementary woman questionnaires were filled in per family.

This questionnaire was comprehensive containing 16 pages divided into 8 blocks from IV to XI. Block IV was an identification block for the eligible woman and Block V obtained data regarding age, age at marriage, literacy and educational attainment of the woman and her husband. In Block VI details of the woman's maternity history and summary figures on children ever borne were recorded.

In Block VII data were obtained on knowledge, attitude and practice of family planning, and contraceptive history including sterilization. More detailed information was obtained for sterilized couples and for IUD acceptors such as side effects, complaints, treatment and user satisfaction.

In Block VIII and IX information was collected on the last two deliveries for the eligible woman if she had the last delivery within

the five years preceding the date of interview. Information regarding place of delivery (home or hospital), lactation, post partum amenorrhoea and immunization was obtained for the last two deliveries.

Attitude towards contraception was asked in Block X and ideals for family size, age at marriage, education of children were ascertained in Block XI. In the same block, information regarding physical disabilities among the members of the family and illnesses during the year preceding the date of interview was collected. The questionnaires were actually administered in Marathi language.

Before finalising the questionnaires, they were pretested in a sample of about 50 families in rural Maharashtra and necessary changes were made in the light of the problems encountered.

Recruitment and Training of Investigators and Field Organization

For conducting a fertility and mortality survey, two alternative types of field organization appeared feasible: either the recruitment of *ad hoc* interviewers, based in Pune, on regular salary for the duration of the field work; or the recruitment of local interviewers working on a regular or piece-rate basis. Only married women were considered suitable as interviewers since one of the main topics of study was reproductive and contraceptive behaviour of women.

Accessibility of the sample village or town, availability of transport, travel costs, logistical support and arrangements for overnight stay of women would be the major problems encountered in sending a central pool of interviewers to the sample places. Local availability of persons with the requisite qualifications and their training and supervision would be the major problems in recruiting local interviewers. The local interviewers, because of their limited education, would have little or no skills in the preparation of a sampling frame or in drawing a random sample. Such interviewers would require close supervision to sustain the quality of their work. Outside interviewers would need close supervision to maintain a reasonable number of interviews per day. Also transport arrangements would have to be made and sufficient travel time would have to be allowed for them to reach the sample centre from the base.

This large-scale survey required *ad hoc* recruitment of about 40 investigators for a short period. Several problems were faced in the recruitment of women investigators. As the major part of the interviewing was to be done in rural areas, the investigators had to be prepared to work in villages. Making special arrangements for residents of other villages or towns for a week's stay in the sample village proved a difficult task. Hence recruitment of local women or residents of nearby villages was preferred as they would be able to make their own arrangements for staying in the sample village during the investigation. Strenuous attempts were made to locate suitable women investigators in or around the sample villages by contacting schools and social service agencies in the chosen talukas. Married and educated women were preferred to others. In these circumstances, the minimum educational requirement was relaxed from graduate to S.S.C. level, provided that the woman had some experience in social or survey work.

As most of the women recruited for this survey had no prior experience in interviewing, a short-term training programme was arranged for them. Before the training began, detailed instructions were prepared in Marathi for filling in the two questionnaires and were supplied to the investigators. Full time training was conducted for a period of one week at the Population Research Centre of the Gokhale Institute in Pune.

During the training, the objectives of the survey and the concepts and definitions of the items included in the questionnaire were explained in order to avoid ambiguities and to maintain uniformity in data collection. The PRC staff participated in the training, shared their experience in field work and gave instructions on how to approach the respondents in general and the rural families in particular to ensure their cooperation.

To gain practical experience, each trainee was asked to visit the nearby slum areas and to fill in two questionnaires under the guidance of the PRC staff. The mistakes made in these interviews were scrutinized and discussed.

In this survey, sample families for investigation were identified by selecting voters from the electoral rolls for the village and the urban block. The procedure of tracing and locating the sample families for interview was explained during the training. In all, forty-one investigators were trained of whom five were discontinued for unsatisfactory performance.

The survey questionnaires were rather long, containing 22 pages, and an investigator was expected to fill in five to six questionnaires a day. For field supervision of the investigators, men supervisors with previous experience in survey field work were recruited and given training in filling the socio-demographic questionnaires used in this survey. For this task, men were preferred to women because of their superior mobility and easy access to other men in the interviewed families.

About two weeks after the field work started, the supervisor took a round of the sample areas under his control, met the investigators, checked their work, clarified their doubts and corrected their errors. The ability and understanding of the investigators were checked in the first supervisory visit. This was crucial because mistakes had to be corrected at the first opportunity.

The supervisor, in the later visits, was required to check, on the spot, ten per cent of the questionnaires in order to ensure that the proper sample families had been identified and interviewed and that the information obtained was reliable. Besides this, the supervisor had to check all the forms filled in by the investigators for internal consistency and to correct the mistakes detected. All these procedures were followed to improve the quality of the data collected. In chapters eight and nine an assessment is made of the data quality in terms of indirect estimates of vital rates and response errors. The completed schedules were brought to PRC, Pune by the supervisors.

Hundred villages, with 50 families from each, and 104 urban blocks,

with 25 families from each, were interviewed by the investigators during the period June 1980 to December 1980. The numbers of villages and blocks completed by each investigator varied according to her availability and efficiency.

The investigators were paid on piece-rate basis. Taking into account the difficulties of a woman investigator in residing in the sample village during the period of enquiry, the travelling charges to and from the village to her nearby place of residence were allowed up to a specified limit unless she was a local woman who could arrange for her own stay.

After taking various steps outlined above to get reliable data, it was felt that, none the less, response errors were bound to arise in some items of information for several reasons. It was particularly suspected that data on such items as the number of deaths occurring during the two years preceding the date of interview might be under-reported. Hence, to assess the response errors in such items, all the families interviewed in a sub-sample of 44 villages and 33 blocks were reinterviewed by the supervisors with regard to these and related items. The extent of response errors is assessed in chapter nine of this report by comparing the original with the reinterview response.

Sampling Design

In designing the sample for NFMS Maharashtra, 1980, two basic constraints were kept in view, namely, the pattern of information available at the stage of drawing the sample and the capacity of the interviewers for making random selections of families in the field according to the design.

Information Available for Sampling

At the time of planning the survey, the published data from the 1971 Census and the District Census Handbooks were available, but the house listing operations for the 1981 Population Census had yet to be completed. The electoral rolls, listing registered voters 21 years and over, were available at the District Collector's office. These were prepared in 1977 or later. The 1971 Census data and the electoral rolls were, therefore, used in designing the sample and for selecting the sample families.

Sampling Skill of the Interviewer

In view of the meagre budget provided for the survey and the logistical problems involved in arranging for the transport and overnight stay of women interviewers, it was decided to recruit women interviewers only from the neighborhood of the sample village or town and these women were given intensive training in Pune, prior to the field work as explained already.

Since the sampling design was to be tailored to interviewers lacking sampling skills, the selection of the rural and urban centres was made by the staff of the Population Research Centre, Gokhale Institute of Politics and Economics, Pune, and the selection of the

sample families from each chosen centre was made by the supervisor from the electoral rolls of registered voters kept at the District Collector's Office. A list of the chosen families, with names and addresses, was prepared and given to the interviewer. This list included an adequate number of substitutes to be used if any selected family could not be traced or had moved out. Certain rules of substitution were enforced to avoid any bias, on the part of the interviewer, in taking up the sample families for interview.

Unit of Sampling

The *de jure* members of the family usually living and eating together were defined to be the family unit. This usual family was the unit of analysis for the survey of fertility and mortality rates and differentials. For instance, a woman visiting her parents' home for delivering her baby was to be included in her husband's family, if it fell in the sample. However, if her parents' family fell in the sample, then she was to be regarded as an "outsider" and information about her delivery was to be obtained separately as a visitor but not as a usual member. If two or more families in a dwelling unit had common eating arrangements, all were to be interviewed. The usual family of the registered voter selected from the electoral rolls was, therefore, used as the unit of sampling also.

Sample Size

For comparable State estimates in the National Fertility and Mortality Survey, the Population Research Advisory Committee of the Government of India had recommended that about 1,200 families should be interviewed for every 11 million population. On this scale, the Maharashtra Survey was expected to obtain about 6,000 interviews. Moreover, for each domain of study, the sample should be large enough to provide a separate estimate. The present survey was expected to yield estimates for the three rural regions of Aurangabad and Nagpur Divisions and Western Maharashtra and for urban centres other than Greater Bombay and for Greater Bombay. Hence 900, 1,450 and 2,643 family interviews were conducted in rural areas of Aurangabad and Nagpur Divisions and Western Maharashtra respectively; 1,561 family interviews were conducted in urban centres other than Greater Bombay and 1,100 family interviews were conducted in Greater Bombay. Thus for this survey, totally 7,654 family interviews were conducted over Maharashtra State. The spread of the sample villages and blocks is shown in Map 2.1. The distribution of the interviews by domains was roughly in proportion to their populations. In the selected families, all married women in the reproductive ages of 15 to 50 were interviewed using a separate questionnaire. This resulted in 8,874 interviews of eligible women.

Type of Sampling Design

A three stage sampling design was used to select rural families, with the taluka as the first stage, the village as the second stage and the registered voter from the electoral rolls as the third stage. The families of the selected voters constituted the sample. Urban families were selected in four stages using the urban centre as the first stage, the electoral ward as the second stage, the page of the electoral rolls

as the third stage and a cluster of families as the final stage. Details of the rural and urban samples are given in Appendix A.

Estimation and Weighting

The procedure of estimation is completely defined by the sampling design. For unbiased estimation in general, the value for each sample unit has to be weighted inversely in proportion to its probability of selection. If the weights are equal for all sample units, the design is termed "self-weighting". Then a simple average provides an unbiased estimate for the population parameter. The appropriate formulae are developed in Appendix A.

Non-response

For various reasons, it was not possible to interview in the survey all the selected families and eligible women in them. It was, therefore, necessary to ascertain the extent and reasons for non-response.

It is not always valid to assume that the non-respondents have characteristics similar to the respondents and, hence, could be represented by them. In fact, it might be suspected that in this survey non-respondent families tended to be selected by such characteristics as family size, mobility, and whether the woman was working outside her home. Some of these characteristics might be correlated to the number of births and deaths in the family. Therefore, omission of the non-respondents from the analysis might bias the results. However, the magnitude of the bias in the overall estimate would depend on how different the non-respondents were from the respondents and how large the percentage non-response was. If the percentage non-response were not large, then the bias in the overall estimate would be negligible even if the non-respondents were highly self-selective. For this reason, it is essential to ensure that the non-response is kept within reasonable limits in the survey interview.

Non-response of Families

The reasons for non-response were ascertained for the three rural regions and the two urban zones. For instance, for Western Maharashtra, on the basis of information available for a sub-sample of 38 villages, 2,538 families were selected for interview, including substitutes. Of these, 188 substitute families were not used so that the effective sample was 2,350. On further investigation, 65 families were not traceable, 84 had left the village and 9 had been transferred. Therefore, these 158 families fell outside the universe of study which was defined as the set of families currently resident in the village. Thus only 2,192 sample families were eligible for interview. Among these, 1,896 were interviewed and 296 could not be interviewed. Hence the percentage response was 86.5 and non-response, 13.5.

The reason for non-response was also ascertained in Western Maharashtra for the 296 non-respondent families. Percentage wise, refusals accounted for 3.4, inability to contact the family during the interviewer's stay at the village for 70.3, deaths for 3.0, living on farm for 2.7, living alone for 9.8 and other reasons for 10.8. Similar

results were obtained for Nagpur and Aurangabad Divisions, all rural regions, for the two urban zones and both zones together. The non-response rate and percentage non-response due to the two principal reasons, refusal and inability to contact, are summarized.

Domain	Non-response as % of eligible sample	% of non-response due to	
		Refusal	Inability to contact
Western Maharashtra	13.5	3.4	70.3
Nagpur Division	11.4	0.0	59.4
Aurangabad Division	8.8	9.4	66.0
Rural	12.1	2.8	66.2
Urban excluding			
Greater Bombay	12.9	11.7	79.4
Greater Bombay	22.5	21.3	71.7
Urban	17.2	17.3	74.9
Maharashtra State	14.0	9.3	70.1

Percentage non-response in rural regions and the urban centres excluding Bombay was well under control, being around 12 per cent. This compares favorably with non-response in other socio-demographic surveys. As anticipated, the percentage non-response in Greater Bombay was about twice as large (22 per cent) as that in the rural regions and urban centres excluding Greater Bombay.

Two of the principal reasons for non-response were refusals and inability to contact. As in other surveys, in rural regions, refusals as a percentage to non-response was negligible, except for Aurangabad Division which could be accounted for in terms of possible misclassification of reasons and a lower non-response rate. In urban centres excluding Greater Bombay, the percentage of refusals rose to 11.7 and in Greater Bombay it was as high as 21.3. This again is in conformity with general survey experience that urban and metropolitan respondents are less cooperative than rural respondents. On account of cost considerations, the interviewer stayed only for a limited duration in the sample village/block and it was not possible to make repeated call-backs to the families that were not contacted during her stay. Hence inability to contact the family was another major reason for non-response in both the rural regions and the urban zones. In fact, this reason accounted for anywhere between 60 to 80 per cent of the non-response.

Since refusals depend on the socio-cultural milieu and inability to contact on the actual procedure and duration of the field visits, it was not possible to reduce further the non-response in this survey. It appears that non-response was well under control in the three rural regions and in the urban centres excluding Greater Bombay and, hence, the bias arising from the self-selection of the non-respondents cannot be large in the estimate made from the data for the respondents only.

However, the estimate for greater Bombay may carry a larger bias on account of the self-selection of non-respondents.

Non-response of Eligible Women

From the interviewed families, all married women aged 15 to 50 were to be further interviewed using the questionnaire on fertility and family planning. There were 6,067 such eligible women in the rural regions of whom, for 5,673 women, the questionnaire was completed. Thus, at the second stage of interview, there was 6.5 per cent non-response for rural women. Nagpur Division had a lower percentage of non-response of 3.2 while Aurangabad had a higher percentage of 10.5, although this Division had the lowest non-response rate for families.

As a percentage to the number of non-respondent eligible women, the major reasons for non-response in the rural area were "newly married" and "have no child", although interviews for such women should have been taken. Clearly this omission arose out of a misunderstanding on the part of the interviewer and could have been avoided if more attention had been paid to this contingency during the training. However, the error arising from this omission would not be serious since newly married women and women without children neither contributed to births nor practised family planning.

It was also found that for the two urban zones, urban centres other than Greater Bombay and Greater Bombay, the percentages of non-response among eligible women were only 0.5 and 2.6 respectively. Hence the bias due to non-response at the second stage of the interview should be negligible in the overall estimate for both urban zones. It is not necessary to consider in detail the reasons for non-response of eligible women as the response rate was high in urban areas for this group.

Scrutiny, Editing and Coding of Data and Preparation of Punched Cards

The scrutiny, consistency checks and editing of the completed questionnaires were started immediately after the investigation was over in the first few villages so that coding and punching of the data could proceed concurrently with the field work. Before coding the information in the questionnaires, the data were first scrutinized for errors and for internal consistency. Ten temporary persons were appointed for coding the data. The purpose, design and questionnaires of the survey were explained to the coders and they were instructed in coding procedures and consistency checks. Work norms were prescribed for coding operations. The quality and output of the coders were controlled by the PRC staff.

Seven sub-cards were designed to code the survey data. Sub-card 1 contained family characteristics and summary totals for the family of the number of married women aged 15 to 50 and adult and non-adult earners, the vital events of births and deaths, and maternity and disability data. Sub-card 2 was devised for coding socio-demographic information of individual member of the family. Sub-card 3 contained information on births and deaths during the two years preceding the date of interview. Sub-cards 4, 5 and 6 were used for coding the information on age, age at marriage, fertility, contraception including

sterilization and data on attitudes to family size and family planning, complaints regarding contraceptives, etc., for married woman aged 15 to 50. Sub-card 7 provided data for matched families from the original interview and the reinterview for the sub-sample. Care was taken to include in the sub-cards all variables that would be needed in the analysis since the tabulations were to be done by an electronic computer. Over 60,000 cards were punched in all for the seven sub-cards. The punched cards were subject to cent per cent verification. These cards provided the input to the electronic computer for generating the basic tables required in the analysis.

Tabulation Plan for the Electronic Computer

A detailed tabulation plan was drawn up on the basis of the seven sub-cards to generate the tables essential for the analysis. Five different units of tabulation were used. The family tables from sub-card 1 were based on 54 original and 19 recoded variables. There were 67 marginal tables and 41 cross tables relating to the background characteristics and the averages of the family size and the number of births and deaths per family. The total number of families tabulated was 7,654.

The second unit of tabulation was the individual family member. These tabulations were generated to provide the distribution of persons and eligible women by age and other characteristics as given in sub-card 2. Fourteen original, eight recoded and five transferred variables were used in these tabulations to obtain 21 marginal tables and 20 cross tables. The number of individuals tabulated was 48,054.

The third set of tabulations used vital events - either births or deaths - as the units of tabulation. These tabulations were needed in the analysis to calculate current birth and death rates, specific for age and other socio-demographic characteristics. There were 2,871 births and 752 deaths reported in the survey. The variables used in this set came from sub-card 3. Eighteen original, six recoded and five transferred variables were used to obtain 19 marginal and 21 cross tables.

The fourth unit of tabulation was the eligible woman who was married and aged 15 to 50. These tabulations provided, specific to age groups, fertility rates, children ever born, contraceptives used and other relevant characteristics of the woman. Hence these tabulations relate to the most important aspect of the report namely, fertility differentials by demographic and social characteristics. Sub-cards 4 to 6 provided the required data. In this set of tables for eligible women, 60 original, 27 recoded and 8 transferred variables were used to generate 82 marginal and 104 cross tables. Data for 8,874 eligible women were used in this set of tables.

The fifth and final set of tables was obtained for comparing the original with the reinterview response. The unit of tabulation was the family and the number of units was 3,042. Sub-card 7 provided the needed data. Twenty-five original and 13 recoded variables were used to generate 23 marginal and 30 cross tables.

Separate tabulations were made for the following domains of study :

Rural regions

- 1) Aurangabad Division,
- 2) Nagpur Division and
- 3) Western Maharashtra;

Urban zones

- 4) Urban centres other than Greater Bombay and
- 5) Greater Bombay.

As mentioned earlier, these domains have distinct ecological, social, demographic and economic features that are relevant to the study of fertility and mortality in Maharashtra.

The sampling design utilized the electoral rolls for the selection of families but failed to ensure self-weightage in the tabulation of the families. As described in Appendix A, suitable weights were used to obtain unbiased estimates of the vital rates. However, in the study of fertility and mortality differentials by other characteristics, an unweighted tabulation was used since it was expected to produce results not much different from the weighted tabulations.

The electronic computer system at the Poona University, International Computers Limited 1904 Scientific on operating system George 3, was used to prepare the five sets of tables from over 60,000 punched cards. Test runs were first made to check the computer programmes before the actual data were tabulated. The computer print out was scrutinized and collated for the analysis.

Analysis and Preparation of the Report

The analysis initially involved the examination of the marginal and cross tables for consistency. The results were compared over the domains of study and interpreted. The current vital rates were directly calculated from the tables. Age specific rates and differentials by socio-economic characteristics were next obtained. Some indirect methods for independently estimating the vital rates from incomplete and inaccurate data were also used. The demographic and socio-economic determinants of fertility and mortality were examined.

The analysis was directed towards the following major topics: comparison of the demographic profile of Maharashtra from the NFMS with the Census profile; background family characteristics; current birth, death and growth rates; age distribution, age at marriage and fertility differentials of currently married women; family planning attitudes and practice; indirect estimation of fertility and mortality; infant and child mortality and life tables; response errors and the assessment of the quality of survey data. The differentials among the three rural regions, urban centres other than Greater Bombay and Greater Bombay were examined under each topic. Other differentials by social and demographic characteristics were also examined.

The first chapter of this report summarizes the findings, presents the conclusions and discusses their implications for the family planning programme and for the population policy. This chapter describes the objectives and the methodology of the survey, the study design, the sample, estimation and non-response. The substantive part of the report is arranged by the topics mentioned in the preceding paragraph.

Time Schedule of Survey Operations, Analysis and Preparation of Report

Planning for the statewide NFMS survey began late in 1979. However, the actual questionnaires were prepared and pretested during January-February 1980. The sampling design was developed and the sample drawn concurrently. The training of the first batch of investigators was completed in May. Field interviews were carried out from June to December, 1980. Scrutiny and editing was done concurrently. The code-book was ready by June 1980. Coding and checking was done from July 1980 to January 1981. The tabulation plan for the computer was prepared in January-February, 1981. Computer runs were tested during February-May 1981. The data were transferred from cards to the disc and files were created during May-August 1981. The various sets of computer tables were produced during August 1981-February 1982. The computer runs were scrutinized by March 1982 and analysis of these tables was completed by May 1982. The draft tables for inclusion in the report were prepared by June 1982. The report was drafted during July-September, 1982. The mimeographed report was ready by 31 December 1982.

Advance planning and the carrying out of operations concurrently, when feasible, reduced potential bottlenecks in field operations, processing and computer tabulations to a large extent. This enabled us to prepare the NFMS Report in a relatively short time. The entire analysis and the preparation of the report was done by the regular staff of the PRC, in addition to their normal duties.

Survey Expenditure

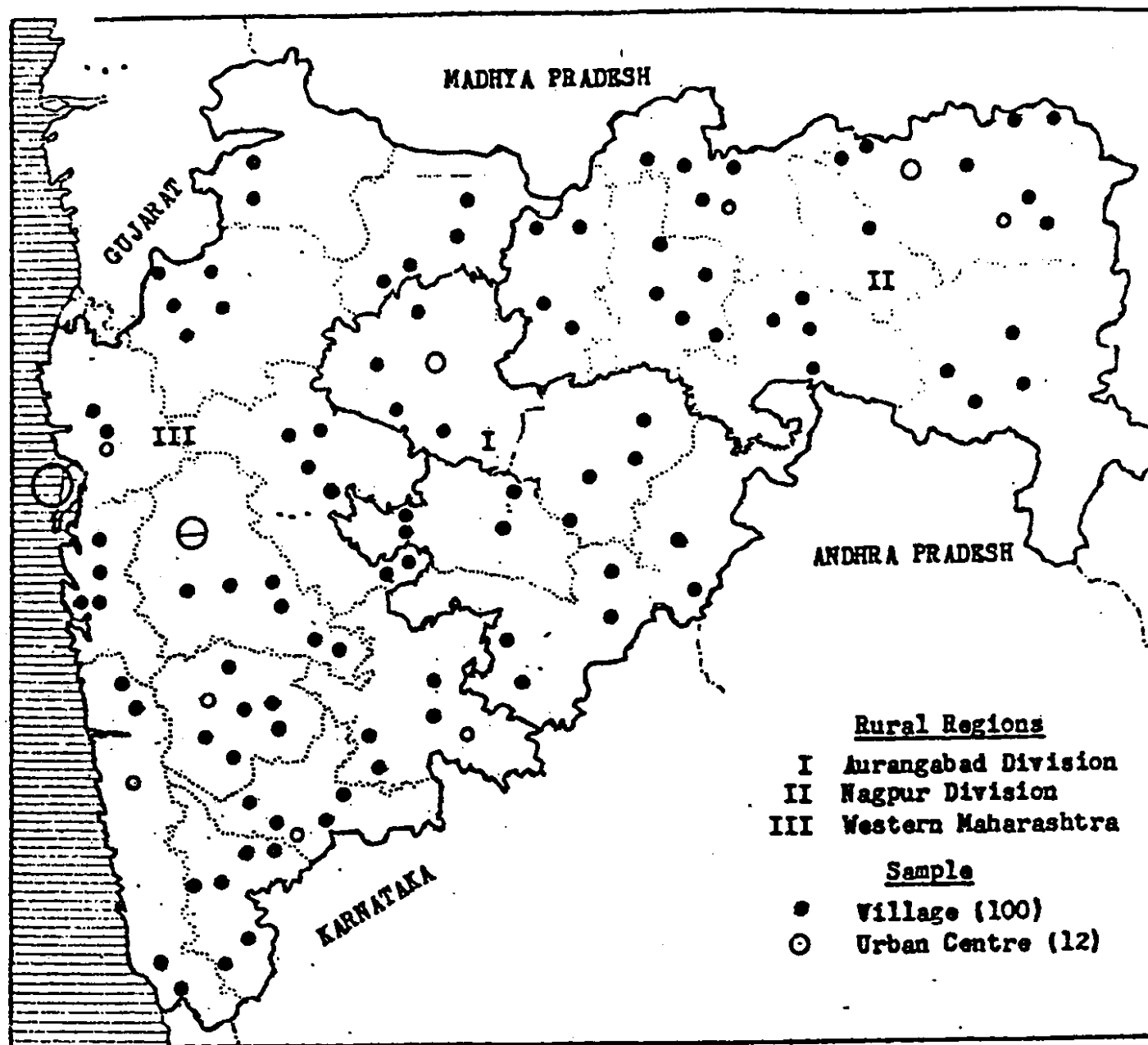
A grant-in-aid of Rs. 2.94 lakhs was sanctioned by the Ministry of Health and Family Welfare to PRC, Pune for conducting a National Fertility and Mortality Survey in Maharashtra. The grant was used in meeting the expenditure connected with field work, data preparation and computer tabulations. Since the original budget allocation for data preparation and computer tabulations was found insufficient, the Ministry's approval was sought and obtained for revised allocations within the original ceiling for the total expenditure. The total expenditure on field work, data preparation and computer tabulations, and office establishment came to Rs. 2.81 lakhs. The analysis and the preparation of the report was done entirely by the PRC staff in addition to their regular work. Hence these items of work were not charged to the grant-in-aid.

As regards the major components of expenditure, about Rs. 96 thousand were spent on field work in payments to the interviewers, their travelling and daily allowances and in supervisory expenditure. Office expenditure on stationary, typing and printing amounted to another Rs. 43 thousand. Expenditure on data preparation - editing, coding, punching, verification, transfer to computer disc and preparation of

files - and data processing by the computer came to Rs. 129 thousand. A five per cent overhead charge of Rs. 13 thousand was paid to the Gokhale Institute for administering the survey and for providing the supporting services.

As with all other projects undertaken by the Institute, the survey was administered with prudence and frugality, while the quality of the data collected was maintained by advance planning and adequate training and supervision of the interviewers.

Map 2.1 : Map of Maharashtra State Showing Distribution of Sample Villages and Urban Centres: NFMS Maharashtra, 1980



CHAPTER 3

DEMOGRAPHIC PROFILE OF MAHARASHTRA

Introduction

In this chapter the demographic profile for regions/zones of Maharashtra State from NFMS 1980 are presented. The main characteristics examined are age structure, proportion married by age and sex, age at marriage, proportions of Scheduled Castes and Tribes and Muslims in the population and educational level in broad age groups by sex. The distributions are given separately for three regions of rural Maharashtra, for urban areas excluding Greater Bombay, for Greater Bombay, for urban Maharashtra and for the State.

The distribution for these characteristics are first compared with those from 1981 Census. The similarity between the distributions from the two sources, NFMS and 1981 Census, would establish the representativeness of the NFMS sample. Next the NFMS estimates are compared with the 1971 Census results. The difference found between 1971 Census and NFMS 1980 should be accountable in terms of changes over the decade 1971-1980, sampling errors in NFMS and the definitional differences between the two data sources.

For instance, there has been a decline in fertility over the last decade in Maharashtra that should lead to a decrease in the percentage of population in age groups 0-4 and 5-9. The distortion due to age selective net interstate migration to Maharashtra on its age distribution would, however, be negligible. Hence the percentage of persons, males and females in age groups 0-4 and 5-9 according to NFMS 1980 should be expected to be less than the corresponding percentage in 1971 Census. This comparison should, therefore, confirm or contradict the expected fertility decline in this decade. Differences between the figures from the 1971 Census and NFMS 1980 would also arise from sampling fluctuations or from definitional differences in the educational classification or from differences in the identification of Scheduled Castes and Tribes in the Census and the survey.

Systematic comparison of the demographic profile from NFMS with the 1981 Census profile should serve to establish the representativeness of the sample while comparison of NFMS with the 1971 Census figures should reveal the trends in the last decade.

Comparison of NFMS with 1981 Census

The age profile for both the sexes combined for Maharashtra State is broadly similar for 1981 Census and NFMS 1980 in Table 3.1. It should be noted that the NFMS figures are subject to sampling variations which are large for regions/zones. Except for Greater Bombay, in the age groups 5-9 and 10-14, the Census percentages are slightly larger than the NFMS percentages. This may be mostly due to the definite preference for ages 5 and 10 as reported in the Census. In the two oldest age groups the Census percentages are below the NFMS figures. It appears that, in the Census, there was a tendency to under-report older ages, especially for women. In NFMS, since the maternity history and other

details were to be collected for married women up to age 50, there might have been a tendency to report female ages 50 or below as ages above 50. This would account for the lower NFMS percentages in age group 45-49, compared to 1981 Census, in rural regions.

The percentages in the three oldest age groups in both rural and urban areas were larger for NFMS than the corresponding percentages from the Census. Urbanward migration and incorrect *de facto* enumeration would account for some distortion of Census figures. Another reason for these differences is that the Census enumerated the institutional population also whereas NFMS was restricted to the household population.

The age profiles separately for males and females (not shown) were broadly similar between the two sources. The differences in percentages by age groups, from the two sources, were also similar to that for both sexes combined for reasons explained in the preceding paragraphs.

Sex ratios calculated from both sources (not shown) were found to be generally in close agreement for each age group for Maharashtra State. They are also broadly in agreement for all the ages in each region/zone. It has already been mentioned that the cut-off age for taking the reproductive history of women was 50. So there could have been a tendency to report ages 48, 49 and 50 as age 51 or above to avoid filling the schedule for some women. This tendency is borne out by the sex ratios for age 45 to 49 and 50 to 54. For ages 45 to 49, the NFMS sex ratio of 820 was well below the Census sex ratio of 896, whereas for ages 50 to 54 the NFMS sex ratio of 1,304 was well above the Census sex ratio of 899. However, there were much larger differences between the sex ratios from the two sources within each rural region or urban zone. The various reasons for this difference are the different patterns of digital and age preferences by sexes in the Census and NFMS, urbanward migration and incorrect *de facto* enumeration in the Census and sampling variations in NFMS.

The percentage of currently married women in reproductive age groups by region/zone from NFMS and from the 1981 Census show a close correspondence as seen from Table 3.2. The only exceptions to this pattern are age groups 15-19 and 20-24 in other urban areas and Greater Bombay. According to NFMS, in these age groups, the percentage married is below that from the Census.

The singulate mean age at marriage for females, as estimated from the 1981 Census, is again found to be close to the NFMS figures (Table 3.3) with three exceptions. In Aurangabad Division, this mean age is 16.0 from NFMS as against 16.8 from Census. In urban areas, this relationship is reversed. In Greater Bombay the singulate mean age was 22.4 from NFMS against 21.3 from the Census, and in other urban areas it is 21.0 from NFMS against 19.8 from the Census. Thus the rural-urban differences in this mean is more in NFMS compared to the Census. The pattern of differences is similar for males except for Greater Bombay.

It is seen from Table 3.2 that the child woman ratio for all women aged 15 to 44 from the Census and NFMS are nearly equal and, in no case, differ by more than 5 per cent. The same is true of the ratio of the number of children to the number married women aged 15 to 44.

The NFMS definition of Scheduled Castes and Tribes is closer to 1971 Census rather than 1981 Census, In fact, the area restrictions relating to Scheduled Castes and Tribes were removed in 1976 in Maharashtra State and hence the 1981 Census distribution is considerably different for Scheduled Castes compared to NFMS. Figures from 1981 Census and NFMS are therefore not comparable. The NFMS figures are compared later with the 1971 Census data based on more similar definitions.

There are large differences in the definition and classification of the population by literacy and education level as between NFMS and the Census. These distributions are compared between NFMS and Census 1971 in the next section.

The comparison of the demographic profile between NFMS and 1981 Census clearly establishes the representativeness of the NFMS sample. The main differences between the concepts and definitions used in the two sources have been pointed out. Where the differences between the two sources are large, the reasons for them have been indicated. It is, therefore, appropriate to compare the 1971 Census results with NFMS in order to ascertain the trend in the demographic profile over the period 1971-80.

Comparison of NFMS with 1971 Census: Age Structure and Sex Ratio

The age structures by five year age groups from the 1971 Census and the NFMS for the eight domains of study are shown in Table 3.4 for all persons. According to the definitions used, the NFMS distribution covers strictly the household population while the Census population includes, in addition, persons living in institutions or those without fixed abode who are not affiliated to any family. The difference between the two sources, due to this reason, would be negligible except for Greater Bombay. For Greater Bombay the difference would be more pronounced in the sex ratio than in the age distribution.

While the age profile for Maharashtra is broadly similar for the 1971 Census and NFMS in Table 3.4 for the intermediate age groups, for the youngest age group 0-4 the NFMS percentage is 11.8 against the Census percentage of 14.4 and for the next age-group 5-9 the NFMS percentage is 12.4 against 14.8 for the Census. As mentioned earlier, since the distortion in these groups due to net inter-state age selective migration is negligible, the difference between NFMS and Census may be ascribed to a declining fertility in the period 1971-80.

The NFMS percentages in age-groups 0-4 and 5-9 are less than the corresponding percentages for the Census in each of the three rural regions and the urban zone excluding Greater Bombay. The rural differences are larger than the urban differences. Only Greater Bombay fails to follow this pattern strictly. These results are in conformity with the combined effect of the decline in fertility on the one hand and, on the other hand, net urbanward migration in adult ages, especially to Greater Bombay.

In Table 3.4 it is found that the percentages in the age groups 50-54, 55-59 and 60 and above, for all the eight domains of study, from the

NFMS are larger than the corresponding percentages from the Census. This can be attributed to a decline in mortality in this decade and, as observed earlier, also to the reduction in the percentage of population below age 10 consequent to the decline in fertility.

The child/married woman ratio in Table 3.4 (the number of children aged 0 to 4 per 1000 married women aged 15 to 44) for NFMS is lower than the Census, for all eight domains of study. With declining infant and child mortality, this ratio should increase, but with declining fertility it should decrease. These figures, therefore, confirm that there was a substantial decline in fertility within marriage which more than offset the decline in infant and child mortality in this decade.

Similarly the child/woman ratio (the number of children aged 0 to 4 per 1000 women aged 15 to 44) shows that the fertility for all women declined between 1971 and 1980 (Table 3.4). Moreover, the decline for all women was larger than for married women, indicating that other changes such as an increasing trend in the age at marriage and a decreasing percentage of married women in younger ages also contributed to the fertility decline.

The sex ratio (number of females per 1000 males) for Maharashtra (not shown) throws some light on the quality of the data from the two sources. The ratio at birth would be around 960 and might be expected to decline in Indian conditions due the excess of female over male mortality. Extreme variations, from one group to the next, indicate age transfer errors for either or both sexes. For instance, for ages 15 to 19, the Census sex ratio is 832 against the survey ratio of 932, which shows a more gradual fall with increasing age. One plausible explanation is that, in the Census, more women transferred their ages upwards from this group than men did although other explanations are also possible. But, generally, the NFMS sex ratios by age group fluctuate less than the Census ratios. Age groups 50-54 and 55-59 are exceptions to this observation. The fact that an additional lengthy questionnaire was to be completed for women aged 50 or less could have prompted the investigator to return, for the marginal group of women with age around 50, ages over 50 in the survey. On the other hand, it is found that, in the Census, many women had exaggerated their ages to 70 or over.

The rural differences in the sex ratios from the two sources show a pattern similar to that for Maharashtra State since the rural population forms 65 per cent of the state population and the effect of age and sex selective migration is less severe on the larger rural population. But the sex ratios from the two sources are different for Greater Bombay. The Census ratios are far below the survey ratios for age groups 20-24 and above. This could be attributed partly to the inclusion of the non-household population in the census that would be selective for males in working ages. The sex ratios for Greater Bombay show larger fluctuations by age groups for the survey than the Census. The higher non-response rate for this city (23 per cent) and the definition of usual family used in the survey would mostly account for this result.

Marital Status by Age and Age at Marriage

According to NFMS, 1980, 4.7 per cent of the females in ages 10 to

14, 37.2 per cent in ages 15 to 19, 83.4 per cent in ages 20 to 24 and 96.1 per cent in ages 25 to 29 were ever married (Table 3.5). The corresponding percentages from the 1971 Census are 7.0, 54.2, 90.1 and 97.6. Thus, in the intervening years, the proportion of ever married females in the younger age groups had declined while marriage had remained almost universal by ages 25 to 29. Naturally the proportion of males ever married in any age group was less than that for females but a decline in this proportion during 1971-80 is evident for males also.

In any group, the proportion ever married for each sex shows a gradient pattern over the rural-urban continuum. It is highest in rural regions, intermediate in urban areas other than Greater Bombay and lowest in Greater Bombay.

The percentage of females ever married in ages 10 to 14 is a sensitive indicator of social backwardness and social change. Among the rural regions, Aurangabad Division had the largest percentage of ever married females in ages 10 to 14. It declined little from 18.6 per cent in 1971 Census to 16.2 per cent in NFMS 1980.

The decline in the proportion married between 1971 and 1980 is observed for all the domains of study. Thus there is consistent evidence on the increase in the age at marriage, and on its sex differentials and a rural-to-urban gradient in the proportion ever married.

The percentage of currently married women in Table 3.6 tends to confirm these results. In younger ages the percentage currently married is not much lower than the percentage ever married because the dissolution of marriage due to divorce or separation or husband's demise should be negligible. The difference between the percentages of ever and currently married women is small up to age group 25-29. For NFMS, for instance, the per cent of women in ages 25 to 29 ever married was 96.1 per cent against 92.4 per cent women currently married.

In older ages, the effect of divorce and separation, and especially husband's mortality, should be larger and hence the difference between the percentages of ever and currently married women should also be larger. In fact, for NFMS, the percentages of ever and currently married women in ages 40 to 44 were 99.5 and 90.7, and for ages 45 to 49 the corresponding percentages were 99.7 and 87.6.

Comparison of the 1971 Census and NFMS 1980 percentages of currently married women by age groups, given in Table 3.6, reveals both the increase in the age at marriage and the improvement in couple survival. For rural Maharashtra, up to age group 25-29, this percentage from the 1971 Census was above the corresponding percentage from NFMS 1980, indicating a rise in the age at marriage in this period. For urban areas, the reversal of this pattern takes place from age group 35-39 or later. The largest difference for the State occurs in ages 15 to 19, between 53.1 per cent in the Census and 36.1 per cent in the survey. These figures confirm the earlier findings.

From the age group 35-39 onwards, the Census percentages are below the survey percentages. For ages 40 to 44, the percentage of currently married women was 84.2 from the 1971 Census against 90.7 in the survey

and for ages 45 to 49 the corresponding figures were 76.3 and 87.6. This difference between the 1971 Census and the survey percentages could be attributed, mainly, to the reduction in mortality and the consequent improvement in husband's survival rates in this period. Similar differences are found for each of the eight domains of study. However, these differences are of about the same magnitude for both rural regions and urban zones since greater reduction in urban mortality might be offset by a slight increase in the proportion of divorces and separations occurring in urban areas.

The mean age at marriage in the recent period has been summarized in the Table 3.3 by the singulate mean at marriage (SMAM) from the two sources. This mean is calculated from the percentage never married in each age-group. Since marriage is almost universal by age 25 to 29 for women and 30 to 34 for men, SMAM refers, roughly, to the experience in the preceding 15 years for women and 20 years for men.

For females in rural Maharashtra, SMAM was 17.8 years according to NFMS 1980 and 16.6 years according to the 1971 Census. Thus there has been an increase of 1.2 years in the female mean age at marriage in the past 15 years or so. For males, SMAM has increased from 22.5 for the 1971 Census to 23.4 years for NFMS 1980, an increase of 0.9 years. SMAM for urban zones is larger than for rural areas. For females, between the Census and the survey, it had increased by 2.2 years in other urban areas and by 1.8 years in Greater Bombay.

The difference in SMAM between males and females is about 6 years and between rural and urban areas about 3 years. There is a decreasing gradient in the age at marriage from Greater Bombay to other urban to rural areas. Among rural regions, Aurangabad Division had the least age at marriage for females, 15.2 years in 1971 and 16.0 in 1980. The recent trends in age at marriage given by SMAM in Table 3.3 are generally consistent with the observations made earlier on the percentage married by age group.

Scheduled Castes and Tribes, and Muslims

The percentages of Scheduled Castes and Tribes and Muslims in the total male and female populations are presented from the 1971 Census and NFMS in Table 3.7 for all the eight domains of study. Differences between the Census and NFMS could arise from definitional differences, changes over time and sampling variations. Since these population groups are residentially clustered, the sampling errors in their proportions are likely to be larger than for other characteristics. Normally the changes in the period 1971-80 should not be large in these proportions. However, since the weaker sections of society are currently receiving special attention in terms of protective social legislation and programmes, it is possible that in 1980 there was a greater consciousness in reporting such caste groups.

As for the definitions used in NFMS, religion was coded during the interview and the caste name was obtained. The caste was coded later as Scheduled Caste or Tribe or other Hindu castes using the list of Scheduled Castes and Tribes from the 1971 Census. Those recently converted to Buddhism (Navaboudhas) were included in Scheduled Castes.

In the 1971 Census, the enumerator obtained, in the individual slip, the religion, coded whether the respondent belonged to a Scheduled Caste or Tribe and wrote down the name of the caste or tribe. Navaboudhas were classified only if they returned a caste or tribe.

For Maharashtra State, NFMS classified 13.5 per cent of the males as Scheduled Castes, 8.0 per cent as Scheduled Tribes and 9.4 per cent as Muslims, while the Census percentages for these three groups were uniformly lower, 12.3, 5.7 and 8.6, respectively (Table 3.7). The larger NFMS percentages might be due mostly to sensitivity and differential perception of these groups by 1980 for reasons mentioned above.

Naturally the largest differences between NFMS and Census percentages in Scheduled Castes occurs in other urban areas and Greater Bombay where these groups should be most aware of the special provisions made for their social uplift. In the rural regions, the difference between the two sources is not large except for Scheduled Tribes in Western Maharashtra.

The distribution of Scheduled Castes and Tribes and Muslims among the three rural regions and two urban zones is of interest. Both according to the Census and NFMS, the Scheduled Castes were more evenly distributed than the Scheduled Tribes as seen from Table 3.7. NFMS data for males show that the Scheduled Castes formed 17.2 per cent of the rural population of Nagpur Division and 10.1 per cent of Greater Bombay's population while other domains had percentages varying within this range. By contrast, Scheduled Tribes formed 15.3 per cent and 9.3 per cent of the rural population of Western Maharashtra and Nagpur Division respectively and less than 4 per cent of the population of the other rural region and urban zones. This is not surprising since normally permanent residence in the tribal village is a necessary condition for being classified as belonging to a Scheduled Tribe.

The urban zones had the highest percentage of Muslims in their male population, 18.6 per cent of Greater Bombay's Population and 14.3 per cent of the males in other urban areas. Among the rural regions, Aurangabad Division had the highest percentage of Muslims in its population, 9.9 and only 0.8 per cent belonging to Scheduled Tribes.

The percentage of females belonging to Scheduled Castes and Tribes, and Muslims displays a similar pattern, essentially confirming the observations made for males in the preceding paragraphs.

Educational Level

In NFMS the educational level was obtained for those at school. For those not at school, their literacy status and educational attainment were obtained. In the 1971 Census, there were two questions in the individual slip on literacy status and educational attainment. Thus there was a slight difference in the questions asked in the Census and the survey.

Apart from the difference in the questions asked, the percentage literates in Maharashtra State rose from 51.0 in the 1971 Census to 58.9

in the 1981 Census for males and for females the percentage rose from 26.4 to 35.1. School enrolment of boys and girls also increased substantially between 1971 and 1980. Thus there is considerable evidence on the improvement in literacy and educational level between the 1971 Census and NFMS 1980.

Educational level by the broad age groups 5-14, 15-19 and 20 and above from NFMS 1980 and the 1971 Census are compared in Table 3.8 for males and in Table 3.9 for females. The classification combined literacy status with educational level into the following classes : 1. illiterate, 2. literate, without formal education, 3. primary or below, 4. middle but above primary and 5. matriculation and above.

In Maharashtra State, in ages 5 and over, between the Census 1971 and NFMS 1980, there was a reduction of male illiteracy from 40.7 per cent to 26.9 per cent and a significant increase in the percentage of males having middle-school education from 14.3 to 36.7 per cent.

In rural areas, in school going ages 5 to 14, the percentage males with any formal schooling, primary or below, was as high as 49.3 in NFMS 1980 whereas it was only 18.9 in the 1971 Census. But in the Census 26.0 per cent of males in this age-group claimed to be literate without any formal education whereas in NFMS this percentage was negligible. In age-group 15-19, NFMS showed 54.6 per cent of males with middle school education compared to 36.3 per cent for the Census. Among adult males, 20 years and over, the percentage receiving middle school education was 30.2 for NFMS and only 9.8 for the Census. Finally the percentage of matriculate males in all age groups in rural areas showed no appreciable change between the 1971 Census and NFMS 1980.

Compared to rural areas, the major difference in the urban pattern of change in the education of males between 1971 and 1980 was the larger percentage of matriculates reported in NFMS than in the Census (27.8 against 17.9) in ages 15 to 19. Among adult males aged 20 and over, there was a significantly larger percentage with middle school education in the NFMS compared to the Census (49.0 against 21.8). As for adult males aged 20 years and over with education up to matriculation or above, NFMS showed a slightly lower percentage of 22.9 compared to 25.0 for the Census, perhaps due to the less reliable reporting of completed matriculation in the Census.

Table 3.9 gives the female education level in broad age groups from the 1971 Census and NFMS, 1980. While female illiteracy in ages 5 and above in Maharashtra declined from 69.0 in 1971 to 52.0 in 1980, the improvement in education was spread over primary and middle school levels. For primary or below, the percentage was 11.0 for the Census against 20.8 for NFMS whereas for middle school, the corresponding percentages were 6.1 and 22.9. The percentage with education up to or above matriculation remained nearly the same, 2.9 for the Census and 3.3 for NFMS.

In the age group 5-14, rural female illiteracy declined from 69.1 in the Census to 41.2 in NFMS 1980. Rural females with primary level of education or below was 42.2 per cent from NFMS against 10.8 per cent from the 1971 Census in this age group. In the next age group, 15-19,

the largest difference was in middle school level, 12.2 for the Census and 34.0 for NFMS. Among adult rural women aged 20 and above, illiteracy was much higher than among the corresponding group of men. The largest percentage difference between the two sources, in this age group was in middle school level, 1.8 per cent from the Census and 10.2 per cent from NFMS. In urban areas, the percentage of females in ages 15 to 19 with education up to or above matriculation rose from 16.3 in 1971 to 21.2 in 1980.

In the measurement of literacy status and educational level, some of the differences between the Census and survey figures arise, no doubt, from definitional dissimilarity. However, as the changes between 1971 and 1980 revealed by the figures are large, they confirm the increasing trend in the level of education among both males and females in this period.

Table 3.1 : Percentage Distribution of Persons by Five Year Age Groups: 1981 Census and NFMS Maharashtra, 1980

Age Group	Aurangabad Division		Nagpur Division		Western Maharashtra		Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Urban Maharashtra		Maharashtra State	
	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS
	0 - 4	12.9	13.0	12.1	12.0	12.1	12.1	12.2	12.3	11.7	11.1	10.4	10.5	11.2	10.8	11.9
5 - 9	15.1	12.9	14.1	12.5	13.9	12.4	14.2	12.5	12.9	12.2	10.9	11.9	12.2	12.1	13.5	12.4
10 - 14	13.5	12.9	13.7	13.5	13.6	13.0	13.7	13.0	13.0	12.4	10.4	12.8	12.1	12.6	13.1	12.9
15 - 19	8.1	9.1	9.0	9.8	9.2	9.9	8.9	9.7	10.3	10.8	9.8	10.1	10.1	10.5	9.3	10.0
20 - 24	7.4	9.0	7.9	9.7	7.9	8.6	7.8	9.0	10.0	9.9	11.7	9.4	10.6	9.7	8.8	9.2
25 - 29	6.9	8.0	6.9	7.7	7.1	7.4	7.0	7.6	8.6	8.2	10.7	8.8	9.4	8.4	7.9	7.9
30 - 34	6.4	6.3	6.0	6.0	6.1	5.8	6.1	6.0	6.9	6.7	8.1	7.4	7.4	7.0	6.6	6.3
35 - 39	6.1	5.6	5.9	4.8	6.0	5.3	6.0	5.2	6.1	5.5	7.1	6.5	6.5	5.9	6.1	5.4
40 - 44	5.5	4.5	5.3	4.8	5.3	4.6	5.3	4.6	5.1	4.7	5.7	5.4	5.2	5.0	5.3	4.7
45 - 49	4.5	3.3	4.9	4.3	4.8	3.8	4.8	3.8	4.2	4.4	4.8	5.1	4.4	4.7	4.6	4.1
50 - 54	3.9	3.7	4.1	4.1	4.0	4.3	4.0	4.2	3.4	3.9	3.6	4.1	3.5	4.0	3.8	4.1
55 - 59	2.6	3.6	2.9	3.8	3.0	3.8	2.9	3.8	2.3	3.0	2.4	2.9	2.3	3.0	2.7	3.5
60 +	7.1	8.1	7.2	7.0	7.0	9.0	7.1	8.3	5.5	7.2	4.4	5.1	5.1	6.3	6.4	7.7
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
	5857		8897		17256		32010		9387		6657		16044		48054	

Table 3.2 : Percentage of Currently Married Women to Total Women by Five Year Age Groups : 1981 Census and NFMS Maharashtra, 1980

Age Group	Aurangabad Division		Nagpur Division		Western Maharashtra		Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Urban Maharashtra		Maharashtra State	
	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS	Census 1981	NFMS
	15 - 19	65.1	66.0	37.8	42.2	43.5	42.5	45.7	46.1	29.0	22.2	19.0	11.4	25.5	18.0	38.2
20 - 24	94.8	95.3	90.7	89.1	89.7	88.7	90.9	90.0	77.1	66.8	65.3	56.9	72.6	63.1	83.8	81.0
25 - 29	96.3	96.6	95.4	95.9	95.4	94.7	95.6	95.3	92.7	86.2	88.0	88.9	90.8	87.4	93.8	92.4
30 - 34	95.1	96.0	95.1	96.8	94.6	94.6	94.8	95.5	93.8	89.6	92.5	90.8	93.3	90.1	94.3	93.5
35 - 39	93.2	92.3	93.5	97.0	92.7	95.5	93.0	95.3	92.3	89.4	92.3	92.2	92.3	90.6	92.8	93.6
40 - 44	87.9	89.8	88.8	92.2	88.0	91.2	88.2	91.3	86.6	87.5	86.9	92.1	86.7	89.5	87.8	90.7
45 - 49	81.9	82.3	82.5	91.1	82.4	86.5	82.3	87.3	80.8	85.9	81.3	90.7	81.0	87.9	81.9	87.6
15 - 49	87.9	88.7	81.5	84.7	82.3	80.7	82.8	83.2	75.4	77.5	71.6	73.6	74.0	75.9	79.9	80.7
Child women ratios:																
All women																
15 - 44	643	650	600	587	567	587	590	596	540	489	477	466	517	479	563	554
Married women																
15 - 44	726	732	738	723	689	723	711	722	721	723	675	682	704	705	707	717

Table 3.3 : Singulate Mean Age at Marriage 1971, 1981 Censuses and NFMS Maharashtra, 1980

	Males			Females		
	Census		NFMS	Census		NFMS
	1971	1981	1980	1971	1981	1980
Aurangabad Division	21.7	22.6	21.9	15.2	16.8	16.0
Nagpur Division	22.4	23.6	23.4	16.7	18.4	18.3
Western Maharashtra	22.8	23.5	23.8	16.9	18.3	18.1
Rural Maharashtra	22.5	23.4	23.4	16.6	18.0	17.8
Urban excluding Greater Bombay	24.9	25.4	26.7	18.8	19.8	21.0
Greater Bombay	25.4	25.7	28.2	20.6	21.3	22.4
Urban Maharashtra	25.2	25.5	27.2	19.5	20.4	21.5
Maharashtra State	23.6	24.3	25.1	17.5	18.9	19.0

Table 3.4 : Percentage Distribution of Persons by Five Year Age Groups: 1971 Census and NFMS Maharashtra, 1980

Age Group	Aurangabad Division		Nagpur Division		Western Maharashtra		Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Urban Maharashtra		Maharashtra State	
	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971	Census 1971	NFMS 1971
	0 - 4	16.1	13.0	15.3	12.0	14.7	12.1	15.1	12.3	13.8	11.1	11.2	10.5	12.8	10.8	14.4
5 - 9	16.2	12.9	15.0	12.5	15.5	12.4	15.2	12.5	13.9	12.2	11.3	11.9	12.8	12.1	14.8	12.4
10 - 14	11.5	12.9	12.2	13.5	13.1	13.0	12.6	13.0	12.6	12.4	10.1	12.8	11.6	12.6	12.3	12.9
15 - 19	7.1	9.1	7.6	9.8	8.3	9.9	7.9	9.7	9.9	10.8	9.5	10.1	9.8	10.5	8.5	10.0
20 - 24	7.3	9.0	7.1	9.7	7.0	8.6	7.1	9.0	9.6	9.9	11.9	9.4	10.5	9.7	8.1	9.2
25 - 29	7.6	8.0	7.2	7.7	7.0	7.4	7.2	7.6	7.9	8.2	10.6	8.8	9.0	8.4	7.7	7.9
30 - 34	6.9	6.3	6.6	6.0	6.2	5.8	6.4	6.0	6.7	6.7	8.6	7.4	7.4	7.0	6.7	6.3
35 - 39	6.0	5.6	6.4	4.8	6.1	5.3	6.1	5.2	6.1	5.5	7.6	6.5	6.7	5.9	6.3	5.4
40 - 44	5.3	4.5	5.3	4.8	5.0	4.6	5.1	4.6	5.1	4.7	5.8	5.4	5.3	5.0	5.2	4.7
45 - 49	4.0	3.3	4.5	4.3	4.5	3.8	4.4	3.8	4.0	4.4	4.4	5.1	4.2	4.7	4.3	4.1
50 - 54	3.6	3.7	3.7	4.1	3.5	4.3	3.6	4.2	3.3	3.9	3.3	4.1	3.3	4.0	3.5	4.1
55 - 59	2.3	3.6	2.7	3.8	2.8	3.8	2.7	3.8	2.1	3.0	2.0	2.9	2.1	3.0	2.5	3.5
60 +	6.1	8.1	6.4	7.0	6.3	9.0	6.3	8.3	5.0	7.2	3.7	5.1	4.5	6.3	5.7	7.7
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
	5857		8897		17256		32018		9387		6657		16044		48054	
Child women ratio:																
All women																
15 - 44	797	650	768	587	721	587	748	596	655	489	539	466	611	479	704	554
Married women																
15 - 44	878	733	880	723	839	723	857	723	832	722	743	682	800	705	841	717

Table 3.5 : Percentage of Ever Married to Total by Sex by Age Group : 1971 Census and NFMS Maharashtra, 1980

Age Group	Aurangabad Division		Nagpur Division		Western Maharashtra		Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Urban Maharashtra		Maharashtra State		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
10 - 14	Census	2.4	18.6	1.7	6.1	1.0	7.1	1.4	8.8	0.4	2.9	0.4	1.0	0.4	2.3	1.2	7.0
	NFMS	2.3	16.2	0.2	2.5	0.1	5.4	0.5	6.5	0.0	1.8	0.2	0.0	0.1	1.0	0.4	4.7
15 - 19	Census	15.6	81.5	10.2	62.4	9.6	60.6	10.8	64.8	4.0	40.3	5.9	22.9	4.7	34.1	8.5	54.2
	NFMS	14.1	68.1	3.3	43.1	7.5	43.4	7.7	47.2	2.0	23.0	0.8	12.7	1.5	19.1	5.5	37.2
20 - 24	Census	58.6	97.0	51.8	97.4	50.2	94.8	52.3	95.9	28.2	84.7	28.9	70.3	28.5	79.1	41.5	90.1
	NFMS	56.3	99.3	44.3	91.8	37.4	91.5	43.1	93.0	17.0	67.9	9.8	58.3	13.8	64.3	32.3	83.4
25 - 29	Census	90.1	98.9	89.8	99.5	86.2	98.8	88.0	99.0	74.2	96.7	66.0	92.0	70.1	94.8	80.8	97.6
	NFMS	90.8	99.5	85.9	98.4	82.2	99.0	85.0	98.9	61.2	91.8	49.3	90.9	56.1	91.4	75.1	96.1
30 - 34	Census	96.8	99.1	97.1	99.7	96.3	99.5	96.6	99.5	92.7	98.6	87.9	96.0	90.4	97.6	94.2	98.9
	NFMS	100.0	100.0	96.0	99.6	97.0	99.6	97.6	99.7	91.9	97.0	83.9	94.0	88.5	95.6	94.2	98.2
35 - 39	Census	98.3	99.7	96.2	99.7	98.0	99.7	97.5	99.7	96.5	99.2	94.2	97.4	95.4	98.5	96.7	99.3
	NFMS	99.4	99.4	99.6	100.0	98.2	99.0	98.9	99.9	95.4	99.6	93.7	97.4	94.6	98.7	97.3	99.4
40 - 44	Census	98.5	99.7	98.3	99.9	98.5	99.6	98.5	99.7	97.4	99.2	96.0	97.4	96.8	98.6	97.9	99.4
	NFMS	98.6	100.0	99.5	100.0	98.5	100.0	98.8	100.0	96.3	97.8	97.3	99.4	96.8	98.5	98.1	99.5
45 - 49	Census	98.6	99.8	98.2	99.9	98.8	99.8	98.6	99.8	98.0	99.4	96.7	97.5	97.4	98.8	98.2	99.5
	NFMS	98.3	100.0	99.5	100.0	99.7	100.0	99.4	100.0	98.6	99.0	97.0	99.3	97.8	99.1	98.8	99.7
10 - 49	Census	60.5	81.2	58.2	74.7	53.8	73.6	56.2	75.4	48.3	67.5	53.8	64.0	49.7	66.2	54.3	73.6
	NFMS	57.3	76.2	52.1	66.4	50.3	68.1	52.1	69.0	43.6	60.5	43.0	57.9	43.4	59.4	49.0	65.6

Table 3.6 : Percentage of Currently Married Women to Total Women by Five Year Age Groups : 1971 Census and NFMS Maharashtra, 1980

Age Group	Aurangabad Division		Nagpur Division		Western Maharashtra		Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Urban Maharashtra		Maharashtra State	
	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS
10 - 14	18.3	16.2	6.0	2.5	6.9	5.4	8.7	6.5	2.9	1.8	1.0	0.0	2.3	1.0	6.8	4.7
15 - 19	80.1	66.0	60.6	42.2	59.6	42.5	63.5	46.1	39.5	22.2	22.7	11.4	33.5	18.0	53.1	36.1
20 - 24	94.9	95.3	94.6	89.1	92.7	88.7	93.6	96.0	83.0	66.8	69.6	56.9	77.7	63.1	88.1	81.0
25 - 29	96.1	96.6	96.4	95.9	95.7	94.7	95.9	95.3	94.2	86.2	90.5	88.9	92.7	87.4	94.9	92.4
30 - 34	94.6	96.0	94.7	96.8	94.2	94.6	94.4	95.5	94.0	89.6	92.6	90.8	93.4	90.1	94.1	93.5
35 - 39	91.7	92.3	91.6	97.0	90.6	95.5	91.3	95.3	91.7	89.4	91.2	92.2	91.5	90.6	91.4	93.6
40 - 44	83.6	89.8	84.6	92.2	84.6	91.2	84.4	91.3	83.8	87.5	83.7	92.1	83.8	89.5	84.2	90.7
45 - 49	75.2	82.3	76.3	91.1	76.9	86.5	76.4	87.3	75.9	85.9	75.9	90.7	75.9	87.9	76.3	87.6
10 - 49	75.7	72.0	69.1	63.8	68.2	64.6	69.9	65.7	62.8	56.1	60.3	55.2	61.9	55.7	67.4	62.1

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Table 3.7 : Percentage of Scheduled Castes, Scheduled Tribes and Muslims to Total Population by Sex : 1971 Census and NFMS Maharashtra, 1980

Region	Total males = 100.0						Total females = 100.0					
	Scheduled Castes		Scheduled Tribes		Muslims		Scheduled Castes		Scheduled Tribes		Muslims	
	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS	Census	NFMS
Aurangabad Division	17.6	16.8	2.0	0.8	8.3	9.9	17.6	17.6	2.0	0.8	8.4	9.5
Nagpur Division	18.0	17.2	5.6	9.3	4.3	5.6	18.3	17.6	5.7	9.4	4.1	5.6
Western Maharashtra	9.9	10.4	11.7	15.3	4.2	5.0	9.8	10.0	11.4	16.3	4.2	5.0
Rural Maharashtra	13.5	13.5	8.2	10.9	5.0	6.1	13.5	13.4	8.1	11.6	5.0	6.0
Urban excluding Greater Bombay	11.2	15.9	1.0	3.7	16.8	14.3	11.7	16.1	1.0	4.4	17.2	13.2
Greater Bombay	7.8	10.1	0.5	0.5	14.4	18.6	8.9	10.1	0.5	0.8	13.7	19.9
Urban Maharashtra	9.8	13.5	0.8	2.3	15.8	16.1	10.7	13.6	0.9	2.9	16.0	16.0
Maharashtra State	12.3	13.5	5.7	8.0	8.6	9.4	12.7	13.5	6.0	8.7	8.2	9.3

Table 3.8 : Percentage Distribution of Males by Educational Level In Broad Age Groups : 1971 Census and NFMS Maharashtra, 1980

Age Group	Illiterate	Literate without formal education	Primary or below	Middle but above primary	Matriculate and above	Total
<u>Rural</u>						
5 - 14 Census	51.1	26.0	18.9	4.0	0.0	100.0
NFMS	27.3	0.0	49.3	23.4	0.0	100.0
15 - 19 Census	25.8	10.0	23.1	36.3	4.8	100.0
NFMS	26.6	0.2	13.8	54.6	4.8	100.0
20 + Census	51.9	14.1	19.9	9.8	4.3	100.0
NFMS	41.9	2.2	21.4	30.2	4.3	100.0
<u>Urban</u>						
5+ Census	49.0	17.7	19.9	10.5	2.9	100.0
NFMS	36.0	1.3	28.6	31.0	3.1	100.0
5 - 14 Census	30.4	35.1	24.5	9.9	0.1	100.0
NFMS	3.3	0.0	57.0	39.5	0.2	100.0
15 - 19 Census	10.9	4.9	17.0	49.3	17.9	100.0
NFMS	5.3	0.6	6.2	60.1	27.8	100.0
20 + Census	24.0	8.5	20.7	21.8	25.0	100.0
NFMS	13.1	3.2	11.8	49.0	22.9	100.0
<u>Maharashtra State</u>						
5+ Census	24.1	15.1	21.3	21.8	17.7	100.0
NFMS	9.5	2.0	23.6	47.7	17.2	100.0
5 - 14 Census	45.2	28.6	20.5	5.7	0.0	100.0
NFMS	19.4	0.0	51.8	28.7	0.1	100.0
15 - 19 Census	20.3	8.1	20.9	41.0	9.7	100.0
NFMS	19.2	0.3	11.1	56.6	12.8	100.0
20 + Census	41.8	12.1	20.2	14.1	11.8	100.0
NFMS	32.0	2.5	18.1	36.7	10.7	100.0
5+ Census	40.7	16.8	20.3	14.3	7.9	100.0
NFMS	26.9	1.6	26.9	36.7	7.9	100.0

Table 3.9 : Percentage Distribution of Females by Educational Level in Broad Age Groups : 1971 Census and NFMS Maharashtra, 1980

Age Group		Illit- erate	Literate without formal education	Primary or below	Middle but above primary	Matri- culate and above	Total
<u>Rural</u>							
5 - 14	Census	69.1	18.3	10.8	1.8	0.0	100.0
	NFMS	41.2	0.2	42.2	16.4	0.0	100.0
15 - 19	Census	59.7	9.3	17.3	12.2	1.5	100.0
	NFMS	48.4	0.5	16.0	34.0	1.1	100.0
20 +	Census	87.3	4.8	5.6	1.8	0.5	100.0
	NFMS	79.5	0.5	9.5	10.2	0.3	100.0
5+	Census	79.0	9.6	8.3	2.7	0.4	100.0
	NFMS	64.8	0.4	19.9	14.6	0.3	100.0
<u>Urban</u>							
5 - 14	Census	37.0	32.4	21.7	8.9	0.0	100.0
	NFMS	5.4	0.2	54.7	39.4	0.3	100.0
15 - 19	Census	22.1	5.3	17.9	38.4	16.3	100.0
	NFMS	13.6	0.7	7.7	56.8	21.2	100.0
20 +	Census	53.5	6.8	15.5	12.5	11.7	100.0
	NFMS	38.3	3.3	10.8	36.4	11.2	100.0
5+	Census	45.0	14.4	17.6	14.3	8.7	100.0
	NFMS	26.3	2.1	22.6	39.7	9.3	100.0
<u>Maharashtra State</u>							
5 - 14	Census	60.1	22.3	13.8	3.8	0.0	100.0
	NFMS	29.7	0.2	46.2	23.8	0.1	100.0
15 - 19	Census	46.7	7.9	17.5	21.3	6.6	100.0
	NFMS	36.0	0.6	13.0	42.1	8.3	100.0
20 +	Census	77.4	5.4	8.5	4.9	3.8	100.0
	NFMS	65.6	1.5	9.9	19.0	4.0	100.0
5+	Census	69.0	11.0	11.0	6.1	2.9	100.0
	NFMS	52.0	1.0	20.8	22.9	3.3	100.0

CHAPTER 4

DEMOGRAPHIC, SOCIAL, ECONOMIC AND HEALTH BACKGROUND CHARACTERISTICS

Introduction

This chapter summarizes the differentials, among the three rural regions and two urban zones, in the background characteristics relating to demographic, social, economic, health and modernization aspects. Indicators of development, social change, health environment and modernization for each rural region and urban zone are related to its fertility and mortality levels and trends. Hence the differentials in these background characteristics should provide a better understanding of the differentials in vital rates presented in the following chapters.

Demographic Characteristics

As seen from Table 4.1, in Maharashtra, the head of the family is generally a married male, aged 30 years or over. The only significant variation among the study domains is in the age of the head. In rural areas, middle aged heads, between 30 and 49 years old, were 44.5 per cent while in urban areas they were 53.9 per cent.

In rural areas, migrating families formed 8.5 per cent whereas they formed 37.6 per cent in urban areas. Migration of families in the ten years preceding the survey was 20.1 per cent in other urban areas against 11.0 per cent in Greater Bombay. Thus the recent migration to other urban areas was more rapid than to Greater Bombay (Table 4.2).

Average family size in rural Maharashtra was 6.4 and in urban Maharashtra 6.0 as seen from Table 4.3. The composition of families varied, but slightly, over the regions and zones, consisting, on the average, of about two adult males, two adult females (15 years of age or over) and one each of non-adult male and female. The percentage of members under age 15 was 38.1 for rural areas against 35.8 for urban areas, suggesting higher rural fertility. There was little variation in this percentage among the rural regions and between the urban zones.

The changes in family size over the two years preceding the survey are shown in Table 4.4. The average size two years ago was 6.13 for Maharashtra State. The major additions to the family in the two year period were 0.10 persons due to marriage and 0.37 persons due to births. Losses due to migration was 0.08 persons, due to other reasons, 0.16 persons and due to deaths, 0.10 persons. The average family size at the time of the survey was 6.28. These magnitudes were roughly of the same order for all study domains. The unweighted birth and death rates per 1,000 population, calculated from these averages were 32.4 and 8.7 respectively for rural areas, 25.1 and 6.7 for urban areas, and 29.8 and 8.1 for the State. Thus the vital rates were higher in rural compared to urban areas. Weighted estimates of vital rates are given in the next chapter and their differentials discussed in greater details.

Figures on the in-migration of persons to families by reasons are

given in Table 4.5 for males and in Table 4.6 for females. The addition to male members of the family due to births formed 6.0 per cent in rural and 4.5 per cent in urban areas. Other reasons contributed negligibly to the increase in the male members of the family. By contrast to males, Table 4.6 shows the importance of marriage migration for females. It accounted for 3.5 per cent of the number of female members in the family in rural areas and for 2.5 per cent in urban areas against 0.1 per cent for males in both rural and urban areas. This sex differential in marriage migration is a distinct cultural trait for Maharashtra State and for India as a whole.

Social Characteristics

Caste is an important social characteristic for marriage, kin group and fertility because of the enforcement of endogamy within caste groups. Table 4.7 shows the distribution of families by the caste-cum-religion classification adopted in this study. Advanced Hindus includes Brahmins, Marathas and out-of-State caste groups. Intermediate Hindus includes traditional artisan and higher service castes. Backward Hindus are the residual castes that were not traditionally regarded as "untouchable". Scheduled Castes and Tribes have been defined in the last chapter. Scheduled Castes also included Navaboudhas.

Advanced Hindus comprised 45.0 per cent, intermediate Hindus 17.9 per cent, backward Hindus 3.9 per cent, Scheduled Castes 14.1 per cent, Scheduled Tribes 7.9 per cent, Muslims 8.3 per cent and other religions 2.9 per cent of the families (Table 4.7). As mentioned in the last chapter, Scheduled Castes were more evenly distributed over the rural regions and urban zones than Scheduled Tribes. The highest percentage of Scheduled Tribes was found in Western Maharashtra region (14.6) and the next highest in Nagpur Division (10.0). The highest percentage of Muslims was found in urban areas (13.3) and the next highest percentage in the rural regions was in Aurangabad Division (9.7). The percentage of advanced Hindus showed a gradient from 42.7 in rural areas, to 44.5 in other urban areas and to 56.5 in Greater Bombay. A higher percentage of intermediate Hindus was found in rural than in urban areas. The highest percentage of backward Hindus was found in Aurangabad Division.

The percentage of ever married women in younger age groups by caste-cum-religion is a sensitive indicator of the status and roles of women as also of the female age at marriage. This percentage is given in Table 4.8. To increase the numbers on which the percentages are based and to control the sampling errors, the community classification was combined into four categories: 1) advanced castes, 2) intermediate castes, 3) Scheduled Castes and Tribes and backward Hindus and 4) Muslims. In the youngest age group of 10-14, 8.8 per cent of females in Scheduled Castes and Tribes were ever married against 5.4 per cent among the intermediate castes, 2.7 per cent among the advanced castes and 1.7 per cent among Muslims. The same ranking generally holds for the study domains. However, Aurangabad region had much higher percentages ever married in all the castes. In the next age group 15-19, the percentage married increases for all communities. The ranking by communities remains the same except that, in urban areas, the percentage of married Muslim women exceeded considerably the percentage for advanced castes. In age group 20-24, over 90 per cent of the women of all communities in

the rural regions had been married. In this age group, in the urban areas about 58 per cent of the women of the advanced castes had been married against around 70 per cent for the other communities. For Aurangabad, the percentage married was consistently higher in all age groups for all communities than the corresponding figures for the other study domains. This reveals a younger age at marriage for females in Aurangabad Division and all the social sanctions on the status and roles of women associated with it.

Similarly data on the percentage of ever married women in age groups 10-14, 15-19 and 20-24 are given in Table 4.9 for the three educational levels, 1) illiterate or literate with no formal education, 2) formal education up to or below seventh standard and 3) formal education up to eighth standard or above. There is a consistent gradient in this percentage with the highest percentage for category 1) and the lowest for 3) in each age group for all the study domains. This clearly indicates the rising age at marriage with increased formal education. For instance, for Maharashtra State, the percentage of women who had ever married in the ages 15 to 19 was 60.7 for those without formal education, 42.2 for those with education up to seventh standard and 22.1 for those with eighth standard education or more. The rural percentage is higher than the corresponding urban percentage in each age group for each educational level. The percentages for Aurangabad Division are higher than the corresponding percentages for the other domains of study. Thus the age at marriage in Aurangabad Division is systematically higher within each educational level.

Current status of school enrolment of boys and girls is shown in Table 4.10. The enrolment rate at primary, secondary and tertiary levels is the ratio of the total enrolment at that level to the population in the ages corresponding to that level of education. This rate could exceed unity sometimes. The age ratio is the ratio of number enrolled in a specified age group to the population in that age group. The following findings may be noted from Table 4.10. Although the enrolment at the primary level was high in all domains of study, the drop-out rate was also high. Thus, in the State, the male enrolment rate at primary level was just over unity and declined to 0.59 at the secondary level and to 0.41 at the tertiary level. The corresponding figures for female enrolment rates were only 0.94, 0.44 and 0.23. Urban enrolment rates were higher than rural enrolment rates for each sex. Among all the domains of study, Aurangabad Division had the lowest enrolment rates for males as well as females. In fact, the rates for females for this rural region were well below the rates for the other two rural regions. Thus Aurangabad appears to be more backward in school enrolment, especially for females, than the other two rural regions. The age ratio for ages 7-10, by definition, is lower than the enrolment rate but the patterns observed for it were also found for the age ratio.

Economic Characteristics

As expected, in rural areas 52.5 per cent of the families were cultivators and 11.1 per cent were agricultural labourers or engaged in activities allied to it (Table 4.11). The corresponding percentages for urban areas were only 3.4 and 1.1. The urban families were well distributed over other means of livelihood : 13.5 per cent professional

and administrative, 15.1 per cent clerical, 14.6 per cent in sales and 13.5 per cent in service activities. In rural areas less than 3.0 per cent were engaged in each of these livelihoods. Processing and manufacturing activities supported 23.7 per cent of the families in rural areas and 34.4 per cent in urban areas. About 3.2 per cent of rural families and 4.4 per cent of urban families lived on unearned income. The variations among rural regions and between urban zones was inconsiderable by the source of livelihood.

When the work participation status of males and females is considered (Table 4.12), in rural areas 44.2 per cent of the males and 74.7 per cent of the females were non-workers whereas in urban areas, 54.1 per cent of the males and 91.1 per cent of the females were non-workers. The higher percentage of male non-workers in urban areas is explained by the higher proportions of males at school and in retirement in urban than in rural areas. The higher percentage of female non-workers in urban areas could be attributed to the higher proportion of the females at school and the unimportance of agriculture which absorbs more female labour. A higher proportion of child labour in rural compared to urban areas is yet another factor contributing to a greater work participation rate in rural areas. Among the rural regions, the percentage of non-workers among females was highest in Aurangabad Division, 81.9 per cent compared with 71.7 per cent for Nagpur Division and 73.7 per cent for Western Maharashtra. The difference in the percentage female non-workers between the two urban zones was not large.

In rural areas the largest percentage of males were engaged in farming and allied occupations (38.9) and the next largest percentage in processing, manufacturing and transport (11.8). In urban areas, only 2.3 per cent of the male population was engaged in agriculture and the rest were well distributed over all the other major occupations, with 16.8 per cent in processing, manufacturing and transport occupations. Of the urban female population, 2.3 per cent was in processing and manufacturing and 2.7 per cent in service occupations.

The average number of earners, non-earners and unemployed per family are shown in Table 4.13. Perceived unemployment was very low in both rural and urban areas for females and in rural areas for males. For females it was negligible in rural areas and other urban areas and only around 0.09 per family in Greater Bombay. For males, it was 0.09 per rural family and 0.24 per urban family. As a percentage to average number of earners per family, this works out to 2.9 per cent in rural areas and 13.9 per cent in urban areas. In the survey, only urban males had a clear cut perception of unemployment.

The average rural family size was 6.41 members of whom 3.07 were earners and 3.34 were non-earners, whereas in an urban family of average size 6.03, only 1.73 were earners and 4.30 were non-earners. The larger average number of earners in rural families compared to urban families arose from a larger number of male adult earners, a much larger number of female adult earners and also a larger number of non-adult earners. In fact, the dependency ratio of non-earners per earner was only 1.10 in rural areas compared to 2.49 in urban areas. The difference is largely accounted for by the higher work participation rate of females in agriculture and a larger utilization of child labour in rural areas. The

variation in the dependency ratio among rural regions and between urban zones was negligible.

The distribution of the average annual family income is shown in Table 4.14 and that of the average per capita income in Table 4.15. The data on income were obtained in the survey by asking a few broad questions since the main purpose was to collect data on fertility and mortality. Hence income data cannot be regarded as reliable. The average per capita income in Maharashtra State from the survey was Rs. 1,090 for 1980 compared to a per capita net domestic product for the State of Rs. 2232 for 1980-81. (*Estimates of State Domestic Product 1985*, Central Statistical Organization, Government of India, p.11). The difference between the two figures is large for various reasons. The difference cannot be accounted for merely by the fact that the domestic product should be larger than the disposable personal income. Hence it is suspected that such items as income in kind and self-consumption by the farmer might be under-reported in the survey. These types of errors are likely to lead to greater under-estimation of rural than urban incomes.

The average annual family income was about Rs. 4,500 in rural Maharashtra, about Rs. 8,600 in other urban areas and Rs. 12,500 in Greater Bombay. Although for each rural region the average income was about the same, Western Maharashtra region had only 35.9 per cent of families in the middle income group compared to 43.3 per cent in Aurangabad Division and 45.1 per cent in Nagpur Division. However, as the percentage of population in this income group was also larger for Western Maharashtra, it did not lead to greater income inequality in per capita terms in this region compared to the other two regions (Table 4.15).

In per capita terms, the average annual income was about Rs. 710 in rural areas, Rs. 1500 in other urban areas and Rs. 2,153 in Greater Bombay. Nearly 64.0 per cent of families in rural areas had a per capita annual income below or up to Rs. 650, compared to 29.4 per cent in other urban areas and only 9.7 per cent in Greater Bombay. Among the rural regions, Aurangabad Division had the lowest per capita income of Rs. 690, although the distribution of families by per capita income was similar in all three regions.

The distribution of rural families by the land owned, land cultivated and land irrigated and share of agriculture in family income for the three rural regions are shown in Tables 4.16 and 4.17. Nagpur Division had the highest percentages of families not owning any land, not cultivating any land and not irrigating any land, 32.2, 35.0 and 58.2 respectively. The percentage of families, with the share of agricultural income below 10 per cent was, therefore, highest for this Division, 35.0 compared to 30.9 for Aurangabad Division and 29.4 for Western Maharashtra.

Health Environment

The type of housing, source of drinking water, access to latrine and prevalence of disabilities and incidence of illness are the major indicators considered under health environment. Differentials among the rural regions and urban zones are examined.

An independent accommodation was defined as either a separate structure or one with a separate entrance. In rural areas, 70.4 per cent of the houses were independent, 11.6 per cent were not independent and 18.0 per cent were huts. There were about 3.3 persons per room (Table 4.18). However, access to open spaces should not be limited in rural areas as in urban areas. Houses that were not independent formed 18.0 per cent in Aurangabad Division, 7.0 per cent in Nagpur Division and 12.0 per cent in Western Maharashtra.

In urban areas excluding Greater Bombay, 49.7 per cent of the residences were independent, 41.0 per cent were not independent and 9.3 per cent were huts and hutments. In Greater Bombay the corresponding percentages were 29.1, 56.9 and 14.0. The number of persons per room was 2.4 in other urban areas and 3.0 in Greater Bombay. These figures indicate the amount of overcrowding in Greater Bombay. Living conditions in houses or flats that are not independent and in huts or hutments should be particularly hard in a city like Bombay, since access to open spaces is limited.

In rural areas, 12.1 per cent of families got their drinking water from taps, 80.2 per cent from wells and 7.7 per cent from other sources (Table 4.19). In other urban areas, the corresponding percentages were 89.8, 9.7 and 0.5, and in Greater Bombay they were 98.6, 1.4 and 0.0. Thus wells were the chief source in rural areas and taps were the main source in urban areas for drinking water. Among the rural regions, only 9.7 per cent of the rural population of Aurangabad Division obtained drinking water from taps against 10.7 per cent in Western Maharashtra and 16.2 per cent in Nagpur Division. Although nearly all families in Greater Bombay depended on tap water, it should be noted that water supply is limited and restricted to only a few hours in a day in most parts of the city and that all residences are not provided with running water taps.

Access to latrine is another important factor in the health environment. In urban areas, if a family has no access to a latrine, it creates a double health hazard to the family and to the community. In rural areas lack of access to latrine does not necessarily imply a health hazard so long as open space is available for this purpose and so long as the drinking water source is not polluted by defecation. In rural areas 95.9 per cent of the families had no access to latrine (Table 4.20). In other urban areas 16.8 per cent and in Greater Bombay 4.0 per cent had no such access. In addition, in other urban areas 23.6 per cent and in Greater Bombay 20.0 per cent of the families had to use public latrines. This is an alarming state of affairs, especially in Greater Bombay, where 24.0 per cent of the families did not have access to either an independent or a common latrine.

The reporting of disabilities and illnesses depends on the severity of the condition and its perception by the respondent. Data collected in surveys on disability and morbidity cannot be regarded as objective but they reveal the subjective perception of the individuals regarding their physical limitations and well-being. Table 4.21 shows that in rural areas, 7.8 per thousand under age 15, 17.9 per thousand in ages 15 to 59 and 51.0 per thousand in ages 60 and over were reported to be disabled. The corresponding figures for urban areas were 9.3, 9.8 and

32.6. Greater Bombay reported 41.1 per thousand disabled persons in ages 60 and over against 28.3 per thousand for other urban areas. Among rural regions, Aurangabad Division had 71.6 per thousand disabled in ages 60 and over compared to 43.6 per thousand for Nagpur Division and 47.6 for Western Maharashtra. Part of this large difference might be due to errors in interviewing and errors in age reporting.

In rural areas, 13.6 per thousand under 15 years of age and 18.4 per thousand aged 15 to 59 were reported to have fallen ill in the preceding year. The corresponding figures for other urban areas were 12.5 and 18.1 and for Greater Bombay 4.3 and 13.1. While incidence of illness was at about the same level in rural and other urban areas, it was significantly at a lower level in Greater Bombay. The incidence rate of illness was more in working ages than in ages below 15. As the reliability of data on reported illness of persons aged 60 and over was doubtful, the incidence rate for this age group is not shown.

Indicators of Modernization

Electric lighting facility and ownership of certain expensive consumer durable items have been used as indicators of modernization. Table 4.22 shows that among the rural regions, in Aurangabad Division only 15.9 per cent of families had electric lighting whereas in Nagpur division the percentage of families using electric lighting was 22.5 and in Western Maharashtra it was 24.5. In other urban areas, the percentage of families using electric lighting was 76.1 and in Greater Bombay it was 88.0. Thus this percentage shows a regular gradation from rural to urban and can be used as an index of modernization.

Families were classified by their ownership of consumer durables into four categories : Owning 1) car or T.V. or telephone or refrigerator, 2) cycle or scooter or electric fan or sewing machine or motor cycle, 3) table or chair or cot, or wooden cupboard or radio, 4) none of these items. Families falling in more than one category were placed in the highest (most expensive) ownership category.

Considering the most expensive category, there is a gradient in the percentage of families owning any item in this category with Aurangabad Division, 0.5, Nagpur Division, 0.6, Western Maharashtra, 1.0, other urban, 17.0 and Greater Bombay, 33.4. The gradient was sharper for the next category of cycles, scooters, etc. The percentage of families owning one or more of these items in each study domain was, Aurangabad Division, 10.7, Nagpur Division, 19.1, Western Maharashtra, 27.1, other urban, 47.3 and Greater Bombay, 37.5. Since many of these items are for personal transport, Greater Bombay with a better public transport system had a smaller percentage of these items than other urban areas. Items in the third category might also be owned by families falling in the first two categories. The ownership of charpoy (cot made of coir ropes), that is more common in Nagpur Division than elsewhere, distorts the regular gradient for this category. Therefore, excluding Nagpur Division, the percentage of families not owning any of these consumer durables was, Aurangabad Division, 49.1, Western Maharashtra, 46.3, other urban, 11.9 and Greater Bombay, 4.9.

The spread of electric lighting and ownership of expensive consumer

durables indicate the extent of modernization of the rural regions and urban zones. It is found that among the rural regions, Western Maharashtra is most modernized, Nagpur Division is somewhat less modernized and Aurnagabad Division is the least modernized. Rural regions, other urban areas and Greater Bombay form a continuum from least to most modernized.

Table 4.1 : Percentage Distribution of Heads of Families According to Age, Sex and Marital Status

	Age (in years) of the head			Marital status of the head			Percentage of male heads	Number of families
	Upto 29	30-49	50+	Unmarried	Married	Widowed or divorced		
Aurangabad Division	13.6	44.7	41.7	1.0	92.1	6.9	97.4	900
Nagpur Division	11.7	48.1	40.2	0.5	93.6	5.9	97.3	1450
Western Maharashtra	7.9	42.4	49.7	0.9	90.0	9.1	92.7	2643
Rural Maharashtra	10.0	44.5	45.5	0.8	91.4	7.8	94.9	4993
Urban excluding Greater Bombay	7.6	50.1	42.3	1.5	87.3	11.2	90.1	1561
Greater Bombay	5.9	59.4	34.7	1.0	93.5	5.5	95.2	1100
Urban Maharashtra	6.9	53.9	39.2	1.3	89.9	8.8	92.5	2661
Maharashtra State	8.9	47.8	43.3	1.0	90.9	8.1	94.1	7654

Table 4.2 : Percentage Distribution of Families According to Migration Status and Duration of Stay at Current Place of Residence

	Duration of residence of immigrant families		Non-migrant families	All families
	Upto 10 years	More than 10 years		
Aurangabad Division	2.1	1.3	96.6	100.0 = 900
Nagpur Division	7.5	5.5	87.0	100.0 = 1450
Western Maharashtra	4.5	3.3	92.2	100.0 = 2643
Rural Maharashtra	4.9	3.6	91.5	100.0 = 4993
Urban excluding Greater Bombay	20.1	18.1	61.8	100.0 = 1561
Greater Bombay	11.0	25.6	63.4	100.0 = 1100
Urban Maharashtra	16.4	21.2	62.4	100.0 = 2661
Maharashtra State	8.9	9.7	81.4	100.0 = 7654

Table 4.3 : Family Size, Male and Female Adults and Non-Adults Per Family

	Average family size	Composition of the Family			
		Average male adults	Average female adults	Average male non-adults	Average female non-adults
Aurangabad Division	6.51	2.08	1.90	1.28	1.25
Nagpur Division	6.14	1.97	1.83	1.18	1.16
Western Maharashtra	6.53	2.04	2.04	1.23	1.22
Rural Maharashtra	6.41	2.02	1.96	1.22	1.22
Urban excluding Greater Bombay	6.02	1.97	1.89	1.12	1.04
Greater Bombay	6.05	2.06	1.84	1.07	1.08
Urban Maharashtra	6.03	2.00	1.87	1.10	1.06
Maharashtra State	6.28	2.02	1.93	1.18	1.15

Table 4.4 : Changes in Average Family Size in the Last Two Years

	Average family size two years ago	In-migrants due to marriage (+)	Other in-migrants (+)	Births (+)	Out-migrants due to marriage (-)	Other out-migrants (-)	Deaths (-)	Average current family size
Aurangabad Division	6.25	0.13	0.00	0.45	0.05	0.14	0.13	6.51
Nagpur Division	5.96	0.09	0.02	0.41	0.12	0.11	0.11	6.14
Western Maharashtra	6.40	0.11	0.02	0.40	0.09	0.21	0.10	6.53
Rural Maharashtra	6.24	0.11	0.02	0.41	0.08	0.18	0.11	6.41
Urban excluding Greater Bombay	5.92	0.09	0.01	0.31	0.07	0.15	0.09	6.02
Greater Bombay	5.90	0.07	0.02	0.27	0.05	0.10	0.06	6.05
Urban Maharashtra	5.91	0.07	0.02	0.30	0.06	0.13	0.08	6.03
Maharashtra State	6.13	0.10	0.02	0.37	0.08	0.16	0.10	6.28

Table 4.5 : Percentage Distribution of Males by Births, Non-Migrants and Immigration by Reason During Last Two Years

	Births	Non-migrants	Immigration by reason			Total
			Marriage	For work	Other reasons	
Aurangabad Division	5.7	94.2	0.1	0.0	0.0	100.0 = 3028
Nagpur Division	6.1	93.5	0.1	0.1	0.2	100.0 = 4585
Western Maharashtra	6.0	93.6	0.1	0.1	0.2	100.0 = 8635
Rural Maharashtra	6.0	93.6	0.1	0.1	0.2	100.0 = 16248
Urban excluding Greater Bombay	4.7	95.0	0.0	0.1	0.2	100.0 = 4790
Greater Bombay	4.1	95.3	0.1	0.4	0.1	100.0 = 3449
Urban Maharashtra	4.5	95.2	0.0	0.2	0.1	100.0 = 8239
Maharashtra State	5.5	94.2	0.1	0.1	0.1	100.0 = 24487

Table 4.6 : Percentage Distribution of Females by Births, Non-Migrants and Immigration by Reason During Last Two Years

	Births	Non-migrants	Immigration by reason			Total
			Marriage	For work	Other reasons	
Aurangabad Division	6.8	89.2	3.9	0.0	0.1	100.0 = 2829
Nagpur Division	5.9	90.5	3.9	0.1	0.2	100.0 = 4312
Western Maharashtra	5.6	90.6	3.5	0.0	0.3	100.0 = 8621
Rural Maharashtra	5.9	90.4	3.5	0.0	0.2	100.0 = 15762
Urban excluding Greater Bombay	4.9	92.0	2.8	0.1	0.2	100.0 = 4597
Greater Bombay	4.6	92.9	2.2	0.0	0.3	100.0 = 3208
Urban Maharashtra	4.8	92.4	2.5	0.1	0.2	100.0 = 7805
Maharashtra State	5.5	91.1	3.2	0.0	0.2	100.0 = 23567

Table 4.7 : Percentage Distribution of Families by Caste-Cum-Religion

	Advanced castes	Inter- mediate castes	Backward castes	Scheduled Castes including Nava Boudha	Scheduled Tribes	Muslims	Other religions	All religions
Aurangabad Division	42.4	17.2	10.6	18.5	0.9	9.7	0.7	100.0 = 900
Nagpur Division	36.3	23.3	7.3	18.0	10.0	4.8	0.3	100.0 = 1450
Western Maharashtra	46.4	18.8	2.3	11.5	14.6	4.7	1.7	100.0 = 2643
Rural Maharashtra	42.7	19.9	5.3	14.6	10.8	5.6	1.1	100.0 = 4993
Urban excluding Greater Bombay	44.5	18.7	1.5	15.4	3.6	11.1	5.2	100.0 = 1561
Greater Bombay	56.5	8.0	1.2	9.6	0.6	16.4	7.7	100.0 = 1100
Urban Maharashtra	49.4	14.3	1.4	13.0	2.4	13.3	6.2	100.0 = 2661
Maharashtra State	45.0	17.9	3.9	14.1	7.9	8.3	2.9	100.0 = 7654

There were 36 families that did not report their religion. They were treated as Hindus and proportionately distributed.

Table 4.8 : Percentage of Ever Married to All Women in Selected Age Groups by Caste-Cum-Religion

	Age group 10-14				Age group 15-19				Age group 20-24			
	Adva- nced castes	Inter- mediate castes	Scheduled Castes and Scheduled Tribes	Muslims	Adva- nced castes	Inter- mediate castes	Scheduled Castes and Scheduled Tribes	Muslims	Adva- nced castes	Inter- mediate castes	Scheduled Castes and Scheduled Tribes	Muslims
Aurangabad Division	13.3	16.4	25.5	3.3	62.0	77.5	78.1	66.7	99.2	98.0	100.0	100.0
Nagpur Division	1.4	3.8	3.3	0.0	38.7	44.8	51.4	19.0	92.7	93.2	92.5	87.0
Western Maharashtra	2.2	6.0	11.0	1.6	39.6	45.8	51.5	41.5	89.0	92.5	95.7	89.7
Rural Maharashtra	4.0	7.2	10.6	1.5	42.7	49.9	55.4	43.0	91.9	93.6	95.4	92.0
Urban excluding Greater Bombay	0.0	0.8	3.9	4.0	10.9	28.9	34.2	34.7	59.1	80.0	73.6	74.3
Greater Bombay	0.0	0.0	0.0	0.0	7.6	9.4	20.5	21.4	56.9	48.1	63.0	63.2
Urban Maharashtra	0.0	0.7	2.7	1.8	9.5	23.8	30.5	28.3	58.1	72.3	71.5	69.8
Maharashtra State	2.7	5.4	8.8	1.7	31.8	41.8	48.6	33.8	80.7	88.0	89.7	78.4

Table 4.9 : Percentage of Ever Married to All Women in Selected Age Groups by Literacy/Educational Attainment

	Age group 10-14			Age group 15-19			Age group 20-24		
	Illit- erate + Literate *	Upto 7th standard	8th std. or above	Illit- erate + Literate *	Upto 7th standard	8th std. or above	Illit- erate + Literate *	Upto 7th standard	8th std. or above
Aurangabad Division	21.1	16.1	-	75.4	55.6	-	99.5	100.0	-
Nagpur Division	5.9	4.8	-	60.3	47.1	25.6	93.2	94.1	80.6
Western Maharashtra	12.0	6.5	-	56.5	41.3	25.0	96.4	86.6	80.0
Rural Maharashtra	13.7	6.9	-	61.8	44.8	26.0	96.6	90.5	81.3
Urban excluding Greater Bombay	17.6	2.6	-	58.5	41.7	21.5	95.4	82.0	55.4
Greater Bombay	-	-	-	40.0	23.9	12.3	87.5	76.3	44.5
Urban Maharashtra	12.5	1.4	-	53.6	35.2	17.5	92.9	80.1	50.9
Maharashtra State	13.6	5.8	-	60.7	42.2	21.1	96.0	87.6	59.5

- Percentage not shown if the number of women in the sample is below 30.

* Without formal education.

Table 4.10 : Enrolment Rate (ER) by Level and Age Ratio (AR) for Males, Females and Persons

	ER Std.	Males			Females			Persons		
		1 to 4th std.	5 to 7th std.	8 to 10 th std.	1 to 4th std.	5 to 7th std.	8 to 10 th std.	1 to 4th std.	5 to 7th std.	8 to 10 th std.
		AR Age 7-10 yrs	11-14 yrs	15-19 yrs	7-10 yrs	11-14 yrs	15-19 yrs	7-10 yrs	11-14 yrs	15-19 yrs
Aurangabad Division	ER	0.93	0.36	0.17	0.61	0.12	0.04	0.78	0.25	0.11
	AR	0.66	0.48	0.14	0.42	0.21	0.02	0.54	0.35	0.09
Nagpur Division	ER	1.10	0.48	0.34	1.00	0.37	0.16	1.05	0.42	0.25
	AR	0.82	0.65	0.28	0.72	0.55	0.12	0.77	0.60	0.20
Western Maharashtra	ER	1.09	0.57	0.38	0.90	0.34	0.10	0.99	0.45	0.25
	AR	0.79	0.73	0.32	0.66	0.46	0.09	0.73	0.59	0.21
Rural Maharashtra	ER	1.06	0.50	0.33	0.87	0.31	0.11	0.97	0.41	0.22
	AR	0.78	0.66	0.28	0.63	0.44	0.09	0.71	0.55	0.19
Urban excluding Greater Bombay	ER	1.07	0.73	0.57	1.06	0.66	0.45	1.06	0.70	0.51
	AR	0.93	0.87	0.31	0.88	0.81	0.22	0.91	0.84	0.27
Greater Bombay	ER	1.15	0.82	0.55	1.11	0.78	0.44	1.13	0.80	0.50
	AR	0.92	0.91	0.35	0.93	0.85	0.26	0.92	0.88	0.31
Urban Maharashtra	ER	1.10	0.77	0.56	1.08	0.71	0.45	1.09	0.74	0.51
	AR	0.93	0.89	0.33	0.90	0.83	0.24	0.91	0.86	0.28
Maharashtra State	ER	1.08	0.59	0.41	0.94	0.44	0.23	1.01	0.52	0.32
	AR	0.83	0.74	0.30	0.72	0.57	0.14	0.77	0.65	0.22

ER Enrolment rate by level : (Total enrolled in specified level)/(Population in corresponding age group).

AR Age ratio : (Number enrolled in specified age group)/(Population in corresponding age group).

Table 4.11 : Percentage Distribution of Families by Main Occupation

	Profess- ional and admini- strative	Clerical	Sales	Service	Agriculture and allied ----- Cultiv- Labour ation	Process- ing and manufac- turing	Unearned income	All occupaions	
Aurangabad Division	1.8	2.6	1.9	1.4	51.0	8.7	31.8	0.8	100.0 = 900
Nagpur Division	3.7	2.6	2.9	1.0	51.4	12.9	24.0	1.5	100.0 = 1450
Western Maharashtra	2.4	2.7	2.5	2.3	53.5	10.9	20.7	5.0	100.0 = 2643
Rural Maharashtra	2.6	2.6	2.5	1.8	52.5	11.1	23.7	3.2	100.0 = 4993
Urban excluding Greater Bombay	14.2	16.9	12.8	10.4	5.7	1.0	33.3	5.7	100.0 = 1561
Greater Bombay	12.5	12.4	17.3	17.7	0.3	1.1	36.1	2.6	100.0 = 1100
Urban Maharashtra	13.5	15.1	14.6	13.5	3.4	1.1	34.4	4.4	100.0 = 2661
Maharashtra State	6.4	7.0	6.7	5.8	35.5	7.6	27.4	3.6	100.0 = 7654

Table 4.12 : Percentge Distribution of Males (M) and Females (F) by Their Main Occupation

		Profe- ssional and admini- strative	Clerical and related	Sales	Service	Agricult- ure and allied	Processing, manufac- turing and related + transport	Non- worker	All occupations
Aurangabad Division	M	0.6	1.0	1.5	1.3	39.8	16.0	39.8	100.0 = 3028
	F	0.1	0.0	0.1	0.0	9.0	8.9	81.9	100.0 = 2829
Nagpur Division	M	1.7	1.2	1.9	0.8	34.9	14.0	45.5	100.0 = 4585
	F	0.4	0.0	0.1	0.1	16.6	11.1	71.7	100.0 = 4312
Western Maharashtra	M	1.1	1.2	1.4	1.3	40.7	9.2	45.1	100.0 = 8635
	F	0.1	0.0	0.1	0.1	21.8	4.2	73.7	100.0 = 8621
Rural Maharashtra	M	1.1	1.2	1.6	1.2	38.9	11.8	44.2	100.0 = 16248
	F	0.1	0.0	0.1	0.1	18.1	6.9	74.7	100.0 = 15762
Urban excluding Greater Bombay	M	5.4	6.9	7.0	4.7	3.6	16.9	55.5	100.0 = 4790
	F	1.4	1.1	0.6	2.3	1.2	3.1	90.3	100.0 = 4597
Greater Bombay	M	5.5	5.8	9.3	10.2	0.5	16.5	52.2	100.0 = 3449
	F	1.1	1.2	0.6	3.1	0.2	1.1	92.7	100.0 = 3208
Urban Maharashtra	M	5.4	6.4	8.0	7.0	2.3	16.8	54.1	100.0 = 8239
	F	1.3	1.2	0.6	2.7	0.8	2.3	91.1	100.0 = 7805
Maharashtra State	M	2.6	2.9	3.7	3.1	26.6	13.5	47.6	100.0 = 24487
	F	0.5	0.4	0.3	1.0	12.3	5.4	80.1	100.0 = 23567

Table 4.13: Average Family Size, Earners by Sex Per Family and Average Number of Unemployed Males and Females

	Average family size	Total earners	Average No. of earners			Average non-earners	Average unemployed males	Average unemployed females	Average non-earners per earner
			Male adult earners	Female adult earners	Non-adult earners				
Aurangabad Division	6.51	3.21	1.90	1.03	0.28	3.30	0.07	..	1.04
Nagpur Division	6.14	2.85	1.68	1.03	0.14	3.29	0.09	..	1.15
Western Maharashtra	6.53	3.15	1.75	1.24	0.16	3.38	0.09	..	1.09
Rural Maharashtra	6.41	3.07	1.76	1.14	0.17	3.34	0.09	..	1.10
Urban excluding Greater Bombay	6.02	1.74	1.39	0.34	0.01	4.28	0.22	..	2.46
Greater Bombay	6.05	1.71	1.49	0.21	0.01	4.34	0.27	0.09	2.53
Urban Maharashtra	6.03	1.73	1.43	0.29	0.01	4.30	0.24	0.04	2.49
Maharashtra State	6.28	2.60	1.64	0.84	0.12	3.68	0.14	0.01	1.42

.. Negligible Percentage.

Table 4.14 : Percentage Distribution of Families by Annual Family Income

	Upto Rs.2050	Rs.2051- Rs.5050	Rs.5051 and above	All incomes	Average annual family income (Rs.)
Aurangabad Division	30.5	43.3	26.2	100.0= 900	4468
Nagpur Division	30.6	45.1	24.3	100.0= 1450	4495
Western Maharashtra	39.3	35.9	24.8	100.0= 2643	4475
Rural Maharashtra	35.2	39.8	25.0	100.0= 4993	4480
Urban excluding Greater Bombay	12.1	32.0	55.9	100.0= 1561	8558
Greater Bombay	1.7	19.4	78.9	100.0= 1100	12497
Urban Maharashtra	7.8	26.9	65.3	100.0= 2661	10186
Maharashtra State	25.8	35.3	38.9	100.0= 7654	6464

There were 57 families which did not report their incomes; these are distributed proportionately.

Table 4.15 : Percentage Distribution of Families by Annual Per Capita Income

	Upto Rs.650	Rs.651- Rs.1050	Rs.1051 and above	All incomes	Average annual per capita income (Rs.)
Aurangabad Division	63.7	19.4	16.9	100.0= 900	692
Nagpur Division	61.9	19.9	18.2	100.0= 1450	743
Western Maharashtra	65.4	18.6	16.0	100.0= 2643	709
Rural Maharashtra	64.0	19.1	16.9	100.0= 4993	716
Urban excluding					
Greater Bombay	29.4	22.4	48.2	100.0= 1561	1537
Greater Bombay	9.7	17.9	72.4	100.0= 1100	2153
Urban Maharashtra	21.3	20.6	58.1	100.0= 2661	1792
Maharashtra State	49.3	19.9	31.1	100.0= 7654	1090

There were 57 families which did not report their incomes; these are distributed proportionately.

Table 4.16 : Percentage Distribution of Rural Families by Land Owned, Cultivated and Irrigated

	Land owned				Land cultivated				Land irrigated				All families	
	No land owned	Upto 2.5 acres	2.51-5.5 acres	5.51 and above	No land cultivated	Upto 2.5 acres	2.51-5.5 acres	5.51 and above	No land irrigated	No land irrigated	Upto 2.5 acres	2.51-5.5 acres		5.51 and above
Auranagbad Division	26.4	8.9	21.2	43.5	30.1	8.5	19.3	42.1	30.1	48.0	10.1	8.0	3.8	100.0 = 900
Nagpur Division	32.2	13.4	18.2	36.2	35.0	12.8	16.9	35.3	35.0	58.2	3.5	2.1	1.2	100.0 = 1450
Western Maharashtra	26.0	27.3	20.2	26.5	28.3	26.9	20.4	24.4	28.3	45.9	15.0	6.9	3.9	100.0 = 2643
Rural Maharashtra	27.9	19.9	19.8	32.4	30.6	19.4	19.2	30.8	30.6	49.8	10.8	5.7	3.1	100.0 = 4993

Families not reporting land owned, cultivated or irrigated have been distributed proportionately.

Table 4.17 : Percentage Distribution of Rural Families by Income from Agriculture as Percentage of Total Income

	Percentage of income from agriculture to total income			Total
	Under 10	10-89	90 and over	
Aurangabad Division	30.9	40.1	29.0	100.0 = 900
Nagpur Division	35.0	39.3	25.7	100.0 = 1450
Western Maharashtra	29.4	48.0	22.6	100.0 = 2643
Rural Maharashtra	31.3	44.0	24.7	100.0 = 4993

Table 4.18 : Percentage Distribution of Families by Type of Housing

	Independent house or flat	Not independent	Huts or hutments	All families	No. of persons per room
Aurangabad Division	63.0	18.0	19.0	100.0 = 900	3.5
Nagpur Division	75.4	7.0	17.6	100.0 = 1450	3.0
Western Maharashtra	70.1	12.0	17.9	100.0 = 2643	3.4
Rural Maharashtra	70.4	11.6	18.0	100.0 = 4993	3.3
Urban excluding					
Greater Bombay	49.7	41.0	9.3	100.0 = 1561	2.4
Greater Bombay	29.1	56.9	14.0	100.0 = 1100	3.0
Urban Maharashtra	41.1	47.6	11.3	100.0 = 2661	2.7
Maharashtra State	60.2	24.1	15.7	100.0 = 7654	2.9

There were 51 families that did not report their type of housing. These have been distributed proportionately.

Table 4.19 : Percentage Distribution of Families by Source of Drinking Water

	Tap water	Well water	River, lake or spring water	All families
Aurangabad Division	9.7	83.4	6.9	100.0 = 900
Nagpur Division	16.2	80.0	3.8	100.0 = 1450
Western Maharashtra	10.7	79.2	10.1	100.0 = 2643
Rural Maharashtra	12.1	80.2	7.7	100.0 = 4993
Urban excluding				
Greater Bombay	89.8	9.7	0.5	100.0 = 1561
Greater Bombay	98.6	1.4	-	100.0 = 1100
Urban Maharashtra	93.4	6.3	0.3	100.0 = 2661
Maharashtra State	40.4	54.5	5.1	100.0 = 7654

Table 4.20 : Percentage Distribution of Families by Access to Latrine

	Independent latrine	Common latrine	Public latrine	No latrine	All families
Aurangabad Division	0.2	0.2	-	99.6	100.0 = 900
Nagpur Division	6.7	0.5	0.1	92.7	100.0 = 1450
Western Maharashtra	1.8	0.9	1.0	96.3	100.0 = 2643
Rural Maharashtra	2.9	0.7	0.5	95.9	100.0 = 4993
Urban excluding					
Greater Bombay	31.0	28.6	23.6	16.8	100.0 = 1561
Greater Bombay	34.2	41.8	20.0	4.0	100.0 = 1100
Urban Maharashtra	32.3	34.1	22.1	11.5	100.0 = 2661
Maharashtra State	13.2	12.3	8.0	66.5	100.0 = 7654

Table 4.21 : Prevalence Rate of Disability and Incidence Rate of Illness per 1,000 Persons by Age Group

	Disabled persons				Ill persons	
	Under 15 years	15-59 years	60 years and above	All ages	Under 15 years	15-59 years
Aurangabad Division	9.2	17.0	71.6	18.4	13.2	19.6
Nagpur Division	5.6	16.1	43.6	14.0	14.5	12.1
Western Maharashtra	8.5	19.2	47.6	17.7	13.3	21.3
Rural Maharashtra	7.8	17.9	51.0	16.8	13.6	18.4
Urban excluding Greater Bombay	10.1	11.9	28.3	12.5	12.5	18.1
Greater Bombay	8.1	6.8	41.1	9.0	4.3	13.1
Urban Maharashtra	9.3	9.8	32.6	11.0	9.1	16.0
Maharashtra State	8.3	15.1	45.9	14.9	12.2	17.5

Table 4.22 : Percentage Distribution of Families by Lighting Facility

	Electric lighting	Kerosene lamp with protected flame	Other lighting	All lighting
Aurangabad Division	15.9	50.9	33.2	100.0 = 900
Nagpur Division	22.5	50.6	26.9	100.0 = 1450
Western Maharashtra	24.5	53.1	22.4	100.0 = 2643
Rural Maharashtra	22.3	52.0	25.7	100.0 = 4993
Urban excluding Greater Bombay	76.1	18.1	5.8	100.0 = 1561
Greater Bombay	88.0	10.8	1.2	100.0 = 1100
Urban Maharashtra	81.0	15.1	3.9	100.0 = 2661
Maharashtra State	42.9	39.1	18.0	100.0 = 7654

There were 90 families that did not answer this question. These have been proportionately distributed.

Table 4.23 : Percentage Distribution of Families by Household Durables

	Car, T.V. telephone, refrigerator	Cycle, scooter, electric, fan, sewing machine, motor cycle	Table, chair, wooden cupboard, radio, etc.	Nothing in the list	Total
Aurangabad Division	0.5	10.7	39.7	49.1	100.0 = 900
Nagpur Division	0.6	19.1	*53.6	26.7	100.0 = 1450
Western Maharashtra	1.0	27.1	25.6	46.3	100.0 = 2643
Rural Maharashtra	0.8	21.8	36.3	41.1	100.0 = 4993
Urban excluding Greater Bombay	17.0	47.3	23.8	11.9	100.0 = 1561
Greater Bombay	33.4	37.5	24.2	4.9	100.0 = 1100
Urban Maharashtra	23.8	43.2	24.0	9.0	100.0 = 2661
Maharashtra State	8.8	29.2	32.0	30.0	100.0 = 7654

* This group included charpoy (cot with coil ropes) which is in more common use in Nagpur Division than elsewhere.

CHAPTER 5

CURRENT FERTILITY AND MORTALITY

RATES AND DIFFERENTIALS

Introduction

In this chapter current fertility and mortality differentials are compared. The crude birth, death and natural increase rates are estimated and compared among the three rural regions and the two urban zones. The rates are given by community, main family occupation and annual family income. Age-specific fertility rates for married and all women are also estimated for the domains of study. The NFMS age-specific fertility rates for Maharashtra 1980 are compared with Sample Registration System (SRS) rates for 1972 to find the changes. To assess the effect of family planning on fertility, age-specific marital fertility rates for all women are compared with those for non-contracepting women. Age-specific mortality rates are estimated for rural and urban Maharashtra for males and females. Age-standardized death rates are compared among the domains of study.

The current estimates given in this chapter are based on the births and deaths reported by the family in the two years preceding the date of interview. Since the field interviews were taken during the period June to December 1980, the annual rates may be taken to refer to the period April 1979 to March 1980.

As explained in Chapter 2, the sampling design was not self-weighting. The family was reweighted inversely in proportion to the number of adults 21 years and over in the rural sample and, in the urban sample, the wards were reweighted inversely in proportion to their probability of inclusion in the sample. The rural and urban estimates were combined in the ratio 65:35. This ratio was observed between the numbers of rural and urban families in the sample and also between the rural and urban population in the 1981 Census.

The birth, death and natural increase rates were calculated as central rates. The mid-period population was obtained as the average of the family size two years ago and the current family size. Since the reference period for reporting births and deaths was two years, their estimated numbers were halved.

The main purpose of this chapter is to examine the differentials in current fertility and mortality rates among the three rural regions and two urban zones. There is evidence indicating some degree of under-enumeration of births and a somewhat larger degree of under-enumeration of deaths. Indirect estimation of these errors and adjustment of the vital rates for under-enumeration are taken up in Chapter 8. On the assumption that under-enumeration does not differ considerably by domains and by characteristics, the findings of this chapter would not be affected by the presence of more or less uniform under-enumeration.

Differentials by Domains

The crude birth rate of the three rural regions and two urban zones is affected both by differences in the background characteristics presented in Chapter 4 and the socio-economic composition of the domain by community, and occupational and income groups.

In Chapter 4, on the basis of social, economic, health and modernization indicators, it was found that there is a gradient from rural to other urban to Greater Bombay. Within rural regions, Aurangabad Division is least modern, Nagpur Division more modern and Western Maharashtra most modern. The crude birth rates in Table 5.2 and crude death rates in Table 5.3 are consistent with this ranking. The crude birth rate for Aurangabad Division was 33.7, for Nagpur Division 33.2, for Western Maharashtra 28.7, for other urban areas 24.6 and for Greater Bombay 23.9. The differences between Aurangabad and Nagpur Divisions and that between other urban areas and Greater Bombay are diminished, possibly by dissimilar socio-economic composition. The crude birth rate for Maharashtra State was 28.5 for the year, April 1979 to March 1980.

The crude death rates for the five domains were Aurangabad Division 11.8, Nagpur Division 10.0, Western Maharashtra 8.6, other urban centres 6.4 and Greater Bombay 5.4. Clearly these rates conform to the ranking by socio-economic characteristics in Chapter 4. The crude death rate for Maharashtra State was 8.3 for the year, April 1979 to March 1980.

The rate of natural increase is the difference between the birth and death rates. The differentials in the natural increase rate tend to be evened out since a high (low) birth rate goes together with a high (low) death rate. The percentage natural increase rate was somewhat higher in rural regions, 2.2 in Aurangabad Division, 2.3 in Nagpur Division and 2.0 in Western Maharashtra, compared to the urban zones, 1.8 in other urban areas and 1.9 in Greater Bombay. The rate of natural increase for Maharashtra State was 2.0 per cent during the year, April 1979 to March 1980.

Socio-Economic Differentials in Vital Rates

The three socio-economic characteristics chosen for the study of differentials in birth and death rates were community, main family occupation and annual family income. In many micro-socio-demographic surveys, these characteristics have shown a high degree of association with fertility and morality levels.

The community classification is based on religion and caste among Hindus and has been described in Chapter 4. The following broad classes were used in order to provide large enough samples and, at the same time, to reveal the major differentials in the population: (1) advanced caste Hindus, (2) intermediate caste Hindus, (3) Scheduled Castes and Tribes and other backward Hindus, (4) Muslims and (5) other religions.

The weighted distribution of communities in each domain is given in Table 5.1. The features noted for the unweighted distributions in Chapter 4 are also true of the weighted distributions. Compared to rural areas, there is a higher percentage of advanced caste Hindus, Muslims

and other religions in other urban areas and Greater Bombay. About a third of the rural population and only about a sixth of the urban population belonged to Scheduled Castes and Tribes, and backward castes.

In the State as a whole, the crude birth rate for advanced caste Hindus was 26.1, for intermediate caste Hindus 28.6, for Scheduled Castes and Tribes and backward Hindus 31.4, and for Muslims 34.1 (Table 5.2). The sample size for other religions was too small to provide a reliable rate. In urban Maharashtra, the birth rates for these four groups were 21.6, 26.0, 23.3 and 32.8 respectively whereas in rural Maharashtra the birth rates for the four groups were 29.2, 29.4, 33.4 and 35.9 respectively. Thus the rural birth rate for each community was higher than its urban rate. Muslims had high fertility rates in both rural and urban areas. Scheduled Castes and Tribes and backward Hindus had a high fertility rate in rural areas. Since the number of sample families in some of the cells was small, more detailed comparisons are not warranted.

The composition of the population by communities had an effect on the birth rate of each study domain. The rural birth rate was higher compared to the urban rate because of a lower percentage of advanced caste Hindus whose birth rate was low and a higher percentage of Scheduled Castes and Tribes and backward Hindus whose birth rate was high. The higher percentage of Muslims in Aurangabad Division tended to increase its birth rate in relation to the other two rural regions. Similarly a higher percentage of Muslims in Greater Bombay tended to bring its birth rate closer to that of other urban areas.

The crude death rate in Maharashtra State, by community was 7.2 for advanced caste Hindus, 9.7 for intermediate caste Hindus, 9.8 for Scheduled Castes and Tribes, and backward Hindus and 6.5 for Muslims (Table 5.3). The rural rates for the four communities were 8.5, 10.9, 10.5 and 8.4 respectively with corresponding urban rates of 5.4, 5.8, 6.8 and 5.1 respectively. The rural rate for each community was above its corresponding urban rate. The rather low death rates for Muslims may be noted. In fact, in both rural and urban areas, advanced caste Hindus and Muslims had lower death rates in comparison with the other two communities.

Unlike on the birth rate, on the death rate the effect of the composition of the population by community seems to be less than the situational effect. For instance, the death rate in Aurangabad Division for each community was higher than its overall rural death rate. Similarly the rural death rate for each community was higher than its urban death rate. It is not surprising to find that composition by community exerted a higher influence on the birth rate and environmental factors on the death rate.

With a high birth rate and a low death rate, the Muslims had the highest rate of natural increase, 2.8 per cent. The rural and urban rates of natural increase for this community were 2.7 per cent and 2.8 percent (Table 5.4). Thus there was not much difference for Muslims between their rural and urban rates of natural increase. The same is true for intermediate caste Hindus, since a higher rural birth rate was balanced by a higher rural death rate and a lower urban birth rate was

balanced by a lower urban death rate. For the other two communities, their urban rates of natural increase were less than their rural rates. The natural increase rate of the remaining communities were 1.9 per cent each for advanced caste Hindus and intermediate caste Hindus and 2.2 per cent for Scheduled Castes and Tribes, and backward Hindus.

The composition by community of the population of each domain tends to even out the differences in the rate of natural increase. The rural regions had a rate of natural increase slightly above 2 per cent while the urban zones had a rate slightly below 2 per cent.

Main family occupation is the second characteristic for which the vital rates were calculated. The broad categories used in this classification and the differentials in their distribution, by study domains, were described in Chapter 4. Agriculture and allied activities absorbed 59.7 per cent of rural families and processing, manufacturing and transport another 25.9 per cent (Table 5.5). In urban areas, only 4.1 per cent of families had agriculture and allied activities as their main occupation and 34.2 per cent were engaged in processing, manufacturing and transport. The rest of the urban families were engaged in professions and administration, clerical and sales jobs, and service activities. Thus the division of labour was distinct between rural and urban areas. Among rural regions, Aurangabad Division had the largest percentage of families employed in processing, manufacturing and transport, mainly in the unorganized sector, and the smallest percentage in agriculture. Greater Bombay had a larger percentage of families engaged in processing and manufacturing, largely in the organized sector, and a smaller percentage in agriculture compared to other urban areas.

In Maharashtra State, the crude birth rate was the lowest for families engaged in professions and administration (21.7), slightly higher for services (24.5), much higher for clerical and sales occupations (28.8), and agriculture and allied activities (29.3) and highest in processing, manufacturing and transport (30.5), as seen from Table 5.6. The birth rates for the corresponding categories in urban areas were 17.0, 23.2, 24.5, 23.1 and 27.1 respectively. In rural areas, families engaged in clerical and trading occupations had the highest birth rate of 41.6. Agriculture and allied activities had the lowest birth rate of 29.5 and families in other occupations had birth rates only slightly above this. Thus, excluding the clerical and trading families which constituted only 5.2 per cent of rural families, the differentials in birth rate among the other occupational classes in rural areas were not large. Contrary to expectations, families engaged in agriculture and allied pursuits had the lowest rural birth rate. This finding has important implications and needs to be investigated further.

For the State as a whole, higher death rates were found in families engaged in agriculture and allied activities (9.4) and processing, manufacturing and transport (8.7) compared to professions and administration (6.6), clerical and sales (6.0) and services (5.0). In urban areas the differentials in death rates were not large but in rural areas, death rates were higher for agriculture and allied activities (9.6) and processing, manufacturing and transport (10.5) as might be

expected (Table 5.7). Only for these occupational groups, the rural death rate was substantially above the urban death rate.

The rate of natural increase given in Table 5.8 shows a rate of 2.1 per cent in urban areas and 2.3 per cent in rural areas for processing, manufacturing and transport occupations. The professional and administrative class had the lowest natural increase rate of 0.9 per cent in urban areas. Other occupational groups had a rate just below 2.0 in urban areas. The sample is not large enough to yield dependable rates in rural areas for the three classes, professional and administrative, clerical and sales, and service.

Annual family income is the third major characteristic for which vital rates were estimated. The income categories were divided into three broad groups with roughly one-third of the families in each group in Maharashtra State. The annual family income groups were, (1) Rs. 2,050 and below, (2) Rs. 2,051 to Rs. 5,050 and (3) Rs. 5,051 and above, with 28.9 per cent, 33.4 per cent and 37.7 per cent of the families respectively. The unweighted distributions were presented in Chapter 4 and the weighted distributions are presented in Table 5.9. The weighted distributions generally showed a shift towards higher income groups compared to the unweighted distributions.

As should be expected, the percentages in the highest income group showed a gradient with 19.8 per cent of rural families, 60.8 per cent of other urban families and 76.5 per cent of families in Greater Bombay in this income group. Among rural regions, Western Maharashtra showed the largest income inequality with only 34.7 per cent in the middle income group, Rs. 2,051 to Rs. 5,050, compared to 42.5 per cent in Aurangabad Division and 43.7 per cent in Nagpur Division. As mentioned in Chapter 4, there might be considerable under-reporting of incomes, especially in rural areas. Also the classification is coarse, with only three income groups.

For Maharashtra State, the birth rate by income groups shows an inverted U-shape, with a birth rate of 28.8 for families with annual income Rs. 2,050 or below, 30.5 for the middle income group and 27.5 for the highest income group (Table 5.10). In urban areas, the same inverted U-shape is observed but the birth rate for the highest income group fell to 22.7 from 29.6 for the middle income group. In rural areas, there is a direct, but rather weak, relationship between annual family income and birth rate. Thus the highest income group in urban areas has the lowest birth rate but, in rural areas, this group has the highest birth rate. Some other micro-demographic studies also suggest different patterns of relationship in rural and urban areas that would bear closer investigation. The sample sizes are too small to warrant comments, within each domain, on the pattern of birth rate by income group.

The crude death rate bears an inverse relationship to the annual family income as seen from Table 5.11. For Maharashtra State, the lowest income group had a death rate of 12.0, the middle income group, 9.0 and the highest income group, 5.4. The same pattern is found within both the rural and urban areas. Interestingly enough, in the lowest income group, the rural death rate of 12.1 was below the urban death rate of 13.1.

Further investigation is needed to establish whether the death rate among the urban slum-dwellers is really higher than among the rural poor.

The natural increase rate is the difference between the birth and the death rates. For Maharashtra, there was a direct relationship between the rate of natural increase and income. The percentage rate for the lowest income group was 1.7, for the middle income group 2.1 and for the highest income group, 2.2 (Table 5.12). Thus the direct relationship of death rate with income seems to dominate over the inverted U-shaped relationship between birth rate and income. In rural areas, the same type of direct relationship between natural increase rate and income is seen, rather more strongly. In urban areas, an inverted U-shaped relationship is seen, perhaps because of the large differentials in birth rate by income group.

Patterns of Age-Specific Fertility Rates

Age-specific fertility rates by quinquennial age groups from 15-19 to 45-49 are shown for the several domains of study for married women in Table 5.13 and for all women in Table 5.14. The reference period for reporting birth was the two years preceding the interview date. The number of married women in an age group, a year before the date of interview, was used as the denominator for calculation of the age-specific marital fertility rate (ASMFR) in Table 5.13. These rates are expressed per 1,000 married women. For the State and for all the domains, the peak rate of ASMFR was reached in ages 20 to 24. In age group 15-19, the rural ASMFR was below that for either urban zone. Thus early marriage seem to be selective for higher fertility and/or quicker completion of family size in urban areas than in rural areas. From the next age group onwards, ASMFR in the two urban zones was below rural ASMFR. ASMFR declined rapidly after ages 30 to 34 in all the domains.

The total marital fertility rate (TMFR) cannot be simply interpreted as the number of children a married woman would have at the end of her reproductive life span, with the prevailing fertility schedule, since it does not relate to a constant cohort of married women. It would tend to over-estimate their completed fertility since the first, second, etc., parities of newly wed women in each age group would be counted more than once. This error would be more if the percentage married is less in younger age groups. Thus the over-estimation would be larger in urban compared to rural areas. This is the reason for the small difference found between the rural TMFR of 4.97 and the urban TMFR of 4.62. The general marital fertility rate (GMFR) is not affected by the proportions married in younger age groups and, therefore, provides a better summary measure of fertility levels and differentials. The GMFR for married women aged 15 to 44 was 179.0 for Maharashtra State, 188.2 for rural areas, 166.9 for other urban areas and 145.7 for Greater Bombay. Thus the GMFR for other urban areas was 88.7 per cent and for Greater Bombay 77.4 per cent that for rural areas.

Similar differentials were found in the GMFR of women aged 15 to 49. These differentials arise from fertility and family planning within marriage and are not affected by other factors such as age at marriage. If it is assumed that married women in ages 15 to 44 constituted roughly

one-sixth of the population, the GMFRs given in Table 5.13, would correspond to a crude birth rate of 31.4 in rural areas, a rate of 27.8 in other urban areas and of 24.3 in Greater Bombay.

The age-specific fertility rates (ASFR) for all women given in Table 5.14 are affected both by fertility and family planning within marriage and by age at marriage and proportion married. The pattern of these rates over the age groups is similar for all domains. Starting from a low value for ages 15 to 19, the age-specific rate reaches its peak value in ages 20 to 24, remains high in ages 25 to 29, falls to about half that value in ages 30 to 34 and declines more rapidly in the next three age groups. For each age group, the ASFR was higher for rural than urban areas.

The total fertility rate (TFR) can be interpreted as the completed family size per woman according to the current schedule of ASFRs. Table 5.14 shows that, according to the current ASFRs, a woman would have, by the time she completes her family by age 49, 4.21 children in rural areas, 3.03 children in other urban areas and 2.80 children in Greater Bombay. The general fertility rate (GFR) for women aged 15 to 44 was 154.5 in rural areas, 112.1 in other urban areas and 99.8 in Greater Bombay. As a percentage to rural TFR, the TFR of other urban areas was 72.0 and that of Greater Bombay was 66.5. The GFR for women aged 15 to 44 showed similar differentials. Other urban GFR was 72.6 per cent and the GFR for Greater Bombay 64.6 per cent of the rural GFR. The differentials in GFR were larger than the corresponding differentials in GMFR because GFR is affected not only by fertility and family planning within marriage but also by the age at marriage and the proportion married. Making the assumption that women aged 15 to 44 constituted one-fifth of the population, the rural GFR of 154.5 would correspond to a crude birth rate of 30.9, the other urban GFR of 112.1 to a rate of 22.4, and the GFR of 99.8 for Greater Bombay to a rate of 20.0.

The ASFR and ASMFR for the three rural regions are given in Table 5.15. Generally the ASFR schedule for Aurangabad Division was the highest, that for Nagpur Division intermediate and for Western Maharashtra the lowest. The pattern of the schedule was similar for all these regions and also similar to those for urban areas given in Table 5.14. However, ASMFR was higher for Nagpur Division and Western Maharashtra in the two youngest age groups, 15-19 and 20-24. The TMFR for Nagpur Division was consequently higher than that for Aurangabad Division.

The fertility levels of the three regions may be compared in terms of TFR or GFR for women aged 15 to 44 and that of married women in terms of GMFR for married women aged 15 to 44. As a percentage of the rural TFR, that of Aurangabad was 110, Nagpur Division 104 and Western Maharashtra 95. As a percentage of rural GFR (aged 15 to 44), the GFR's for the three regions were 112, 102 and 95 respectively. As a percentage of rural GMFR (ages 15 to 44) 104, 104 and 97 were the figures for the three regions respectively. These summary measures indicate that within marriage, the fertility level was about the same in Aurangabad Division and Nagpur Division while it was slightly less in Western Maharashtra. But when the fertility level of all women is considered, Aurangabad Division had the highest fertility, followed by Nagpur Division while

Western Maharashtra had the lowest fertility among the rural regions. These differences in fertility may be attributed mainly to other reasons such as age at marriage and proportion of women married.

The ASFR schedule from the survey was compared with the corresponding rates from the Sample Registration System (SRS) estimates for 1980 (Table 5.16). Except for the age group 25-29 in rural areas, the age-specific rates from the two sources are within admissible limits of variation due to sampling. The total fertility rate, which is subject to less sampling variation, is quite close as estimated from the two sources. In fact for 1980, for rural areas it is 4.0 from SRS and 4.2 from NFMS, and for urban areas, it is 3.0 from SRS and 2.9 from NFMS. It, therefore, appears valid to assess the trends in ASFR by comparing the SRS estimates for 1972 with the NFMS estimates for 1980.

The schedule of ASFR for 1972 from the Sample Registration System (SRS) are compared with the NFMS 1980, separately for rural and urban areas, in Table 5.16 to assess the trends. In rural areas, there was a decline in ASFR of 9.0 per cent from SRS, 1972 for ages 15 to 19 and an increase of 3.5 per cent in the next age group. This shift could be ascribed to an increase in the age at marriage between 1972 and 1980. From age group 25-29 onwards, the percentage decline rapidly rose from 7.2 to 91.9 for ages 45 to 49. This pattern of decline could be attributed to increasing recourse to family planning with increasing age.

The percentage decline in ASFR in urban areas, for NFMS 1980 compared to SRS 1972, steadily rose from 3.2 in ages 15 to 19 to 100.0 in ages 45 to 49. Since the age at marriage was already high in 1972 in urban areas, its increase did not result in an increase in fertility between 1972 and 1980, in ages 20 to 24 that was found for rural areas. Moreover, for urban areas, the effect of family planning in older ages was larger than for rural areas. The GFR for NFMS 1980 compared to SRS 1972, declined by 8.8 per cent in rural areas and by 23.3 per cent in urban areas, and the TFR declined by 16.8 per cent in rural areas and by 26.2 per cent in urban areas. As observed earlier, the declines in the younger age groups could be attributed to the rise in the age at marriage and the decline in the older age groups could be attributed to the increasing use of family planning methods by couples between 1972 and 1980.

The urban ASFR and ASMFR are compared with the rural rates by age group in Table 5.17. The urban ASFR was 52.1 per cent of the rural rate in ages 15 to 19 and reached a peak of 78.4 per cent in ages 30 to 34 and declined sharply after ages 35 to 39. The urban GFR for women aged 15 to 44 was 69.3 per cent of the rural rate. These figures show the rural-urban differentials in the age-specific fertility schedule that arise from differences in fertility within marriage and family planning on the one hand and from differences in the age at marriage and proportion married on the other hand.

If only the fertility of married women is considered, the urban ASFMR was 130.0 per cent of the rural rate in ages 15 to 19 since the women who married young in urban areas were self-selected for higher fertility. In the following age groups, this percentage declined

steadily up to ages 35 to 39 (79.9 per cent), and then more rapidly in the two older age groups. The percentage of urban to rural ASMFR was below 100.0 only due to differential fertility and family planning within marriage. For this reason this percentage was above the percentage of urban to rural ASFR which was also affected by the age at marriage and the proportion of married women.

By comparing the ASMFR schedule of all married women with that for non-contracepting married women, the impact of family planning on fertility could be assessed. The assumption is made that the fertility of all married women could have been that of non-contracepting married women in the absence of family planning. Since non-contracepting women might be selected for sub-fecundity and sterility, this method would provide a conservative estimate of the effect of family planning on the lower side.

In Table 5.18, the percentage family planning impact (FPI) on the fertility rate is measured by the difference between the rates for non-contracepting and all married women expressed as a percentage to the rate for the non-contracepting married women. First it may be noted that both in rural and urban areas, the ASMFR for all married women was systematically lower than that for non-contraceptors among them. The percentage of urban to rural ASMFR was also lower for all married women compared to that for non-contraceptors among them, except in the age groups 35-39 and 40-44.

The percentage family planning impact (FPI) was negligible in ages 15 to 19 in both rural and urban areas and reached 58.8 for rural and 53.1 for urban areas in ages 40 to 44. The urban FPI was greater than the rural FPI in all age groups up to 30-34. Taking reproductive ages 15 to 44, the FPI for rural areas was 29.5 and for urban areas it was 37.5. The impact was slightly higher if ages 15 to 49 were taken. Compared to the fertility of non-contraceptors, the impact of family planning on all married women in reproductive ages was to reduce the rural fertility by 29 per cent and urban fertility by 37 per cent. Since almost all rural women and most urban women accepted family planning methods from the programme, it may be concluded, conservatively, that, by 1980, the impact of the programme was to reduce rural fertility by about 29 per cent and urban fertility by 37 per cent in Maharashtra State.

Patterns of Age-Specific Mortality Rates

Age-specific mortality rates for rural and urban areas, and Maharashtra State are given in Table 5.19 for males and in Table 5.20 for females. The estimates of mortality were subject to larger sampling errors than for fertility, since deaths were rarer events than births. Also they were subject to various response and recall errors. Hence these rates have been adjusted indirectly and life tables constructed from them in Chapter 8. In this section the pattern of the unadjusted mortality rates is discussed briefly.

The mortality rates presented in Tables 5.19 and 5.20 were calculated from deaths occurring during the two years preceding the date of interview. The sum of the current population and the population two years ago in a particular age group for males or females was taken to be

the number of years exposed to the risk of mortality and used as the denominator for calculation of the rate. All numbers used are unweighted. The annual age-specific mortality rate is expressed per 1,000 exposure years.

For males the age-specific mortality rates (ASMR), shown in Table 5.19, follow the typical J-shaped curve, with a sharp decline from childhood to adult ages, a gradual increase over adult ages and finally a sharp increase in old age. Urban rates are generally lower than rural rates. The unweighted crude death rate for males was 8.8 for rural areas, 8.0 for urban areas and 8.5 for the State.

The ASMRs for females are shown for rural, urban and Maharashtra State in Table 5.20. These also show the typical J-shape of a mortality curve. The crude female death rate in rural areas was 8.2 and in Maharashtra 7.3. However, the crude death rate for urban females was unusually low, only 5.5 compared to 8.0 for urban males. It is suspected that female deaths might be under-reported to a greater extent than male deaths, especially in urban areas. The errors in reporting deaths in the survey are assessed and indirect estimates of death rates and life tables are presented in Chapter 8 of this report.

The crude unweighted death rates are the result of the age distribution of ASMR. To eliminate the effect of the age distribution, the death rate was standardized to the Maharashtra State age distribution and the results are shown in Table 5.21. The standardized rates were below the corresponding crude rates in rural areas and above them in urban areas. This is to be expected since a higher percentage of the urban population falls in working ages where ASMR is low. For instance, in Greater Bombay males had a crude death rate of 7.3 and a standardized rate of 9.5 and females had a crude rate of 3.5 and a standardized rate of 4.2. Even the standardized rates were low for urban females, clearly indicating larger response and other non-sampling errors in reporting deaths occurring to urban females. These errors are investigated in Chapter 8.

Table 5.1 : Percentage Distribution* of Families by Caste-Cum-Religion

Caste-cum-religion	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Advanced castes	40.7	36.0	46.6	42.4	51.7	56.2	54.4	46.7
Intermediate castes	16.9	22.6	18.8	19.6	16.4	8.2	11.2	16.7
Scheduled Castes, Scheduled Tribes and other castes	31.8	36.8	28.1	31.4	17.1	12.2	14.1	25.2
Muslims	9.9	4.3	4.9	5.6	9.9	16.3	14.0	8.5
Other religions	0.7	0.3	1.6	1.0	4.9	7.1	6.3	2.9
All castes-cum- religions	100.0 = 897	100.0 = 1448	100.0 = 2637	100.0 = 4982	100.0 = 1553	100.0 = 1083	100.0 = 2636	100.0 = 7618
Caste not reported: No. of Families	3	2	6	11	8	17	25	36

* Weighted according to the sampling design.

Table 5.2 : Births Per 1,000 Population* by Caste-Cum-Religion

Caste-cum-religion	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Advanced castes	30.5 (381)	30.1 (524)	28.3 (1221)	29.2 (2126)	20.7 (691)	22.1 (609)	21.6 (1300)	26.1 (3426)
Intermediate castes	32.3 (154)	32.8 (338)	26.2 (497)	29.4 (989)	25.9 (290)	26.1 (86)	26.0 (376)	28.6 (1365)
Scheduled Castes, Scheduled Tribes and other castes	38.4 (269)	36.9 (512)	29.0 (749)	33.4 (1530)	29.2 (318)	18.4 (123)	23.3 (441)	31.4 (1971)
Muslims	35.7 (87)	32.1 (69)	37.8 (125)	35.9 (281)	33.8 (173)	32.5 (180)	32.8 (353)	34.1 (634)
All castes-cum-religions [⊕]	33.7 (900)	33.2 (1450)	28.7 (2643)	30.9 (4993)	24.6 (1561)	23.9 (1100)	24.1 (2661)	28.5 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

⊕ The group "all castes-cum-religions" includes other religions such as Christians, Parsees, etc.

Table 5.3 : Deaths Per 1,000 Population^a by Caste-Cum-Religion

Caste-cum-religion	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Advanced castes	10.3 (381)	8.4 (524)	8.0 (1221)	8.5 (2126)	5.5 (691)	5.4 (609)	5.4 (1300)	7.2 (3426)
Intermediate castes	17.1 (154)	12.6 (338)	7.9 (497)	10.9 (989)	5.3 (290)	6.4 (86)	5.8 (376)	9.7 (1365)
Scheduled Castes, Scheduled Tribes and other castes	12.2 (269)	10.1 (512)	10.2 (749)	10.5 (1530)	9.0 (318)	5.0 (123)	6.8 (441)	9.8 (1971)
Muslims	8.9 (87)	10.6 (69)	7.1 (125)	8.4 (281)	7.1 (173)	4.4 (180)	5.1 (353)	6.5 (634)
All castes-cum-religions ⁺	11.8 (900)	10.0 (1450)	8.6 (2643)	9.6 (4993)	6.4 (1561)	5.4 (1100)	5.8 (2661)	8.3 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

+ The group "all castes-cum-religions" includes other religions such as Christians, Parsees, etc.

Table 5.4 : Percentage Rate^a of Natural Increase by Caste-Cum-Religion

Caste-cum-religion	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Advanced castes	2.0 (381)	2.2 (524)	2.0 (1221)	2.1 (2126)	1.5 (691)	1.7 (609)	1.6 (1300)	1.9 (3426)
Intermediate castes	1.5 (154)	2.0 (338)	1.8 (497)	1.9 (989)	2.1 (290)	2.0 (86)	2.0 (376)	1.9 (1365)
Scheduled Castes, Scheduled Tribes and other castes	2.6 (269)	2.7 (512)	1.9 (749)	2.3 (1530)	2.0 (318)	1.3 (123)	1.7 (441)	2.2 (1971)
Muslims	2.7 (87)	2.2 (69)	3.1 (125)	2.7 (281)	2.7 (173)	2.8 (180)	2.8 (353)	2.8 (634)
All castes-cum-religions ⁺	2.2 (900)	2.3 (1450)	2.0 (2643)	2.1 (4993)	1.8 (1561)	1.9 (1100)	1.8 (2661)	2.0 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

+ The group "all castes-cum-religions" includes other religions such as Christians, Parsees, etc.

Table 5.5 : Percentage Distribution* by Main Family Occupation

Main family occupation	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Professional and administrative	2.3	3.7	2.7	2.9	13.0	12.1	12.5	6.3
Clerical and sales	4.8	5.6	5.1	5.2	28.8	27.9	28.3	13.3
Service	1.6	1.1	2.5	1.9	16.7	17.6	17.3	7.4
Agriculture and allied	55.1	62.4	59.8	59.7	7.9	1.9	4.1	40.0
Processing and manufacturing	35.3	25.4	22.8	25.9	27.9	38.0	34.2	28.8
Non-earners	0.9	1.8	7.1	4.4	5.7	2.5	3.6	4.2
All occupations	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	=	=	=	=	=	=	=	=
	899	1450	2643	4992	1561	1099	2660	7652
Occupation not reported:								
No. of families	1	-	-	1	-	1	1	2

* Weighted according to the sampling design.

Table 5.6 : Births Per 1,000 Population* by Main Family Occupation

Main family occupation	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Professional and administrative	- (15)	29.0 (53)	38.0 (63)	32.8 (131)	12.5 (221)	19.9 (137)	17.0 (358)	21.7 (489)
Clerical and sales	- (40)	44.1 (80)	34.9 (137)	41.6 (257)	24.9 (464)	24.3 (327)	24.5 (791)	28.8 (1048)
Service	- (13)	- (15)	36.1 (61)	31.0 (89)	14.5 (163)	28.0 (195)	23.2 (358)	24.5 (447)
Agriculture and allied	33.4 (538)	31.3 (933)	27.2 (1703)	29.5 (3174)	25.5 (105)	- (15)	23.1 (120)	29.3 (3294)
Processing and manufacturing	32.5 (286)	37.2 (348)	30.6 (548)	33.0 (1182)	35.6 (519)	23.4 (397)	27.1 (916)	30.5 (2098)
All occupations ⁺	33.7 (900)	33.2 (1450)	28.7 (2643)	30.9 (4993)	24.6 (1561)	23.9 (1100)	24.1 (2661)	28.5 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all occupations" includes other occupations not shown in the classification.

Table 5.7 : Deaths Per 1,000 Population* by Main Family Occupation

Main family occupation	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Professional and administrative	- (15)	5.6 (53)	6.7 (63)	6.0 (131)	5.3 (221)	7.8 (137)	6.8 (358)	6.6 (489)
Clerical and sales	- (40)	7.5 (80)	7.6 (137)	7.4 (257)	7.2 (464)	4.4 (327)	5.5 (791)	6.0 (1048)
Service	- (13)	- (15)	5.9 (61)	4.9 (89)	3.3 (163)	5.9 (195)	5.0 (358)	5.0 (447)
Agriculture and allied	10.8 (538)	10.8 (933)	8.6 (1703)	9.6 (3174)	7.2 (105)	- (15)	5.1 (120)	9.4 (3294)
Processing and manufacturing	13.0 (286)	10.2 (348)	9.4 (548)	10.5 (1182)	6.7 (519)	5.8 (397)	6.1 (916)	8.7 (2098)
All occupations ⁺	11.8 (900)	10.0 (1450)	8.6 (2643)	9.6 (4993)	6.4 (1561)	5.4 (1100)	5.8 (2661)	8.3 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all occupations" includes other occupations not shown in the classification.

Table 5.8 : Percentage Rate* of Natural Increase by Main Family Occupation

Main family occupation	Aurangabad Division	Nagpur Division	Western Maha- rashtra	Rural Maha- rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha- rashtra	Maha- rashtra State
Professional and administrative	- (15)	2.3 (53)	3.1 (63)	2.7 (131)	0.7 (221)	1.2 (137)	0.9 (358)	1.5 (489)
Clerical and sales	- (40)	3.7 (80)	2.7 (137)	3.4 (257)	1.8 (464)	2.0 (327)	1.9 (791)	2.3 (1048)
Service	- (13)	- (15)	3.0 (61)	2.6 (89)	1.1 (163)	2.2 (195)	1.8 (358)	2.0 (497)
Agriculture and allied	2.3 (538)	2.0 (933)	1.9 (1703)	2.0 (3174)	1.8 (105)	- (15)	1.8 (120)	2.0 (3294)
Processing and manufacturing	2.0 (286)	2.7 (348)	2.1 (548)	2.3 (1182)	2.9 (519)	1.8 (397)	2.1 (916)	2.2 (2098)
All occupations ⁺	2.2 (900)	2.3 (1450)	2.0 (2643)	2.1 (4993)	1.8 (1561)	1.9 (1100)	1.8 (2661)	2.0 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all occupations" includes other occupations not shown in the classification.

Table 5.9 : Percentage Distribution* by Annual Family Income

Annual family income	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Rs. 2050 and below	37.5	35.5	46.1	41.4	12.3	1.8	5.7	28.9
Rs. 2051 - Rs. 5050	42.5	43.7	34.7	38.8	26.9	21.7	23.6	33.4
Rs. 5051 and above	20.0	20.8	19.2	19.8	60.8	76.5	70.7	37.7
All family incomes	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	=	=	=	=	=	=	=	=
	895	1447	2634	4976	1551	1070	2621	7597
Family income not reported : No of families	5	3	9	17	10	30	40	57

* Weighted according to the sampling design.

Table 5.10 : Births Per 1,000 Population* by Annual Family Income

Annual family income	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Rs. 2050 and below	31.9 (273)	39.9 (442)	23.7 (1035)	29.1 (1750)	29.3 (187)	- (19)	27.2 (206)	28.8 (1956)
Rs. 2051 - Rs. 5050	32.3 (387)	29.2 (653)	31.8 (945)	31.1 (1985)	30.4 (497)	29.0 (208)	29.6 (705)	30.5 (2690)
Rs. 5051 and above	35.3 (235)	33.6 (352)	29.4 (654)	31.8 (1241)	21.7 (867)	23.1 (843)	22.7 (1710)	27.5 (2951)
All family incomes ⁺	33.7 (900)	33.2 (1450)	28.7 (2643)	30.9 (4993)	24.6 (1561)	23.9 (1100)	24.1 (2661)	28.5 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all family incomes" includes 57 families whose income was not reported.

Table 5.11 : Deaths Per 1,000 Population* by Annual Family Income

Annual family income	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Rs. 2050 and below	16.8 (273)	12.9 (442)	10.5 (1035)	12.1 (1750)	14.0 (187)	- (19)	13.1 (206)	12.0 (1956)
Rs. 2051 - Rs. 5050	12.2 (387)	8.7 (653)	11.5 (945)	10.7 (1985)	6.9 (497)	8.0 (208)	7.5 (705)	9.0 (2690)
Rs. 5051 and above	5.7 (235)	9.3 (352)	4.4 (654)	6.1 (1241)	4.9 (867)	4.7 (843)	4.8 (1710)	5.4 (2951)
All family incomes ⁺	11.8 (900)	10.0 (1450)	8.6 (2643)	9.6 (4993)	6.4 (1561)	5.4 (1100)	5.8 (2661)	8.3 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all family incomes" includes 57 families whose income was not reported.

Table 5.12 : Percentage Rate* of Natural Increase by Annual Family Income

Annual family income	Aurangabad Division	Nagpur Division	Western Maha-rashtra	Rural Maha-rashtra	Urban excluding Greater Bombay	Greater Bombay	Urban Maha-rashtra	Maha-rashtra State
Rs. 2050 and below	1.5 (273)	2.7 (442)	1.3 (1035)	1.7 (1750)	1.5 (187)	- (19)	1.4 (206)	1.7 (1956)
Rs. 2051 - Rs. 5050	2.0 (387)	2.1 (653)	2.0 (945)	2.0 (1985)	2.4 (497)	2.1 (208)	2.2 (705)	2.1 (2690)
Rs. 5051 and above	3.0 (235)	2.4 (352)	2.5 (654)	2.6 (1241)	1.7 (867)	1.8 (843)	1.8 (1710)	2.2 (2951)
All family incomes ⁺	2.2 (900)	2.3 (1450)	2.0 (2643)	2.1 (4993)	1.8 (1561)	1.9 (1100)	1.8 (2661)	2.0 (7654)

* Rate weighted according to the sampling design.

The number of families on which the rate is based is shown in parentheses.

- Rate not shown if based on less than fifty families.

+ The group "all family incomes" includes 57 families whose income was not reported.

Table 5.13 : Age Specific Fertility Rate for Married Women

Age group	Rural Maharashtra			Urban excluding Greater Bombay			Greater Bombay			Urban Maharashtra			Maharashtra State		
	No. of married women*	Births during last 2 years	Annual ASMFR	No. of married women*	Births during last 2 years	Annual ASMFR	No. of married women*	Births during last 2 years	Annual ASMFR	No. of married women*	Births during last 2 years	Annual ASMFR	No. of married women*	Births during last 2 years	Annual ASMFR
15 - 19	687	232	168.9	112	48	214.3	36	17	236.1	148	65	219.6	835	297	177.8
20 - 24	1331	833	312.9	316	186	294.3	160	89	278.1	476	275	288.9	1807	1108	306.6
25 - 29	1088	575	264.2	326	155	237.7	263	111	211.0	589	266	225.8	1677	841	250.7
30 - 34	883	262	148.4	265	64	120.8	227	57	125.6	492	121	123.0	1375	383	139.3
35 - 39	781	114	73.0	227	25	55.1	176	22	62.5	403	47	58.3	1184	161	68.0
40 - 44	670	32	23.9	195	3	7.7	164	3	9.1	359	6	8.4	1029	38	18.5
45 - 49	482	2	2.1	171	0	0.0	126	0	0.0	297	0	0.0	779	2	1.3
15 - 49	5922	2050		1612	481		1152	299		2764	780		8686	2830	
TMFR			4.97			4.65			4.61			4.62			4.81
GMFR (15-49)			173.1			149.2			129.8			141.1			162.9
GMFR (15-44)			188.2			166.9			145.7			158.1			179.0

ASMFR = Age specific marital fertility rate 0/00. TMFR = Total marital fertility rate per woman.

GMFR = General marital fertility rate 0/00.

* Since the births related to a 2 year period the number of married women in the age group a year ago was taken as the denominator for calculation of ASMFR.

Table 5.14 : Age Specific Fertility Rate for All Women

Age group	Rural Maharashtra			Urban excluding Greater Bombay			Greater Bombay			Urban Maharashtra			Maharashtra State		
	Female expo- sure * years	Births during last 2 years	Annual ASFR	Female expo- sure * years	Births during last 2 years	Annual ASFR	Female expo- sure * years	Births during last 2 years	Annual ASFR	Female expo- sure * years	Births during last 2 years	Annual ASFR	Female expo- sure * years	Births during last 2 years	Annual ASFR
15 - 19	3028	232	76.6	1000	48	48.0	628	17	27.1	1628	65	39.9	4656	297	63.8
20 - 24	2952	833	282.2	958	186	194.2	540	89	164.8	1498	275	183.6	4450	1108	249.0
25 - 29	2298	575	250.2	768	155	201.8	590	111	188.1	1358	266	195.9	3656	841	230.0
30 - 34	1874	262	139.8	604	64	106.0	500	57	114.0	1104	121	109.6	2978	383	128.6
35 - 39	1642	114	69.4	512	25	48.8	382	22	57.6	894	47	52.6	2536	161	63.5
40 - 44	1474	32	21.7	448	3	6.7	356	3	8.4	804	6	7.5	2278	38	16.7
45 - 49	1110	2	1.8	400	0	0.0	278	0	0.0	678	0	0.0	1788	2	1.1
15 - 49	14378	2050		4690	481		3274	299		7964	780		22342	2830	
TFR			4.21			3.03			2.80			2.95			3.76
GFR (15-49)			142.6			102.6			91.3			97.9			126.7
GFR (15-44)			154.5			112.1			99.8			107.1			137.6

ASFR = Age specific fertility rate 0/00. TFR = Total fertility rate per woman. GFR = General fertility rate 0/00.

* Since the births related to a 2 year period, the female exposure years were calculated as the sum of the current female population and the population 2 years ago in the age group.

Table 5.15 : Age Specific Fertility Rates for All Women and for Married Women for Rural Regions

Age group	Age specific fertility rate 0/00				Age specific marital fertility rate 0/00			
	Aurangabad Division	Nagpur Division	Western Mahara- shtra	Rural Mahara- shtra	Aurangabad Division	Nagpur Division	Western Mahara- shtra	Rural Mahara- shtra
15 - 19	96.1	82.6	67.9	76.6	141.9	196.8	165.1	168.9
20 - 24	293.5	287.1	272.6	282.2	306.8	323.4	306.5	312.9
25 - 29	263.4	254.3	245.2	250.2	272.7	268.2	260.8	264.2
30 - 34	163.4	137.2	135.6	139.8	170.6	144.4	145.4	148.4
35 - 39	86.3	93.2	54.0	69.4	94.4	95.4	56.6	73.0
40 - 44	21.1	15.2	25.9	21.7	23.6	16.4	28.6	23.9
45 - 49	0.0	2.9	1.6	1.8	0.0	3.3	1.9	2.1
TFR per woman	4.62	4.36	4.01	4.21	5.05	5.23	4.82	4.97
GFR (15-49)	162.7	144.7	135.05	142.6	183.5	177.3	167.2	173.1
GFR (15-44)	173.8	157.6	146.4	154.5	195.0	195.1	182.2	188.2

TFR : Total fertility rate.

GFR : General fertility rate.

Table 5.16 : Comparison of Age Specific Fertility Rates for All Women : SRS 1972, 1980 and NFMS

Age group	Rural				Urban			
	SRS 1980	NFMS 1980	SRS 1972	% Decline*	SRS 1980	NFMS 1980	SRS 1972	% Decline*
15 - 19	96.2	76.6	84.2	9.0	66.9	39.9	41.2	3.2
20 - 24	260.8	282.2	272.8	-3.5	202.1	183.6	215.7	14.9
25 - 29	215.9	250.2	269.7	7.2	182.7	195.9	225.6	13.2
30 - 34	129.7	139.8	188.8	26.0	89.7	109.6	182.8	40.0
35 - 39	62.6	69.4	127.1	45.4	43.8	52.6	97.7	46.2
40 - 44	24.9	21.7	48.3	55.1	13.3	7.5	33.3	77.5
45 - 49	15.1	1.8	22.1	91.9	7.6	0.0	3.4	100.0
GFR (15-49)	126.3	142.6	156.4	8.8	101.5	97.9	127.6	23.3
TFR per women	4.0	4.2	5.1	16.8	3.0	2.9	4.0	26.2

TFR : Total fertility rate.

GFR : General fertility rate.

* Percentage decline in NFMS compared to SRS 1972.

Table 5.17 : Urban and Rural ASFR and ASMFR and Urban as Percentage of Rural

Age group	ASFR			ASMFR		
	Rural	Urban	Urban as % of rural ASFR	Rural	Urban	Urban as % of rural ASMFR
15 - 19	76.6	39.9	52.1	168.9	219.6	130.0
20 - 24	282.2	183.6	65.1	312.9	288.9	92.3
25 - 29	250.2	195.9	78.3	264.2	225.8	85.5
30 - 34	139.8	109.6	78.4	148.4	123.0	82.9
35 - 39	69.4	52.6	75.9	73.0	58.3	79.9
40 - 44	21.7	7.5	34.6	23.9	8.4	35.1
45 - 49	1.8	0.0	0.0	2.1	0.0	0.0
GFR/GMFR						
(15-49)	142.6	97.9	68.7	173.1	141.1	81.5
(15-44)	154.5	107.1	69.3	188.2	158.1	84.0

ASFR : Age specific fertility rate 0/00.

ASMFR : Age specific marital fertility rate 0/00.

Table 5.18 : ASMFR, ASMFR for Non-Contracepting Married Women and Per Cent Family Planning Impact*

Age group	ASMFR for married women			ASMFR for non-contracepting married women			% Family planning impact*	
	Rural	Urban	Urban as % of rural ASMFR	Rural	Urban	Urban as % of rural ASMFR	Rural	Urban
15 - 19	168.9	219.6	130.0	169.8	221.1	130.2	0.5	0.7
20 - 24	312.9	288.9	92.3	327.4	321.3	98.1	4.4	10.1
25 - 29	264.2	225.8	85.5	346.0	334.2	96.6	23.6	32.4
30 - 34	148.4	123.0	82.9	280.5	258.5	92.2	47.1	52.4
35 - 39	73.0	58.3	79.9	182.1	139.9	76.8	59.9	58.3
40 - 44	23.9	8.4	35.1	58.0	17.9	30.9	58.8	53.1
45 - 49	2.1	0.0	0.0	3.9	0.0	0.0	46.2	-
GMFR								
(15-49)	173.1	141.1	81.5	250.0	227.0	90.8	30.8 ⁺	37.8 ⁺
(15-44)	188.2	158.1	84.0	266.8	252.8	94.8	29.5 ⁺	37.5 ⁺

ASMFR : Age specific marital fertility rate 0/00.

*Impact = $100 - 100 \cdot (\text{ASMFR for married women}) / (\text{ASMFR for non-contracepting married women})$.

- Indeterminate.

+ Average of age specific impact weighted by the number of married women in the age group.

Table 5.19 : Age Specific Mortality Rates for Males

Age Group	Rural Maharashtra			Urban Maharashtra			Maharashtra State		
	Male exposure years *	Deaths during last 2 years	Annual ASMR	Male exposure years *	Deaths during last 2 years	Annual ASMR	Male exposure years *	Deaths during last 2 years	Annual ASMR
0 - 4	3102	106	34.2	1394	19	13.6	4496	125	27.8
5 - 9	4083	12	2.9	2037	4	2.0	6120	16	2.6
10 - 14	4285	5	1.2	2053	2	1.0	6338	7	1.1
15 - 19	3379	5	1.5	1739	2	1.2	5118	7	1.4
20 - 24	2932	4	1.4	1647	3	1.8	4579	7	1.5
25 - 29	2662	7	2.6	1414	1	0.7	4076	8	2.0
30 - 34	2015	3	1.5	1178	5	4.2	3193	8	2.5
35 - 39	1705	4	2.3	1014	3	3.0	2719	7	2.6
40 - 44	1496	5	3.3	817	9	11.0	2313	14	6.1
45 - 49	1359	6	4.4	837	8	9.6	2196	14	6.4
50 - 54	1110	10	9.0	621	4	6.4	1731	14	8.1
55 - 59	1136	11	9.7	535	7	13.1	1671	18	10.8
60 - 69	1968	36	18.3	721	25	34.7	2689	61	22.7
70 +	1047	69	65.9	399	39	97.7	1446	108	74.7
All ages	32279	283	8.8	16406	131	8.0	48685	414	8.5

ASMR = Age specific mortality rate O/00.

* Sum of current male population and population 2 years ago.

Table 5.20 : Age Specific Mortality Rates for Females

Age Group	Rural Maharashtra			Urban Maharashtra			Maharashtra State		
	Female exposure* years	Deaths during last 2 years	Annual ASMR	Female exposure* years	Deaths during last 2 years	Annual ASMR	Female exposure* years	Deaths during last 2 years	Annual ASMR
0 - 4	2952	101	34.2	1390	27	19.4	4342	128	29.5
5 - 9	4016	5	1.2	1865	1	0.5	5881	6	1.0
10 - 14	4177	9	2.2	2010	2	1.0	6187	11	1.8
15 - 19	3028	17	5.6	1629	2	1.2	4657	19	4.1
20 - 24	2953	7	2.4	1499	2	1.3	4452	9	2.0
25 - 29	2299	4	1.7	1358	1	0.7	3657	5	1.4
30 - 34	1874	5	2.7	1104	2	1.8	2978	7	2.4
35 - 39	1642	1	0.6	894	1	1.1	2536	2	0.8
40 - 44	1475	3	2.0	805	2	2.5	2280	5	2.2
45 - 49	1110	5	4.5	679	2	2.9	1789	7	3.9
50 - 54	1576	7	4.4	674	6	8.9	2250	13	5.8
55 - 59	1296	6	4.6	436	3	6.9	1732	9	5.2
60 - 69	1633	34	20.8	654	10	15.3	2287	44	19.2
70 +	853	50	58.6	364	24	65.9	1217	74	60.8
All ages	30884	254	8.2	15361	85	5.5	46245	339	7.3

ASMR = Age specific mortality rate 0/00.

* Sum of current female population and population 2 years ago.

Table 5.21 : Unweighted Crude Death Rate and Death Rate Standardized to Maharashtra Age Distribution by Sex

	Males		Females	
	Crude death rate 0/00	Standardized death rate 0/00	Crude death rate 0/00	Standardized death rate 0/00
Aurangabad Division	11.3	10.8	9.5	9.0
Nagpur Division	9.7	10.3	9.0	9.8
Western Maharashtra	7.4	6.8	7.4	6.9
Rural Maharashtra	8.8	8.4	8.2	8.0
Urban excluding Greater Bombay	8.5	8.4	7.0	7.2
Greater Bombay	7.3	9.5	3.5	4.2
Urban Maharashtra	8.0	8.9	5.5	5.9
Maharashtra State	8.5	8.5	7.3	7.3

CHAPTER 6

FAMILY FORMATION AND CUMULATIVE FERTILITY

Introduction

In this chapter, the results of NFMS Maharashtra, 1980 on family formation and cumulative fertility are presented. The process of family formation is spread over the reproductive ages of the woman, 15 to 50 years. More specifically, it starts with marriage or menarchy of the woman, whichever is later and ends when the family size is completed or at menopause, whichever is earlier. The pace of child-bearing is quicker initially and slows down later. Cumulative fertility is a measure of a woman's childbearing experience, up to the time of her interview. Hence it varies widely by the woman's current age and the duration since first marriage. The latter two variables are related to each other by the age at first marriage.

Ideally a woman's completed family size is the best measure of her fertility. However, completed family size can be known only after the woman reaches menopause. Hence it will not throw any light on recent changes in fertility. Moreover, it will not reveal the process of family formation over the life cycle of the woman. For these reasons, it is necessary to study the cumulative fertility of women at different stages of family formation.

The principal measure of cumulative fertility used in this chapter is the number of children ever borne by the woman. The number of children ever borne by a woman is also the number of live births to her. A live birth is defined as a foetus which shows any sign of life after expulsion from the mother's womb. In this report, parity is used as synonymous with the number of children ever borne by a woman.

The mean number of children ever borne per currently married woman is used as a measure of the cumulative fertility of a group. Since the group might consist of a cross-section of women in different stages of family formation, the mean would be affected by the distribution of the women by their ages or marital durations. For instance, the age distribution of currently married women in rural areas is generally younger than in urban areas. For this reason, the rural mean parity would be less than the mean parity obtained by using, hypothetically, the urban age distribution on the rural parity. This procedure is called standardization. An alternative method would be to compare the rural with the urban mean parity in each age group. The same difficulty in comparing mean parity arises with regard to the distribution of the women by their marital duration, since this distribution may be different, for instance, between illiterate women and women educated up to or above the eighth standard. It is, therefore, necessary to bear in mind the compositional differences with regard to age and marital duration in comparing the mean parity between any two groups of women.

The results are generally presented for the three rural regions and the two urban zones. As stated before, current age, age at first marriage and duration in years since the first marriage are important demographic variables that determine the stage of family formation and,

hence, account for most of the variation in cumulative fertility of currently married women. It is necessary to control for these variables before examining differentials for family formation and cumulative fertility by other characteristics.

Illiteracy and educational attainment of the currently married woman and that of her husband are important characteristics that determine cumulative fertility and the pattern of family formation. The community of the woman, based on her caste and religion, is another important variable in the study of cumulative fertility and family formation since each community has distinct marriage customs, kinship patterns and fertility values and generally practises endogamy within its sub-groups. Differentials in cumulative fertility by both these characteristics are examined in this chapter.

In addition to parity, several other measures of cumulative fertility are presented. These measures are based on the numbers of conceptions and living children, numbers of sons and daughters ever born and numbers of living sons and daughters.

Values regarding family size are reflected to some extent in the ideals about the number of children, sons and daughters, about the age at marriage for brides and grooms, and educational aspirations for sons and daughters. Hence these characteristics are also presented in this chapter.

The data analysed in this chapter were obtained in the supplementary questionnaire completed for all currently married women aged 15 to 50 in the sample families. There were 8,874 such women. Some items of information were not available for a few women as indicated in the tables.

Differentials by Background Variables

In this section, the distributions of currently married women aged 15 to 50, by selected background variables are presented. Current age, age at first marriage and duration since first marriage are proximate demographic variables that determine the stage of family formation and the level of cumulative fertility. Apart from this, the mean parity of a group of women depends on their composition by age or marital duration. These variables have, therefore, to be controlled for in comparing the cumulative fertilities of different groups of women. Finally, in a period of declining fertility, different age cohorts of women would have different patterns of family formation and levels of completed family size. For these reasons it is necessary to analyse the fertility of currently married women aged 15 to 50 by their current age and duration since first marriage.

Age at first marriage links the current age with duration since first marriage. It is also a sensitive indicator of the status and roles of women and the extent of social change. The literacy and educational attainment of the woman and that of her husband are also indicators of social status and modernization. Hence the distribution of currently married women by these characteristics are also presented in this section for the study domains.

The age composition of currently married women, 15 to 50 years old, is given for the study domains in Table 6.1. The mean age of currently married women was 29.9 years for Aurangabad Division, 31.3 years for both Nagpur Division and Western Maharashtra, 32.4 years for other urban areas and 33.8 years for Greater Bombay. The percentages of currently married women in ages 15 to 19 in these domains were 13.9, 11.3, 10.6, 6.8 and 3.1 respectively. The rural to urban gradient persisted in the percentages currently married in the next age group also. These figures confirm the gradient in the age at marriage by domains that was previously commented on.

Duration since first marriage is a measure of the duration of exposure to reproduction within marriage. In this survey, it was defined as the difference between the current age and the age at first marriage, if the first marriage occurred after menarchy. Otherwise it was defined to be the difference between the current age and the age at menarchy. It is seen from Table 6.2 that the percentage in the marital duration group, 0 - 4 years, was highest for rural areas (27.6), lower for other urban centres (23.5) and least for Greater Bombay (18.1). These differentials broadly correspond to the level of socio-economic development of each domain as outlined in Chapter 4.

The distribution by the age at first marriage is given in Table 6.3. This distribution confirms the gradient in the age at marriage among the rural regions and the urban zones. In fact, in Aurangabad Division, 25.4 per cent of the women were married on or before completing age 12 compared to 14.8 per cent for rural Maharashtra. The average age at first marriage for women was 15.0 years for Aurangabad Division, 16.0 years for Nagpur Division, 16.3 years for Western Maharashtra, 17.3 years for other urban areas and 18.9 years for Greater Bombay.

The average age at marriage by age groups, given in Table 6.4, reveals a steady increase in the age at marriage over the cohorts in recent times. In rural areas, for the age cohort 20 - 24, the mean age at marriage was 16.7 and is unlikely to increase since few first marriages would take place beyond age 24. For the following age cohorts the mean ages were 16.6, 15.9, 15.7, 15.2 and 15.0 respectively. Thus in the last 25 years, the rural mean age at marriage has increased by 1.7 years. Since most marriages in urban areas take place before reaching age 30, the trend in age cohorts 25-29 to 45-49 is considered. In other urban areas, the mean age at marriage steadily declined from 18.1 years for age cohort 25-29 to 16.4 years for age cohort 45-49, a decline of 1.7 years. Similarly, the difference for Greater Bombay was about 1.4 years, from 19.4 years for age cohort 25-29 to 18.0 years for age cohort 40-44, ignoring the mean for the age cohort 45-49 which was subject to large sampling and non-sampling errors.

The distributions of the currently married women aged 15 to 50 and their husbands by their educational attainment are given in Tables 6.5 and 6.6. Women's educational attainment was far below that of their husbands'. There was a sharp rural-urban difference in the educational attainment of the women as well as their husbands. Among the rural regions, Aurangabad Division had the highest percentage illiterate and the lowest percentage in each of the other educational levels both for

the women and their husbands.

Measures of Cumulative Fertility

Several measures of cumulative fertility are presented in this section to facilitate the discussion of the differentials in cumulative fertility by domains and other characteristics in the following section. The mean number of live births by sex and by whether alive or dead, the mean number of conceptions by live births, still births and miscarriages, and the number of living children are the principal measures of cumulative fertility used in this report.

The mean numbers of live births per woman by domains were 2.91 for Aurangabad Division, 3.29 for Nagpur Division, 2.97 for Western Maharashtra, 3.08 for other urban and 3.03 for Greater Bombay (Table 6.7). The age composition of the currently married women was not the same in all the domains. The average ages, in years, of such women were 29.9, 31.3, 31.3, 32.4 and 33.8 respectively for the domains mentioned above. Hence the mean number of live births cannot be compared directly over the domains. Either the comparison has to be made for each age group separately or the mean has to be standardized for the age distribution of these women. These comparisons are, therefore, made in the next section.

The sex-ratio at birth (females per 1000 males) and the sex-ratio of living children, given in the last two columns of Table 6.7, are important indicators of the quality of reporting of live births by sex. Biologically the sex-ratio at birth is expected to be around 960 and, under present Indian conditions, the sex-ratio of living children is expected to be somewhat lower due to the relatively higher infant and child mortality of females compared to males. The exceptionally low sex-ratio at birth for Aurangabad Division (901) and urban areas excluding Greater Bombay (915) and the equally low sex-ratio for living children in these two domains (909 and 908 respectively) indicate that there might have been a greater under-count of female than male live births in Aurangabad Division and other urban areas.

In Maharashtra State, of 1.57 male live births per currently married woman, only 0.09 sons were living away from their mothers whereas among the 1.49 female live births, 0.23 daughters were living away from their mothers. This is mainly explained by marriage migration of the bride to her husband's home.

The figures on the average number of conceptions are presented in Table 6.8. It is suspected that the percentage of under-reporting due to recall lapse and other reasons would be larger in reporting still-births than live births and much larger in reporting miscarriages since early foetal loss might not be recognized or might be easily forgotten. The ratio of still-births per 1000 live and still-births was 12.6 for Maharashtra State and varied in the range, from 16.8 for Aurangabad Division to 9.2 for Greater Bombay. Recall lapse of still-births and misclassification between live and still-births would contribute to errors in this ratio. The ratio of miscarriages per 1,000 conceptions in Maharashtra State was 33.1, ranging from 18.8 for Aurangabad Division to 57.1 for other urban areas. The ratio is also

subject to recall and other response errors. Perhaps both still-birth and miscarriage rates were grossly under-estimated in the survey for the several reasons mentioned earlier.

The distribution of currently married women in each domain by the number of conceptions is shown in Table 6.9, by the number of children ever borne in Table 6.10 and by the number of living children in Table 6.11. The means for these measures of fertility are also given in these tables. Currently married women in Maharashtra State had, according to NFMS 1980, on the average, 3.21 conceptions, 3.07 live births and 2.60 living children. These averages were the result of both the pattern of cumulative fertility and the age composition of currently married women. Since their age composition varied among the domains, their cumulative fertility, by domains, can not be compared simply in terms of the mean numbers of conceptions, live births or living children given in Tables 6.9 to 6.11. Appropriate comparisons, controlling for the age distribution, are made in the next section.

Family Formation and Cumulative Fertility

The average number of children ever borne per currently married woman by age groups in Table 6.12 shows the pace of family formation by age cohorts. The mean parity per currently married woman aged 45 to 50 was 5.34 live births in rural Maharashtra, 5.14 live births in other urban areas and 3.92 live births in Greater Bombay. For the cohort of women aged 40 to 44, the corresponding figures were 5.35, 4.63 and 4.49 respectively. The figure of 4.49 for Greater Bombay may be somewhat large - due to sampling fluctuation since it does not fit in with the family building process for women in this city. For the age cohort 35-39, the mean parities for these three domains were 4.58, 4.33 and 3.68 respectively. The same rural to urban gradient was observed in the mean parities for women aged 30 to 34 and 25 to 29. Thus, for all cohorts of currently married women aged 25 and over, the cumulative fertility was highest in rural Maharashtra, intermediate in other urban areas and lowest in Greater Bombay. However, in age groups 15-19 and 20-24, the pace of family building was more rapid in urban than in rural areas. It should be noted that the number of currently married women was considerably augmented up to age group 25-29 due to new first marriages, but not in ages 30 and above. So, only women in age groups 30-34 and above could be more properly regarded as forming a cohort.

Within rural areas, by cohorts, currently married women aged 30 to 34 had a mean parity of 3.62, women aged 35 to 39 a mean parity of 4.58, women aged 40 to 44 a mean parity of 5.35 and those aged 45 and above a mean parity of 5.34. The increasing mean parity, by age group, was due both to increasing family size with advancing age and to a larger completed family size for older cohorts. Progressive memory lapse had, perhaps, resulted in greater under-enumeration of live births in the oldest cohort in ages 45 to 50 compared to younger cohorts. Similarly, in other urban areas, the mean parities, by cohorts, were 3.40 for women aged 30 to 34, 4.33 for women aged 35 to 39, 4.63 for women aged 40 to 44 and 5.14 for women aged 45 to 50. The increasing trend is again due to the family building process and a larger completed family size for older cohorts. The mean parities for Greater Bombay also showed an upward gradient, with 3.26 for women aged 30 to 34, 3.68 for those aged

35 to 39, 4.49 for those aged 40 to 44 and 3.92 for those aged 45 to 50. That the mean for ages 40 to 44 did not fit the trend could be ascribed to errors arising from progressive memory lapse and a small sample.

The mean parity of currently married women in ages 15 to 50 cannot be directly compared over the domains since their age composition varied. To make valid comparisons, the mean was standardized to the age distribution of currently married women in Maharashtra State and the results are given in the last column of Table 6.12. The standardized mean parities were 3.18 live births in rural Maharashtra, 3.02 in other urban areas and 2.68 in Greater Bombay. Thus the mean cumulative fertility for rural women was slightly above that for women in other urban areas and substantially above that for women in Greater Bombay. This gradient is not evident from the unstandardized means.

As is the practice in all demographic surveys in India, in consonance with the cultural sensibilities of the population, the supplementary questionnaire on fertility and family planning was filled in only for currently married women aged 15 to 50. It has been indicated in the preceding paragraphs that the currently married women in younger age groups do not properly form a cohort since their numbers are substantially and continuously augmented up to age 30. But the mean parity for all women by age groups does not suffer from this limitation and hence it can be given a cohort interpretation from the youngest age group. However, such a measure mixes up married women engaged in family building with women not currently married who have either not started on or have interrupted the process of family building. For older cohorts this might not prove to be a serious hindrance since most of these women were found to be 'ever married' in this survey.

A method was developed for converting the mean parity of currently married to that of ever married women. It was based on the cumulative proportion, by age group, of time spent in currently married status by the ever married women by using NFMS age distributions of all, currently married and ever married women. The method is described in Appendix B to this chapter. The method was tested on the results of *Fertility Differentials in India, 1972* published by the Office of the Registrar General, Government of India (1976). It was found to provide satisfactory estimates of mean parity for ever married and all women from the mean parity for currently married women.

Estimates obtained by applying this method are shown in Table 6.13. The mean parity of ever married women was slightly below that of currently married women and the difference between the two increased with age group since the proportion of time spent in currently married state by the ever married women was near unity in the youngest age group and declined steadily with age. The mean parity for all women was much lower than for ever married women in the youngest age group since the proportion ever married was also low in this age group. The mean parity for all women came closer to the mean parity for ever married women for age groups 20 and above in rural areas and for age groups 25 and above in urban areas.

Since over 95 per cent of women were ever married in age groups 30 and above, the mean parity for all women may be taken as a measure of

their cumulative fertility in these age groups. For rural Maharashtra, this measure was 3.49 in ages 30 to 34, 4.41 in ages 35 to 39, 5.14 in ages 40 to 44 and 5.13 in ages 45 to 49. The steady increase with age may be attributed both to the progress of family building and to the increasing trend in the completed family size for older cohorts. The slight decline in the oldest age group could be the result of relatively greater lapse in the recall of live births by these women.

Compared to rural Maharashtra, the pace of family building was slower and the completed family size for ages 45 to 49 smaller in other urban areas. The mean parity of 4.29 for women aged 40 to 44 in Greater Bombay is out of line with the cumulative fertility for the two adjacent age groups and also with that for other urban women aged 40 to 44. This large mean parity could be due to the large sampling error arising from the small sample size for this cell. With this exception, the pace of family building was found to be slower and the completed family size smaller in Greater Bombay compared to other urban areas.

The cohort of women aged 35 to 39 had nearly completed their family size since their mean parity would increase by only 2.4 per cent in the next ten years according to the current schedule of ASFR presented in Table 5.14. Hence the recent decline in completed family size can be roughly assessed by comparing the mean parity for all women for the cohort aged 45 to 49 with that for the cohort aged 35 to 39. In rural areas, the mean parity for the cohort of women aged 45 to 49 was 5.13 live births and declined by 14.0 per cent to 4.41 for the cohort aged 35 to 39. In other urban areas it declined from 4.71 by 13.4 per cent to 4.08 for these two cohorts and in Greater Bombay it declined from 3.77 by 8.2 per cent to 3.46 for the two cohorts. Thus a significant decline in the completed family size of the cohort of women aged 35 to 39 may be expected in the next ten years in both rural and urban areas. Since the completed family size for Greater Bombay was already lower than that for the other two domains, the anticipated percentage decline in it is also less.

The age-standardized mean numbers of living children for the three domains are given in the last column of Table 6.14. This is another measure of cumulative fertility. However, it gives the effect of fertility netted for the effect of child mortality. For this reason, its variation over the domains may be expected to be less. This age-standardized mean was 2.64 for rural Maharashtra, 2.73 for other urban areas and 2.44 for Greater Bombay. The lower cumulative fertility in other urban areas does not seem to offset the much lower mortality of children with the result that the mean number of living children is somewhat greater in other urban than in rural areas. A similar pattern of rural to urban differentials is found in the standardized mean numbers of living sons (Table 6.15) and living daughters (Table 6.16). While the standardized mean was about the same for rural and other urban areas, it was distinctly lower for Greater Bombay. Similarly the mean number of living children, as well as of sons and daughters, for currently married women aged 45 to 50 in rural areas was about equal to that in other urban areas but larger than that for Greater Bombay.

The mean cumulative fertility has been compared over the domains by duration since first marriage in Table 6.17. Marital duration was

defined before as the number of years lapsed, up to the date of survey, since their first marriage or menarchy, whichever was later, for currently married women. Standardization by duration removes some of the effect of the age at marriage. Therefore, the duration standardized mean parity shows greater variation by rural and urban areas and Greater Bombay than the unstandardized mean parity. Comparing the mean parity for marital duration 20 to 24 years, rural women had 5.11 live births, women of other urban areas 4.54 and women of Greater Bombay 4.43. For marital duration 25 years and above, the corresponding mean parities were 5.88, 5.51 and 4.54. Thus for the oldest marital duration cohort, the mean parity for Greater Bombay was substantially below that for the other two domains, while for the previous marital duration cohort of 20 to 24 years, both the urban domains had mean parities well below that for the rural areas. Table 6.18 provides marital duration specific mean numbers of living children. Here the rural-urban differentials in the means for the two oldest cohorts are reduced because of the counteracting differentials in the mortality levels of children. For the same reason, the duration standardized mean number of living children in rural areas was below that in other urban areas.

Cumulative Fertility Differentials by Concomitant Characteristics

In this section, the cumulative fertility by community, by educational attainment of the currently married woman and her husband and by her age at first marriage are compared. The cumulative fertility is measured by the age standardized and the duration standardized mean parity. These measures are presented separately for rural Maharashtra, urban areas other than Greater Bombay and Greater Bombay.

The mean parity by community is presented in Table 6.19. For the State as a whole, the mean parity was lowest for advanced caste Hindus, highest for Scheduled Castes and Muslims, and intermediate for other castes. This was also generally true of the age standardized mean parities in rural Maharashtra, other urban areas and Greater Bombay. The range of variation among the communities in the age standardized mean parity within rural areas was less than within the two urban zones. The standardized rural mean parity for advanced caste Hindus and backward Hindus, was significantly higher than their respective mean parities in the two urban zones. But for the other communities, including the Muslims, there was not much difference between their rural and urban mean parities. Thus the effect of urbanization on fertility was felt mostly by advanced and backward caste Hindus. In Table 6.20, figures of mean parity, standardized to the Maharashtra distribution of marital duration, are presented. The ranking of communities by cumulative fertility discussed for Table 6.19 generally remained good.

The cumulative fertility of currently married women by their educational attainment is shown in Table 6.21 for four domains. In the State, illiterate and literate women without formal education had a mean parity of 3.43 live births, women with formal education below or up to VII standard had a mean parity of 2.74, those with education VIII to XII standard had a mean parity of 2.18 and those with education above XII standard had a mean parity of 1.73. The mean parity, standardized to the Maharashtra State age distribution of these women, may be compared over the domains. While there was a gradient in this mean by educational

attainment in all three domains, the urban differentials were larger than the rural differentials. However, the mean parity of women with the same educational attainment did not vary much over the three domains. It may be inferred, therefore, that the effect of education was, perhaps, stronger than the effect of residence. This finding would bear further analytical investigation.

In Table 6.22, the cumulative fertility of currently married women is measured in terms of the mean parity standardized for marital duration. The pattern of the duration standardized mean parity by the woman's educational attainment and place of residence (rural, other urban or Greater Bombay) was broadly similar to that for the age standardized mean parity except that the range of variation in the standardized means was narrower in Table 6.22. This is because, in standardizing for the marital duration, the effect of age at marriage is removed to some extent. Also shorter marital durations would predominate the distribution for urban women compared to the standard distribution. The most significant rural-urban difference in the duration standardized mean parity occurred among women with an educational attainment of or above VIII standard.

The mean parity, standardized for the Maharashtra State age distribution of currently married women, is given by husband's educational level in Table 6.23. A similar pattern of relationship as that for the woman's own educational attainment (Table 6.21) is found in this table. The gradient in the mean by educational level within each domain seems stronger than the rural-urban gradient within each educational level. Thus education appears to be a more important factor than residence in determining the mean cumulative fertility. However, the range of variation in the age standardized mean by husband's educational level seems to be less than that by the woman's own educational attainment. Hence the currently married woman's educational attainment appears to have a larger effect on her cumulative fertility than the educational level of her husband.

Age at first marriage is a proximate variable that affects the fertility of currently married women. In rural areas, 31.9 per cent of these women were married before reaching age 15, while for other urban areas and Greater Bombay this percentage was only 24.4 and 11.7 (Table 6.24). The corresponding percentages for women who were first married in ages 15 to 18 were 54.3, 46.5 and 44.1 respectively. The lower age at marriage in rural areas for all currently married women is evident from these figures. In Maharashtra State, the mean parity for women who were married before age 15 was 4.25, those first married in ages 15 to 18 was 3.10, those first married in ages 19 to 22 was 2.34 and those first married in ages 23 and above was 1.75. The differentials in these means cannot be attributed solely to age at marriage since each group of women could be at different stages of family formation and their distribution by duration of marriage could be different. In Table 6.25, the mean parity is given by age at first marriage by duration of marriage. Comparing only those women with a marital duration of 20 years or more, in rural Maharashtra, the mean parity was 5.79 for those married before age 15, 5.21 for those married in ages 15 to 18 and 4.73 for those married in ages 19 and above (Table 6.25). The corresponding mean parities for other urban areas were 5.70, 4.95 and 3.60 and for

Greater Bombay they were 4.87, 4.81 and 3.70. Thus there was a difference by the age at marriage, in the cumulative fertility of women with the longest marital duration within each domain. The range of variation in the mean parity by age at marriage was smaller in rural compared to urban areas. Higher age at marriage and urban residence jointly appeared to reduce the mean parity by more than the sum of the separate effects of the two factors. This type of interactive effect needs further analytical investigation.

Age at the delivery of the first child is another indicator related to the age at marriage. However, for a girl married before her menarchy, the duration between her marriage and first delivery could be longer than for a girl married after menarchy. This would partly explain the higher percentage of women who delivered their first baby before reaching 16 years of age in other urban areas compared to rural areas (Table 6.26). In rural area 16.2 per cent of the women, in other urban areas 20.5 per cent of the women and in Greater Bombay 32.6 per cent of the women delivered their first baby only after reaching 22 years of age. This indicates the earlier start of family building in rural compared to urban areas.

Mean parity by community and by age at marriage is given in Table 6.27. The mean parity of women married for the first time before age 15 was larger than for women married between ages 15 and 18 which in turn was larger than the mean parity of women married above age 18. These differentials were also true for each community. There are no consistent differentials in the mean parity by community within each age at first marriage group. This lack of pattern might be due to the small sample size on which the mean parity was based. Standardizing for the age at first marriage, the mean parity was lowest for advanced and intermediate Hindus and highest for Scheduled Castes and Tribes and Muslims. The differentials in mean cumulative fertility by communities persist even after controlling for the age at first marriage. So these differentials arise from other social and cultural factors and not merely from the age at marriage.

Ideals About Age at Marriage, Family Size and Educational Aspirations for Children

In this section, the differences among the domains, in the ideals of currently married women on number of children, sons and daughters, age at marriage for brides and grooms and women's aspirations for the education of their sons and daughters are examined. Values regarding these variables have an effect on fertility and family size.

Whereas in rural areas only 8.5 per cent of the currently married women stated that their ideal family size was two, in other urban areas 28.0 per cent and in Greater Bombay 37.9 per cent considered the two child family as their ideal (Table 6.28). Among the rural regions, the two child family was an ideal for 5.2 per cent of the women in Ayrangabad Division, 4.9 per cent of the women in Nagpur Division and 11.5 per cent of the women in Western Maharashtra. The three child and four child family were the ideals for 63.9 and 21.0 per cent of the rural women, for 46.7 and 22.4 per cent of other urban women, and for

44.5 and 16.4 per cent of women in Greater Bombay. Thus there was greater preference for the two child family in urban but not in the rural areas.

The mean ideal number of children was 3.3 in rural areas against 3.0 in other urban areas and 2.8 in Greater Bombay (Table 6.29). The mean ideal number of sons for the three domains were 2.0, 1.7 and 1.6 respectively and, for daughters, 1.3, 1.3 and 1.2 respectively. The preference for sons in both rural and urban areas is clear from these figures although the rural preference for sons was sharper.

From Table 6.30 it is seen that 29.4 per cent of currently married women in rural areas and 34.4 per cent in urban areas said that they had more children than they wanted. A further 26.3 per cent of rural women and 27.4 per cent of urban women did not want an additional child. Thus 55.7 per cent of the rural women and 61.8 per cent of the urban women had already as many or more children than they wanted. This percentage shows the contradiction between the actual number of children that a currently married woman had and the ideal number of children she would like to have. However, the percentage cannot be readily interpreted as the unmet need for family planning since the decision to have an additional child rests with the family, contingent on prevailing social norms and values.

The ideal mean age at marriage for brides was 16.4 years in rural areas, 18.0 years in other urban areas and 19.8 years in Greater Bombay whereas that for grooms was 20.8 years, 23.3 years and 24.9 years respectively (Table 6.29). Although these ideals were higher than the actual mean age at marriage for women (Table 6.4), yet the rural-urban differentials were similar for both the ideal and the actual age at marriage. Among the rural regions, Aurangabad Division had the lowest mean ideal age at marriage for both brides and grooms.

The mean ideal age at marriage for brides by community is given in Table 6.31. In rural Maharashtra, this mean was highest for other religions and lowest for backward Hindus and Scheduled Castes and Tribes. There was not much difference between the means for other communities. In other urban areas, advanced Hindus had the highest and Scheduled Castes the lowest mean ideal age at marriage. In Greater Bombay the highest mean was for other religions while all the other communities had nearly the same mean ideal age at marriage. For each community, the ideal age at marriage was lowest for rural areas and highest for Greater Bombay. On the whole, the ideal age at first marriage for brides was above the actual age at first marriage (Table 6.4) and there was less variation, by community, in the ideal than in the actual age at marriage.

The educational aspirations for daughters is indicative of the changing roles and status of girls as perceived by currently married women. In rural areas 23.2 per cent of women desired to educate their daughters only up to IV standard compared to 4.4 per cent of urban women with such low educational aspirations for their daughters (Table 6.32). Complementarily, only 7.9 per cent of the rural women had the aspiration to educate their daughters above S.S.C. against 30.5 per cent of women in urban areas with a similar aspiration. Among the rural

regions, Aurangabad Division was more backward, in this respect, than the other two regions. The percentage of women desiring to educate their daughters only up to IV standard was 39.6 for Aurangabad Division, 19.6 for Nagpur Division and 19.5 for Western Maharashtra.

Educational aspirations for sons, reported by currently married women, was naturally higher than for daughters and the variation by domains was less for sons than for daughters (Table 6.33). The percentage of women desiring to give an education above S.S.C. to their sons was 32.1 for rural areas, 40.3 for other urban areas and 54.8 for Greater Bombay.

Table 6.1 : Percentage Distribution of Currently Married Women 15 to 50 Years by Age Group

	Age group in years							All ages	Age not given	Total No. of women	Average age
	15-19	20-24	25-29	30-34	35-39	40-44	45-50				
Aurangabad Division	13.9	23.5	17.5	15.4	12.8	9.3	7.6	100.0= 1124	3	1127	29.9
Nagpur Division	11.3	21.7	17.7	13.6	12.1	12.6	11.0	100.0= 1686	-	1686	31.3
Western Maharashtra	10.6	21.4	18.1	14.7	13.5	10.7	11.0	100.0= 3250	4	3254	31.3
Rural Maharashtra	11.4	21.9	17.9	14.5	13.0	10.9	10.4	100.0= 6060	7	6067	31.0
Urban excluding Greater Bombay	6.8	18.8	20.2	15.8	13.9	11.9	12.6	100.0= 1631	4	1635	32.4
Greater Bombay	3.1	12.8	22.1	19.3	15.2	14.0	13.5	100.0= 1172	-	1172	33.8
Urban Maharashtra	5.2	16.3	21.0	17.3	14.4	12.8	13.0	100.0= 2803	4	2807	33.0
Maharashtra State	9.4	20.2	18.9	15.4	13.4	11.5	11.2	100.0= 8863	11	8874	31.6

Table 6.2 : Percentage Distribution of Currently Married Women by Years Since First Marriage

	Years since first marriage						Total number of women
	0-4	5-9	10-14	15-19	20-24	25 and more	
Aurangabad Division	28.5	17.9	16.6	11.9	12.0	13.1	100.0= 1127
Nagpur Division	28.6	14.7	16.5	10.2	13.0	17.0	100.0= 1686
Western Maharashtra	27.0	17.7	15.3	12.9	12.1	15.0	100.0= 3254
Rural Maharashtra	27.6	16.9	15.9	12.0	12.4	15.2	100.0= 6067
Urban excluding Greater Bombay	23.5	18.8	16.0	12.3	12.5	16.9	100.0= 1635
Greater Bombay	18.1	18.8	19.6	13.7	13.8	16.0	100.0= 1172
Urban Maharashtra	21.2	18.8	17.5	12.9	13.0	16.6	100.0= 2807
Maharashtra State	25.6	17.5	16.4	12.3	12.6	15.6	100.0= 8874

Table 6.3 : Percentage Distribution of Currently Married Women by Age at First Marriage

	Age at first marriage in years										Age at first marriage not given	Total No. of women	Average age at first marriage	
	12 and below	13 and 14	15 and 16	17 and 18	19 and 20	21 and 22	23 and 24	25 to 29	30 and above	All ages				
Aurangabad Division	25.4	20.8	30.1	16.3	5.5	0.9	0.7	0.2	0.1	100.0=	1015	112	1127	15.0
Nagpur Division	16.5	15.1	33.0	21.6	9.9	2.6	0.6	0.6	0.1	100.0=	1609	77	1686	16.0
Western Maharashtra	10.3	17.0	35.2	21.6	12.0	2.9	0.7	0.3	0.0	100.0=	3000	254	3254	16.3
Rural Maharashtra	14.8	17.1	33.6	20.7	10.2	2.4	0.7	0.4	0.1	100.0=	5624	443	6067	16.0
Urban excluding Greater Bombay	11.6	12.8	25.2	21.3	14.5	6.8	4.8	2.7	0.3	100.0=	1568	67	1635	17.3
Greater Bombay	4.8	6.9	22.0	22.1	18.6	11.8	6.9	6.3	0.6	100.0=	1166	6	1172	18.9
Urban Maharashtra	8.7	10.3	23.9	21.6	16.2	8.9	5.7	4.3	0.4	100.0=	2734	73	2807	18.0
Maharashtra State	12.8	14.9	30.4	21.0	12.2	4.6	2.3	1.6	0.2	100.0=	8358	516	8874	16.6

Table 6.4 : Average Age at Marriage of Currently Married Women by Age Group

	Age group of women							
	15-19	20-24	25-29	30-34	35-39	40-44	45-50	All ages
Rural Maharashtra	16.2	16.7	16.6	15.9	15.7	15.2	15.0	16.0
Urban excluding Greater Bombay	16.1	17.6	18.1	17.9	16.9	17.0	16.4	17.3
Greater Bombay	16.7	18.7	19.4	19.2	19.1	18.0	18.9	18.9
Urban Maharashtra	16.2	17.9	18.7	18.5	17.9	17.5	17.4	18.0
Maharashtra State	16.2	17.1	17.3	16.9	16.4	16.0	16.0	16.6

Table 6.5 : Percentage Distribution of Currently Married Women by Educational Attainment

	Illi- terate	Upto 7th std.	8th std. to S.S.C.	Above S.S.C.	All levels	Educational attainment not given	Total No.of women
Aurangabad Division	85.6	12.3	2.0	0.1	100.0= 1124	3	1127
Nagpur Division	62.8	30.9	6.1	0.2	100.0= 1686	0	1686
Western Maharashtra	71.4	24.9	3.5	0.2	100.0= 3246	8	3254
Rural Maharashtra	71.7	24.2	3.9	0.2	100.0= 6056	11	6067
Urban excluding Greater Bombay	36.3	32.8	24.2	6.7	100.0= 1630	5	1635
Greater Bombay	30.2	33.9	28.4	7.5	100.0= 1171	1	1172
Urban Maharashtra	33.7	33.2	26.0	7.1	100.0= 2801	6	2807
Maharashtra State	59.6	27.1	10.9	2.4	100.0= 8857	17	8874

Table 6.6 : Percentage Distribution of Currently Married Women by Educational Attainment of Husband

	Illi- terate	Upto 7th std.	8th std. to S.S.C.	Above S.S.C.	All levels	Educational attainment not given	Total No.of women
Aurangabad Division	47.2	34.2	16.2	2.4	100.0= 1123	4	1127
Nagpur Division	30.2	47.3	19.4	3.1	100.0= 1683	3	1686
Western Maharashtra	35.9	43.9	17.9	2.3	100.0= 3220	34	3254
Rural Maharashtra	36.4	43.1	18.0	2.5	100.0= 6026	41	6067
Urban excluding Greater Bombay	11.6	34.9	37.5	16.0	100.0= 1625	10	1635
Greater Bombay	13.1	28.3	45.5	13.1	100.0= 1171	1	1172
Urban Maharashtra	12.2	32.1	40.9	14.8	100.0= 2796	11	2807
Maharashtra State	28.8	39.6	25.2	6.4	100.0= 8822	52	8874

Table 6.7 : Average Number of Live Births Per Currently Married Women by Sex and Whether Living or Dead ; Average Age of Woman; and Sex-Ratio of Children at Birth and of Living Children

	Average No. per Woman						Total live births	Average age of woman	Sex-ratio of children at birth*	Sex-ratio of living children*
	Sons living with women	Sons living away	Sons dead	Daughters living with women	Daughters living away	Daughters dead				
Aurangabad Division	1.15	0.08	0.30	0.89	0.23	0.26	2.91	29.9	901	909
Nagpur Division	1.27	0.07	0.35	1.04	0.24	0.32	3.29	31.3	945	950
Western Maharashtra	1.16	0.15	0.21	0.98	0.26	0.21	2.97	31.3	951	945
Rural Maharashtra	1.19	0.11	0.27	0.98	0.25	0.25	3.05	31.0	940	940
Urban excluding Greater Bombay	1.34	0.07	0.20	1.12	0.16	0.19	3.08	32.4	915	908
Greater Bombay	1.35	0.04	0.16	1.19	0.16	0.13	3.03	33.8	949	967
Urban Maharashtra	1.35	0.06	0.18	1.15	0.16	0.16	3.06	33.0	929	932
Maharashtra State	1.24	0.09	0.24	1.04	0.23	0.22	3.05	31.6	937	938

* Sex-ratio = Females per 1000 males.

Table 6.8 : Average Number, Per Currently Married Woman, of Live Births, Still-Births, Miscarriages and Conceptions; Still-Birth Rate and Miscarriage Rate

	Average per woman				Still-births per 1,000 all births *	Miscarriages per 1,000 conceptions
	Live births	Still births	Mis- carriages	Conceptions		
Aurangabad Division	2.91	0.05	0.06	3.02	16.76	18.80
Nagpur Division	3.29	0.04	0.10	3.43	11.58	28.38
Western Maharashtra	2.97	0.04	0.08	3.09	12.75	24.37
Rural Maharashtra	3.05	0.04	0.08	3.17	13.11	24.59
Urban excluding Greater Bombay	3.08	0.04	0.19	3.37	13.26	57.08
Greater Bombay	3.03	0.03	0.13	3.19	9.21	41.21
Urban Maharashtra	3.06	0.04	0.17	3.30	11.61	50.67
Maharashtra State	3.05	0.04	0.11	3.21	12.63	33.06

* All births include still and live births.

Table 6.9 : Percentage Distribution of Currently Married Women by Number of Conceptions

	Number of conceptions								Total No. of women	Average No. of concep- tions
	0	1	2	3	4	5	6	7 or more		
Aurangabad Division	21.5	12.5	13.5	12.7	13.8	9.5	6.8	9.7	100.0 = 1127	3.02
Nagpur Division	15.5	13.9	12.3	13.2	12.0	10.6	8.8	13.7	100.0 = 1686	3.43
Western Maharashtra	17.3	14.1	14.1	14.3	12.9	10.8	6.9	9.6	100.0 = 3254	3.09
Rural Maharashtra	17.6	13.8	13.5	13.7	12.8	10.5	7.4	10.7	100.0 = 6067	3.17
Urban excluding Greater Bombay	12.7	11.9	14.8	17.4	15.6	10.5	5.6	11.5	100.0 = 1635	3.38
Greater Bombay	10.2	12.1	18.2	18.5	16.4	11.4	6.1	7.1	100.0 = 1172	3.19
Urban Maharashtra	11.6	12.0	16.3	17.9	15.9	10.8	5.8	9.7	100.0 = 2807	3.30
Maharashtra State	15.7	13.2	14.4	15.0	13.8	10.6	6.9	10.4	100.0 = 8874	3.21

Table 6.10 : Percentage Distribution of Currently Married Women by Number of Children Ever Borne

	Number of children borne								Total No. of women	Average No. of children borne
	0	1	2	3	4	5	6	7 or more		
Aurangabad Division	21.6	13.7	13.4	13.6	13.2	9.0	6.9	8.6	100.0 = 1127	2.91
Nagpur Division	16.3	13.9	12.9	13.5	12.8	10.0	8.7	11.9	100.0 = 1686	3.29
Western Maharashtra	17.8	14.7	14.4	14.6	12.8	11.2	6.4	8.1	100.0 = 3254	2.98
Rural Maharashtra	18.1	14.3	13.8	14.1	12.9	10.4	7.2	9.2	100.0 = 6067	3.05
Urban excluding Greater Bombay	13.2	13.5	16.2	17.6	15.2	10.0	5.3	9.0	100.0 = 1635	3.14
Greater Bombay	10.7	14.2	18.5	19.0	15.7	10.4	5.5	6.0	100.0 = 1172	3.03
Urban Maharashtra	12.1	13.8	17.2	18.1	15.4	10.2	5.4	7.8	100.0 = 2807	3.09
Maharashtra State	16.2	14.1	14.9	15.4	13.7	10.3	6.6	8.8	100.0 = 8874	3.07

Table 6.11 : Percentage Distribution of Currently Married Women by Number of Living Children

	Number of living children								Total No. of women	Average No. of living children
	0	1	2	3	4	5	6	7 or more		
Aurangabad Division	22.8	17.2	15.7	15.8	13.6	8.4	4.0	2.5	100.0 = 1127	2.36
Nagpur Division	17.6	17.1	15.8	17.3	13.3	9.3	6.7	2.9	100.0 = 1686	2.62
Western Maharashtra	18.9	16.6	16.6	17.1	13.2	9.5	4.8	3.3	100.0 = 3254	2.55
Rural Maharashtra	19.3	16.8	16.2	16.9	13.3	9.2	5.2	3.1	100.0 = 6067	2.53
Urban excluding Greater Bombay	13.7	15.7	18.6	18.8	15.8	8.0	5.1	4.3	100.0 = 1635	2.75
Greater Bombay	11.6	14.7	21.2	20.3	16.1	9.3	3.4	3.4	100.0 = 1172	2.75
Urban Maharashtra	12.8	15.3	19.6	19.4	16.0	8.6	4.4	3.9	100.0 = 2807	2.75
Maharashtra State	17.2	16.3	17.4	17.8	14.1	9.0	4.9	3.3	100.0 = 8874	2.60

Table 6.12 : Average Number of Children Ever Borne Per Currently Married Woman by Age Group and Age-Standardized Average *

	Age group							Ages 15-50	Age- stand- ardized average*
	15-19	20-24	25-29	30-34	35-39	40-44	45-50		
Rural Maharashtra	0.36	1.25	2.68	3.62	4.58	5.35	5.34	3.05	3.18
Urban excluding Greater Bombay	0.45	1.43	2.53	3.40	4.33	4.63	5.14	3.14	3.02
Greater Bombay	0.61	1.19	2.25	3.26	3.68	4.49	3.92	3.03	2.68
Urban Maharashtra	0.49	1.35	2.41	3.33	4.04	4.57	4.61	3.09	2.87
Maharashtra State	0.38	1.27	2.59	3.52	4.40	5.08	5.07	3.07	3.07

* Age standardized to Maharashtra State distribution.

Table 6.13 : Mean Parity for Currently Married Women, Ever Married Women and All Women

	Mean parity for currently married women				Mean parity for ever married women*				Mean parity for all women*			
	Rural Maha- rashtra	Urban exclu- ding Greater Bombay	Greater Bombay	Maha- rashtra State	Rural Maha- rashtra	Urban exclu- ding Greater Bombay	Greater Bombay	Maha- rashtra State	Rural Maha- rashtra	Urban exclu- ding Greater Bombay	Greater Bombay	Maha- rashtra State
15-19	0.36	0.45	0.61	0.38	0.35	0.43	0.55	0.37	0.17	0.10	0.07	0.14
20-24	1.25	1.43	1.19	1.27	1.22	1.39	1.13	1.23	1.13	0.94	0.66	1.03
25-29	2.68	2.53	2.25	2.59	2.60	2.45	2.18	2.51	2.57	2.24	1.98	2.41
30-34	3.62	3.40	3.26	3.52	3.50	3.24	3.16	3.40	3.49	3.15	2.97	3.34
35-39	4.58	4.33	3.68	4.40	4.42	4.09	3.56	4.23	4.41	4.08	3.46	4.21
40-44	5.35	4.63	4.49	5.08	5.14	4.34	4.31	4.86	5.14	4.24	4.29	4.83
45-50	5.38	5.12	3.97	5.09	5.13	4.76	3.79	4.83	5.13	4.71	3.77	4.82

* The mean parities per ever-married and all women were estimated indirectly from the mean parity per currently married women by the method given in the Appendix B.

Table 6.14 : Average Number of Living Children Per Currently Married Women by Age Group and Age-Standardized Average*

	Age group							Ages 15-50	Age- stand- ardized average*
	15-19	20-24	25-29	30-34	35-39	40-44	45-50		
Rural Maharashtra	0.32	1.11	2.32	3.10	3.82	4.30	4.10	2.53	2.64
Urban excluding Greater Bombay	0.43	1.32	2.32	3.06	3.80	4.06	4.11	2.75	2.73
Greater Bombay	0.58	1.12	2.16	2.99	3.29	3.95	3.55	2.75	2.44
Urban Maharashtra	0.47	1.25	2.25	3.02	3.57	4.01	3.87	2.75	2.56
Maharashtra State	0.34	1.14	2.29	3.07	3.73	4.20	4.02	2.60	2.60

* Age standardized to Maharashtra State distribution.

Table 6.15 : Average Number of Living Sons Per Currently Married Women by Age Group and Age-Standardized Average*

	Age group							Ages 15-50	Age- stand- ardized average*
	15-19	20-24	25-29	30-34	35-39	40-44	45-50		
Rural Maharashtra	0.17	0.57	1.18	1.60	1.98	2.22	2.12	1.31	1.36
Urban excluding Greater Bombay	0.18	0.68	1.25	1.59	1.93	2.00	2.08	1.41	1.36
Greater Bombay	0.22	0.53	1.12	1.45	1.65	2.02	1.92	1.39	1.23
Urban Maharashtra	0.19	0.63	1.19	1.53	1.81	2.01	2.01	1.41	1.30
Maharashtra State	0.17	0.59	1.18	1.57	1.92	2.14	2.08	1.34	1.34

* Age standardized to Maharashtra State distribution.

Table 6.16 : Average Number of Living Daughters Per Currently Married Women by Age Group and Age-Standardized Average*

	Age group							Ages 15-50	Age- stand- ardized average*
	15-19	20-24	25-29	30-34	35-39	40-44	45-50		
Rural Maharashtra	0.15	0.53	1.15	1.50	1.84	2.08	1.98	1.23	1.28
Urban excluding Greater Bombay	0.25	0.64	1.07	1.47	1.86	2.06	2.03	1.35	1.30
Greater Bombay	0.36	0.59	1.04	1.54	1.63	1.93	1.63	1.35	1.21
Urban Maharashtra	0.28	0.63	1.06	1.50	1.76	2.00	1.86	1.35	1.26
Maharashtra State	0.17	0.56	1.12	1.50	1.81	2.05	1.93	1.27	1.27

* Age standardized to Maharashtra State distribution.

Table 6.17 : Average Number of Children Ever Borne Per Currently Married Women by Duration of Marriage and Duration-Standardized Average*

	Duration of marriage in years						All durations	Duration stand- ardized average*
	0-4	5-9	10-14	15-19	20-24	25 and above		
Rural Maharashtra	0.59	2.11	3.31	4.19	5.11	5.88	3.05	3.14
Urban excluding Greater Bombay	0.77	2.33	3.35	4.08	4.54	5.51	3.14	3.09
Greater Bombay	0.84	2.18	3.11	3.81	4.43	4.54	3.03	2.84
Urban Maharashtra	0.80	2.27	3.24	3.96	4.49	5.12	3.09	2.99
Maharashtra State	0.64	2.16	3.29	4.11	4.91	5.62	3.07	3.07

* Duration standardized to Maharashtra State distribution.

Table 6.18 : Average Number of Living Children Per Currently Married Woman by Duration of Marriage and Duration-Standardized Average*

	Duration of marriage in years						All durations	Duration standardized average*
	0-4	5-9	10-14	15-19	20-24	25 and above		
Rural Maharashtra	0.52	1.86	2.89	3.54	4.21	4.52	2.53	2.60
Urban excluding Greater Bombay	0.72	2.17	3.07	3.55	4.07	4.47	2.75	2.71
Greater Bombay	0.79	2.05	2.92	3.45	3.91	3.95	2.75	2.57
Urban Maharashtra	0.75	2.12	3.00	3.51	4.00	4.26	2.75	2.66
Maharashtra State	0.58	1.95	2.93	3.53	4.14	4.44	2.60	2.60

* Duration standardized to Maharashtra State distribution.

Table 6.19 : Mean Parity and Age-Standardized Mean Parity* Per Currently Married Women by Caste-Cum-Religion

Caste-cum-religion	Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Maharashtra State mean parity
	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	
Advanced castes	2.95	3.01	2.78	2.51	2.86	2.47	2.90
Intermediate castes	3.01	3.22	3.16	3.17	3.25	3.31	3.05
Backward castes	3.17	3.49	2.79	2.33	-	-	3.16
Scheduled Castes	3.28	3.34	3.46	3.55	3.64	3.22	3.35
Scheduled Tribes	3.03	3.28	4.00	3.68	-	-	3.11
Muslims	3.29	3.35	3.56	3.83	3.30	3.23	3.37
Other religions	3.37	3.10	3.53	3.71	2.54	2.06	3.12
All castes-cum-religions	3.05	3.18	3.14	3.02	3.03	2.68	3.07

* Mean parity standardized to Maharashtra State age distribution.

- Number of currently married women below 20.

Table 6.20 : Mean Parity and Duration-Standardized Mean Parity* Per Currently Married Women by Caste-Cum-Religion

Caste-cum-religion	Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Maharashtra State mean parity
	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	
Advanced castes	2.95	2.87	2.78	2.66	2.86	2.65	2.90
Intermediate castes	3.01	3.37	3.16	3.15	3.25	3.03	3.05
Backward castes	3.17	2.94	2.79	3.13	-	-	3.16
Scheduled Castes	3.28	3.22	3.46	3.37	3.64	3.20	3.35
Scheduled Tribes	3.03	3.23	4.00	2.95	-	-	3.11
Muslims	3.29	3.39	3.56	3.85	3.30	3.35	3.37
Other religions	3.37	3.32	3.53	3.44	2.54	2.38	3.12
All castes-cum-religions	3.05	3.12	3.14	3.08	3.03	2.84	3.07

* Mean parity standardized to Maharashtra State marital duration distribution.

- Number of currently married women below 20.

Table 6.21 : Mean Parity and Age-Standardized Mean Parity* Per Currently Married Women by Educational Level of Woman

Educational level of woman	Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Maharashtra State mean parity
	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	
Illiterate and literate without formal education	3.33	3.20	3.86	3.48	3.86	3.17	3.43
Upto 7th standard	2.42	3.11	3.24	3.21	3.25	2.92	2.74
8th to 12th standard	1.90	2.97	2.34	2.32	2.18	2.08	2.18
Above 12th standard	-	-	1.62	1.58	2.08	1.50	1.73
All levels of education	3.05	3.18	3.14	3.02	3.03	2.68	3.07

* Mean parity standardized to Maharashtra State age distribution.

- Number of currently married women below 20.

Table 6.22 : Mean Parity and Duration-Standardized Mean Parity* Per Currently Married Women by Educational Level of Woman

Educational level of woman	Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Maharashtra State mean parity
	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	
Illiterate and literate without formal education	3.33	3.10	3.86	3.37	3.86	3.10	3.43
Upto 7th standard	2.42	3.08	3.24	3.10	3.25	3.02	2.74
8th to 12th standard	1.90	3.36	2.34	2.52	2.18	2.32	2.18
Above 12th standard	-	-	1.62	2.35	2.08	1.90	1.73
All levels of education	3.05	3.12	3.14	3.08	3.03	2.84	3.07

* Mean parity standardized to Maharashtra State marital duration distribution.

- Number of currently married women below 20.

Table 6.23 : Mean Parity and Age-Standardized Mean Parity* Per Currently Married Women by Educational Level of Husband

Educational level of women	Rural Maharashtra		Urban excluding Greater Bombay		Greater Bombay		Maharashtra State mean parity
	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	Mean parity	Std. mean parity*	
Illiterate and literate without formal education	3.53	3.23	4.14	3.52	3.94	3.18	3.62
Upto 7th standard	3.13	3.19	3.65	3.43	3.78	3.18	3.28
8th to 12th standard	2.08	3.07	2.75	2.83	2.51	2.41	2.37
Above 12th standard	2.04	3.01	2.22	2.13	2.26	1.85	2.18
All levels of education	3.05	3.18	3.14	3.02	3.03	2.68	3.07

* Mean parity standardized to Maharashtra State age distribution.

Table 6.24 : Mean Parity Per Currently Married Women by Age at First Marriage

	Age at first marriage					Age at first marriage not given	Total No. of women
	14 years and below	15-18 years	19-22 years	23 years and above	All ages		
Rural Maharashtra :							
Percentage of women	31.9	54.3	12.6	1.2	100.0 = 5624	443	6067
Mean parity	4.20	2.97	2.29	2.21	3.05	0.30	
Urban excluding Greater Bombay :							
Percentage of women	24.4	46.5	21.3	7.8	100.0 = 1568	67	1635
Mean parity	4.49	3.31	2.38	1.48	3.14	0.48	
Greater Bombay :							
Percentage of women	11.7	44.1	30.4	13.8	100.0 = 1166	6	1172
Mean parity	4.17	3.57	2.42	1.77	3.03	0.67	
Maharashtra State :							
Percentage of women	27.7	51.4	16.8	4.1	100.0 = 8358	516	8874
Mean parity	4.25	3.10	2.34	1.75	3.07	0.33	

Table 6.25 : Mean Parity Per Currently Married Women by Age at First Marriage by Duration of Marriage

Duration of marriage	Age at first marriage				Age not given	Number of married women	Age at first marriage				Age not given	Number of married women
	14 years and below	15-18 years	19 years and above	All ages			14 years and below	15-18 years	19 years and above	All ages		

Rural Maharashtra						Urban excluding Greater Bombay						
Upto 10 years : percentage	17.9	62.3	19.8	100.0= 2243	170	2413	11.5	46.6	41.9	100.0= 611	18	629
Mean parity	1.52	1.36	1.18	1.26			1.74	1.79	1.41	1.58		
10-20 years : percentage	32.6	55.0	12.4	100.0= 1699	159	1858	24.8	50.6	24.6	100.0= 469	35	504
Mean parity	3.73	3.71	3.39	3.38			4.06	3.79	2.98	3.43		
20 years and above: percentage	50.4	42.7	6.9	100.0= 1682	114	1796	41.1	42.8	16.1	100.0= 488	14	502
Mean parity	5.79	5.21	4.73	5.19			5.70	4.95	3.60	4.94		

All durations : percentage	31.9	54.3	13.8	100.0= 5624	443	6067	24.4	46.5	29.1	100.0= 1568	67	1635
Mean parity	4.20	2.97	2.28	3.05			4.49	3.31	2.14	3.14		

Greater Bombay						Maharashtra State						
Upto 10 years : percentage	3.4	34.9	61.7	100.0= 417	1	418	14.8	55.8	29.4	100.0= 3272	190	3462
Mean parity	2.43	1.71	1.47	1.59			1.57	1.45	1.32	1.36		
10-20 years : percentage	12.1	48.3	39.6	100.0= 395	3	398	28.0	53.3	18.7	100.0= 2562	196	2758
Mean parity	3.55	3.85	2.80	3.37			3.76	3.74	3.10	3.39		
20 years and above: percentage	21.7	51.2	27.1	100.0= 354	2	356	44.6	44.0	11.4	100.0= 2524	130	2654
Mean parity	4.87	4.81	3.70	4.46			5.72	5.10	4.01	5.05		

All durations : percentage	11.7	44.1	44.2	100.0= 1166	6	1172	27.7	51.4	20.9	100.0= 8358	516	8874
Mean parity	4.17	3.57	2.22	3.03			4.25	3.10	2.23	3.07		

Table 6.26 : Mean parity Per Currently Married Women by Age at First Delivery

	Age at first delivery				All Ages
	15 years or less	16-21 years	22 years and above	Zero parity or age at first delivery not given	
Rural Maharashtra :					
Percentage of women	4.7	61.0	16.2	18.1	100.0 = 4067
Mean parity	4.95	3.78	3.09	0.05	3.05
Urban excluding Greater Bombay :					
Percentage of women	9.1	56.9	20.5	13.5	100.0 = 1635
Mean parity	4.68	3.84	2.55	0.05	3.14
Greater Bombay :					
Percentage of women	4.4	52.1	32.6	10.9	100.0 = 1172
Mean parity	4.69	3.77	2.61	0.04	3.03
Maharashtra State :					
Percentage of women	5.4	59.1	19.2	16.3	100.0 = 8874
Mean parity	4.84	3.80	2.87	0.05	3.07

Table 6.27 : Mean Parity and Standardized Mean Parity Per Currently Married Woman by Caste-Cum-Religion by Age at First Marriage for Maharashtra

	Age at first marriage				Standardized mean parity
	Upto 14 years	15-18 years	19 years and above	All ages	
Advanced castes	4.21	3.04	2.11	2.90	2.90
Intermediate castes	4.09	2.92	2.08	3.05	3.07
Backward castes	3.84	3.33	2.63	3.16	3.13
Scheduled Castes	4.38	3.28	2.17	3.35	3.37
Scheduled Tribes	4.42	2.90	2.77	3.11	3.39
Muslims	4.44	3.46	2.86	3.37	3.35
Other religions	5.27	3.65	2.26	3.12	3.30
All castes-cum-religions	4.25	3.10	2.22	3.07	3.07

Table 6.28 : Percentage Distribution of Currently Married Women by Ideal Number of Children

	Ideal number of children										Total	Ideal not given	Total No. of women	Average ideal No. of children
	1	2	3	4	5	6	7	8	9 or more					
Aurangabad Division	0.0	5.2	52.4	31.4	7.7	2.9	0.4	0.0	0.0	100.0 =	854	273	1127	3.5
Nagpur Division	0.0	4.9	72.7	19.9	1.8	0.5	0.0	0.2	0.0	100.0 =	1524	162	1686	3.2
Western Maharashtra	0.1	11.5	62.5	18.4	4.2	2.3	0.4	0.3	0.3	100.0 =	2783	471	3254	3.3
Rural Maharashtra	0.1	8.5	63.9	21.0	4.1	1.8	0.3	0.2	0.1	100.0 =	5161	906	6067	3.3
Urban excluding														
Greater Bombay	0.1	28.0	46.7	22.4	1.1	0.8	0.1	0.3	0.5	100.0 =	1519	116	1635	3.0
Greater Bombay	0.1	37.9	44.5	16.4	0.4	0.4	0.0	0.2	0.1	100.0 =	1112	60	1172	2.8
Urban Maharashtra	0.1	32.3	45.9	19.8	0.8	0.6	-	0.2	0.3	100.0 =	2631	176	2807	2.9
Maharashtra State	0.1	16.5	57.8	20.6	3.0	1.4	0.2	0.2	0.2	100.0 =	7792	1082	8874	3.2

- Negligible.

Table 6.29 : Average, Per Currently Married Woman, of Ideal Number of Children by Sex and Ideal Age at Marriage for Males and Females

	Ideal No. of children	Ideal No. of sons	Ideal No. of daughters	Ideal age at marriage	
				Males	Females
Aurangabad Division	3.5	2.1	1.4	19.6	15.2
Nagpur Division	3.2	2.0	1.2	21.2	17.1
Western Maharashtra	3.3	2.0	1.3	21.0	16.5
Rural Maharashtra	3.3	2.0	1.3	20.8	16.4
Urban excluding Greater Bombay	3.0	1.7	1.3	23.3	18.0
Greater Bombay	2.8	1.6	1.2	24.9	19.8
Urban Maharashtra	2.9	1.7	1.2	24.4	19.1
Maharashtra State	3.2	1.9	1.3	22.0	17.3

Table 6.30 : Percentage Distribution of Currently Married Women by Children Ever Borne Compared to Children Wanted

	More children than wanted	Additional children wanted			Total No. of women
		None	One	Two or more	
Aurangabad Division	26.4	29.2	13.8	30.6	100.0 = 1127
Nagpur Division	30.1	24.9	14.7	30.3	100.0 = 1686
Western Maharashtra	29.9	26.1	14.6	29.4	100.0 = 3254
Rural Maharashtra	29.4	26.3	14.5	29.8	100.0 = 6067
Urban excluding Greater Bombay	34.1	26.9	16.3	22.7	100.0 = 1635
Greater Bombay	34.6	28.2	18.9	18.3	100.0 = 1172
Urban Maharashtra	34.4	27.4	17.4	20.8	100.0 = 2807
Maharashtra State	30.9	26.7	15.4	27.0	100.0 = 8874

Table 6.31 : Average Ideal Age at Marriage for Women by Caste-Cum-Religion

	Advanced castes	Inter-mediate castes	Backward castes	Scheduled Castes	Scheduled Tribes	Muslims	Other religions	All castes-cum-religions
Rural Maharashtra	16.7	16.5	15.8	15.8	16.0	16.5	17.6	16.4
Urban excluding Greater Bombay	19.3	18.3	19.2	17.3	18.5	17.9	18.9	18.6
Greater Bombay	19.9	19.8	-	19.3	-	19.5	21.0	19.8
Urban Maharashtra	19.6	18.6	19.4	18.0	18.7	18.7	20.0	19.1
Maharashtra State	17.7	17.0	16.2	16.5	16.2	17.7	19.3	17.3

- Number of currently married women below 20.

Table 6.29 : Average, Per Currently Married Woman, of Ideal Number of Children by Sex and Ideal Age at Marriage for Males and Females

	Ideal No. of children	Ideal No. of sons	Ideal No. of daughters	Ideal age at marriage	
				Males	Females
Aurangabad Division	3.5	2.1	1.4	19.6	15.2
Nagpur Division	3.2	2.0	1.2	21.2	17.1
Western Maharashtra	3.3	2.0	1.3	21.0	16.5
Rural Maharashtra	3.3	2.0	1.3	20.8	16.4
Urban excluding Greater Bombay	3.0	1.7	1.3	23.3	18.0
Greater Bombay	2.8	1.6	1.2	24.9	19.8
Urban Maharashtra	2.9	1.7	1.2	24.4	19.1
Maharashtra State	3.2	1.9	1.3	22.0	17.3

Table 6.30 : Percentage Distribution of Currently Married Women by Children Ever Borne Compared to Children Wanted

	More children than wanted	Additional children wanted			Total No. of women
		None	One	Two or more	
Aurangabad Division	26.4	29.2	13.8	30.6	100.0 = 1127
Nagpur Division	30.1	24.9	14.7	30.3	100.0 = 1686
Western Maharashtra	29.9	26.1	14.6	29.4	100.0 = 3254
Rural Maharashtra	29.4	26.3	14.5	29.8	100.0 = 6067
Urban excluding Greater Bombay	34.1	26.9	16.3	22.7	100.0 = 1635
Greater Bombay	34.6	28.2	18.9	18.3	100.0 = 1172
Urban Maharashtra	34.4	27.4	17.4	20.8	100.0 = 2807
Maharashtra State	30.9	26.7	15.4	27.0	100.0 = 8874

Table 6.31 : Average Ideal Age at Marriage For Women by Caste-Cum-Religion

	Advanced castes	Inter-mediate castes	Backward castes	Scheduled Castes	Scheduled Tribes	Muslims	Other religions	All castes-cum-religions
Rural Maharashtra	16.7	16.5	15.8	15.8	16.0	16.5	17.6	16.4
Urban excluding Greater Bombay	19.3	18.3	19.2	17.3	18.5	17.9	18.9	18.6
Greater Bombay	19.9	19.8	-	19.3	-	19.5	21.0	19.8
Urban Maharashtra	19.6	18.6	19.4	18.0	18.7	18.7	20.0	19.1
Maharashtra State	17.7	17.0	16.2	16.5	16.2	17.7	19.3	17.3

- Number of currently married women below 20.

Table 6.32 : Percentage Distribution of Currently Married Women by Level of Education Desired for Daughters

	Upto 4th std.	5th to 7th std.	8th std. to S.S.C.	Above S.S.C.	Accor- ding to capacity	Training in household occupation	Enough to earn living	All levels	Level not given	Total No. of women
Aurangabad Division	39.6	25.6	19.4	4.6	9.9	0.7	0.2	100.0 = 923	204	1127
Nagpur Division	19.6	30.8	31.8	13.1	4.7	0.0	0.0	100.0 = 1411	275	1686
Western Maharashtra	19.5	36.3	23.5	6.5	13.1	0.4	0.7	100.0 = 2776	478	3254
Rural Maharashtra	23.2	32.9	25.1	7.9	10.2	0.3	0.4	100.0 = 5110	957	6067
Urban excluding Greater Bombay	5.8	9.6	42.2	27.6	13.2	0.0	1.6	100.0 = 1520	115	1635
Greater Bombay	2.5	10.8	49.7	34.3	2.5	0.0	0.2	100.0 = 1134	38	1172
Urban Maharashtra	4.4	10.1	45.4	30.5	8.6	0.0	1.0	100.0 = 2654	153	2807
Maharashtra State	16.7	25.2	32.1	15.6	9.6	0.2	0.6	100.0 = 7764	1110	8874

Table 6.33 : Percentage Distribution of Currently Married Women by Level of Education Desired for Sons

	Upto 4th std.	5th to 7th std.	8th to S.S.C.	Above S.S.C.	Accor- ding to capacity	Training in household occupation	Enough to earn living	All levels	Level not given	Total No. of women
Aurangabad Division	4.5	13.4	35.5	31.2	13.3	1.5	0.6	100.0 = 934	193	1127
Nagpur Division	3.2	6.7	39.5	39.3	10.8	0.1	0.4	100.0 = 1423	263	1686
Western Maharashtra	2.3	6.3	36.1	28.7	25.0	0.5	1.1	100.0 = 2793	461	3254
Rural Maharashtra	2.9	7.7	36.8	32.1	19.0	0.6	0.9	100.0 = 5150	917	6067
Urban excluding Greater Bombay	1.5	2.8	32.7	40.3	20.7	0.0	2.0	100.0 = 1529	106	1635
Greater Bombay	0.3	1.0	37.8	54.8	5.7	0.0	0.4	100.0 = 1138	34	1172
Urban Maharashtra	1.0	2.0	34.9	46.5	14.3	0.0	1.3	100.0 = 2667	140	2807
Maharashtra State	2.3	5.8	36.2	36.9	17.4	0.4	1.0	100.0 = 7817	1057	8874

CHAPTER 7

FAMILY PLANNING KNOWLEDGE AND USE

Introduction

In this chapter, the knowledge about and the prevalence of family planning methods are assessed for the State of Maharashtra. The data are from NFMS, 1980 and relate to currently married women aged 15 to 50. Family planning methods include the modern contraceptive methods of condom, oral pills and IUD, and sterilization.

The data are presented separately for the three rural regions and the two urban zones. Figures about the prevalence of knowledge about and use of various methods are presented first. Both current users and ever users are considered. The use of family planning is examined in relation to the duration of marriage. Data on the knowledge and current use by age and by whether wanting additional children are presented.

The source of the family planning method, after-effects, and the parity and age of wife and husband at acceptance are some of the aspects examined for each method of family planning.

The characteristics of the woman like her education and community are examined in relation to her age and parity or the number of living children. Within each age group of currently married women, for those with and without any knowledge of contraceptives, the mean parity and mean number of living children are given. The same parameters are presented by age group by contraceptive method currently used - sterilization, other methods, none. These parameters are also presented by the educational level of the women for knowledge and for current method used. Finally mean parity and mean number of living children are given by community and by the contraceptive method currently used.

The data presented in this chapter reveal the spread of family planning knowledge and use in the rural regions and urban zones by the method used, by demographic characteristics such as age and parity and by social characteristics such as the woman's education and community.

Knowledge and Use of Methods

In Maharashtra State the percentage of currently married women knowing about condom was 24.1, oral pill 18.0, IUD 15.5 and sterilization 79.0 (Table 7.1). The percentage knowing each method was much higher in other urban areas compared to rural areas and highest in Greater Bombay. Among rural regions, Aurangabad Division had the lowest percentage of knowledge about each method.

In terms of the number of modern methods known, 18.7 per cent women had knowledge of no method, 52.9 per cent knew of one method only and 28.4 per cent knew of two or more methods as given in Table 7.2. The rural-urban and regional differentials were similar to those found for each modern contraceptive method including sterilization. While in rural areas, only 18.7 per cent knew of two or more methods of family

planning, the corresponding percentages were 37.3 for other urban areas and 65.8 for Greater Bombay. Thus most of the women in rural areas knew only about sterilization.

In terms of the usage of modern methods, 65.0 per cent of the women had never used any method, 33.3 per cent had ever used one method and 1.7 per cent two or more methods as seen from Table 7.3. The percentage of women who had never used any method was 68.2 in rural areas and 58.2 in urban areas. The corresponding percentage for Aurangabad Division was 77.4. The percentage of women who had ever used one modern method of contraception was 31.2 for rural and 37.7 for urban areas, while the percentage who had ever used two or more methods was 0.6 and 4.1 respectively for the two areas.

Table 7.4 shows the percentage of women who had ever used different methods. Condom, oral pill and IUD were used by, respectively, 6.7 per cent, 5.1 per cent and 3.0 per cent of the urban couples and only by 1.3 per cent, 0.5 per cent and 0.3 per cent of the rural couples. There was not much difference in the percentage of couples sterilized between the rural areas (30.4) and the urban areas (32.0).

From the Family Planning Programme service statistics, it has been indirectly estimated that roughly 30.6 per cent of the eligible couples (with wife aged 15 to 44) in rural areas and 39.5 per cent in urban areas were effectively protected by sterilization in 1980-81 in Maharashtra State (Srikantan, K.S. and K. Balsubramanian (1983), Demographic Evolution of India's Family Planning Programme, *Artha Vijnana*, Vol. 25, No.3, pp.205-230). From the survey it was found that 33.5 per cent of these eligible couples in rural areas and 36.6 per cent in urban areas were sterilized.

The percentage of sterilized couples in Maharashtra was slightly higher in NFMS (34.5) than from the service statistics (33.2). The larger percentage in NFMS might be ascribed to sterilizations taking place outside the programme. The direct estimate for rural areas from the survey was somewhat higher than the indirect estimate made from the service statistics (by the method of attrition due to mortality and aging). The urban estimate from the service statistics was, however, higher than the direct estimate from the survey. This difference arises largely because the survey figures are by place of residence, whereas in the service statistics, some rural couples who got sterilized in urban areas might have been reported as urban residents.

The total of the percentages of women who had ever used various methods or no method of family planning came to 100.7 per cent for rural areas and 105.0 per cent for urban areas. The slight excess in this total over 100.0 per cent shows that only about 0.7 per cent of the rural and 5.0 per cent of the urban women had used multiple methods or shifted from one method to another.

Table 7.5 shows the percentage distribution of the current use of modern family planning methods by currently married women and is similar to Table 7.4 which gives figures on the ever use of such methods. In order to avoid double counting of users of multiple methods, all sterilized couples were included in that category. Of the remaining

women, those wearing IUD were classified under IUD. Of the still remaining women, those taking the pills were placed under the pill category. Couples using condom but not using any of the above methods were counted as condom users. Those not using any of the four methods were counted as non-users.

In rural areas, the percentage of women who were not currently using any modern method, given in Table 7.5, was only slightly higher than the corresponding percentage of women who had never used any modern method, given in Table 7.4. In urban areas, the percentage not currently using was 3.9 points higher than the percentage who had never used any modern method. The reason for the larger urban difference was that the percentage of urban women currently using the condom, oral pill and IUD was well below the percentage of women who had ever used these methods. In urban areas only 1.4 per cent of the women were currently using IUD compared to 3.0 per cent who had ever used it. The corresponding percentages for the oral pill were 1.4 against 5.1 and for the condom, they were 3.1 against 6.7. In rural areas, both the percentages of ever and current users were low for all three methods. For the State as a whole, 30.9 per cent of the couples were sterilized, 0.5 per cent women were currently wearing IUD, 0.6 per cent women were taking oral pills and 1.4 per cent couples were using condoms while 66.6 per cent couples were currently using none of these methods of family planning.

Table 7.6 shows the current and ever user rates for thousand married couples (with wife aged 15 to 50) by the method of contraception. The percentage of current and ever use of condom, oral pill and IUD was negligible in rural areas but somewhat higher in urban areas. The practice of coitus interruptus was insignificant in both rural and urban areas. As a percentage of ever users, current users formed 50.4 per cent for condom, 30.5 per cent for oral pill and 41.7 per cent for IUD.

The rate of non-users of modern methods of family planning - sterilization, IUD, condom and the pill - per 1000 married couples by marital duration showed a decrease up to 20-24 years and then increased slightly for couples married for 25 years or more (Table 7.7). The rates for Maharashtra were 966 for 0-4 years duration, 792 for 5-9 years duration, 553 for 10-14 years duration, 415 for 15-19 years duration, 365 for 20-24 years duration and 489 for marital duration 25 years or more. This is consistent with the increasing practice of family planning with increasing marital duration except for the oldest cohort who might have larger family size values and who were not exposed to the programme during their prime child-bearing years. The rural and urban areas showed similar trends by marital duration, though the rural rates for non-users were generally higher. The largest rural-urban difference in the rate was observed for marital duration 5-9 years. The rural rate was 870 against a rate of 633 for other urban areas and 646 for Greater Bombay. Thus urban women accepted family planning earlier in their marital cycle than rural women did.

The percentage distributions of currently married women in specified age groups, by whether wanting or not wanting additional children are shown by knowledge of contraceptive methods in Table 7.8 and by contraceptive methods currently used in Table 7.9. For women aged

under 25, the percentage having no knowledge of contraception was not consistent between women wanting more children and those wanting no more children (Table 7.8). In fact, for women wanting more children this percentage was lower than for women wanting no more children for this age group since contraceptive knowledge was not relevant to reproductive behaviour in the youngest age group. However, for women aged 25-34 years and those aged 35 and over, the percentage with no knowledge of contraceptive methods was generally higher among women wanting more children compared to those wanting no more children. In fact, among women aged 35 years or more, the percentage for the former group was nearly twice as large as for the latter group in all three domains. Thus clearer differentials in contraceptive knowledge emerged, between women wanting and those not wanting additional children, as the women reached their desired family size.

The percentage of women currently using a contraceptive method was consistently higher for women wanting no more children compared to those wanting more children in each age group (Table 7.9). This percentage steadily increased with age and the difference in the percentages for the two groups of women also increased with age. For women aged 35 years and above, percentage non-users was 72.7 among rural women wanting more children compared to 37.8 among rural women wanting no more children. The corresponding percentages of non-users among women aged 35 or above in other urban areas for the two groups were 79.8 against 41.7 and in Greater Bombay they were 83.5 against 44.6. Similarly, in the same age group, the percentages sterilized among women wanting more children and those wanting no more children were 27.1 against 61.6 in rural areas, 18.3 against 54.1 in other urban areas and 13.2 against 52.0 in Greater Bombay. In ages 25 to 34, the same pattern of relationship was observed, although generally, the percentage using contraception was less than for women aged 35 years or above. Thus reproductive desires were more closely linked to contraceptive use than to contraceptive knowledge.

Source of Supply and After Effects of Oral Pill, Condom and IUD

The sources of supply and after effects of the oral pill, condom and IUD are discussed in this section. The figures are given in Tables 7.10 to 7.16. It should be noted that very few couples were using these methods in the State sample. Hence only broad findings are presented here.

About one-fifth of the condom users in urban areas and two-fifths in rural areas had obtained it free of cost. Among women using the pill, one-fifth of the urban women and three-tenths of the rural women had obtained it free of cost (Table 7.10). About 90 per cent of women who had ever used the pill reported no inconvenience. Roughly the remaining ten per cent complained of nausea, headache, etc. (Table 7.11).

About 60 per cent of the IUDs were fitted by private doctors in urban areas, whereas in rural areas very few IUDs were inserted (Table 7.12). The percentage of women reporting no inconvenience after IUD insertion was 35.0 in rural Maharashtra, 53.5 in other urban areas and 62.5 in Greater Bombay. The after effect of bleeding was reported by 50.0 per cent of rural women who ever had an IUD insertion, 30.3 of other urban women and 15.0 in Greater Bombay. About 10 per cent reported

other physical troubles after the IUD insertion (Table 7.13).

Among urban women who had ever worn IUD, 45.5 per cent were aged 20 to 24 and 33.7 per cent were aged 25 to 29 when the device was first inserted (Table 7.14). Among these women, 34.7 per cent had used the device after the first live birth, 26.7 per cent after the second live birth and 18.8 per cent after the third live birth (Table 7.15). Thus IUD, both as a limiting method and as a reversible spacing method, was used sufficiently early in the life cycle of the women. Of the women who had worn IUD, 35.0 per cent in rural areas, 16.3 per cent in other urban areas and 20.0 per cent in Greater Bombay shifted to sterilization whereas current users of IUD formed 15.0 per cent of ever users in rural areas, 46.5 per cent in other urban areas and 47.5 per cent in Greater Bombay. Hence the percentage of women shifting from IUD to sterilization was larger in rural than in urban areas.

Age and Parity at Sterilization and After Effects

Data relating to the age and parity at sterilization and its after effects are presented in this section. The percentage distribution of sterilized couples by years since sterilization (Table 7.17) shows the highest percentage of 22.9 done 3 to 4 years before the survey in 1980 and the next highest percentage of 18.6 done 5 to 6 years before the survey. These high percentages related to the Emergency period. Whereas in urban areas the percentage of sterilizations done 3 to 4 years ago and 5 to 6 years ago were 19.4 and 13.2, in rural areas they were much higher, 24.6 and 21.2 respectively. Thus the effect of the programme during the Emergency was felt more sharply in rural than in urban areas.

The tapering off in the percentage of sterilizations done in earlier years of the programme may be attributed somewhat to the attrition due to mortality and marriage dissolution but more to the steadily increasing tempo of the programme up to the time of the Emergency. It may also be noted that percentage of couples sterilized in the initial years of the programme (11 to 12 years ago, 13 to 14 years ago, 15 to 16 years ago and 16 or more years before the survey) was higher in urban areas than in rural areas. Further, Aurangabad Division lagged in the percentage of sterilized couples in earlier years and picked up during the Emergency compared to the other two rural regions.

Graph 7.1 reveals the more salient features of Table 7.17. The cumulative percentage sterilized before 1964 and from that year to 1980 is shown for rural areas, other urban areas and Greater Bombay. It is seen that in urban, compared to rural areas, relatively more sterilizations were done in the earlier period, that the tempo of sterilizations picked up over the years since the slope is over 45°, that the gradient was steeper in the Emergency years than before, that the rural gradient was steeper than the urban gradient during the Emergency years and that the gradient declined after the Emergency due to the backlash effect on the programme.

The average age of wife at sterilization was 30.4 years in rural areas and 28.9 in urban areas (Table 7.18). In rural areas 32.2 per cent of couples were sterilized when the wife was aged 25 to 29 and 31.5 per

cent were sterilized when the wife was aged 30 to 34. The corresponding percentages for other urban areas were 37.8 and 27.9 and for Greater Bombay 41.7 and 30.2. Thus a somewhat larger percentage of couples in urban compared to rural areas, was sterilized when the wife was 25 to 29 years old.

The average age of husband at sterilization of the couple was 36.6 years for the State against an average age of wife of 29.9 years. The average age of husband was 36.9 years in rural areas and 35.9 years in urban areas (Table 7.19). The percentages of husbands aged 30 to 34, 35 to 39 and 40 to 44 at sterilization of the couple were 27.3, 29.3 and 21.2 in rural areas and 30.6, 31.6 and 16.1 in urban areas. Thus a larger percentage of couples were sterilized in urban than in rural areas when the husband was 30 to 34 years old. A reverse rural-urban differential was observed for couples sterilized when the husband was 40 to 44 years old.

In urban areas only 3.1 per cent of the couples underwent sterilization at a camp against 23.6 per cent in the rural areas (Table 7.20). But 28.2 per cent of urban couples were sterilized in private hospitals or dispensaries against only 9.0 per cent of rural couples. The percentage of couples who were sterilized in government or work-place hospitals was about the same in rural and urban areas.

There were significant differences among rural regions in the distribution of couples by the place of sterilization. In Western Maharashtra, 12.8 per cent of the couples were sterilized in private hospitals or dispensaries against 1.6 per cent in Aurangabad Division and 4.8 per cent in Nagpur Division. By contrast, sterilization camps played an important role in Nagpur Division where 44.0 per cent of the couples were operated against 13.0 per cent in Aurangabad Division and 15.6 per cent in Western Maharashtra. Correspondingly sterilization was done in government or work-place hospitals only on 51.2 per cent of the couples in Nagpur Division compared to 85.4 per cent in Aurangabad Division and 71.6 per cent in Western Maharashtra.

Of the two urban zones, in Greater Bombay a higher percentage of sterilizations (32.2) was performed privately compared to other urban areas (25.4). Only 0.8 per cent of the sterilized couples in Greater Bombay had the operation done in camps against 4.8 per cent in other urban areas.

The percentage distribution of sterilized couples is shown by the number of children living at sterilization in Table 7.21 and by the number of sons living at sterilization in Table 7.22. The percentage of couples who had 4 or more living children at sterilization was 68.3 for Aurangabad Division, 65.8 for Nagpur Division, 62.9 for Western Maharashtra, 62.7 for other urban areas and 60.6 for Greater Bombay. The percentages of couples who had 2 living children at the time of sterilization were 6.9, 8.3, 8.1, 9.9 and 10.0 respectively for these domains. Thus a slight rural-urban gradient was observed in the percentage of couples sterilized with two living children with a higher percentage for urban zones compared to rural regions. But the difference between Aurangabad Division and Greater Bombay was more significant in this respect.

The percentage of couples who underwent sterilization when they had three or more living sons was 42.3 in Aurangabad Division, 37.9 in Nagpur Division, 37.3 in Western Maharashtra and other urban areas and 36.5 in Greater Bombay. The percentages of couples who had one living son at sterilization in these domains were, respectively, 17.3, 16.2, 18.2, 22.9 and 21.7. Thus a larger percentage of urban couples underwent sterilization with only one living son.

The after-effects of vasectomy and tubectomy operations reported by the wives are shown in Table 7.23. In rural Maharashtra 81.2 per cent of the husbands were reported to have had no after-effects while for other urban areas this percentage was 86.1 and for Greater Bombay 89.0. The after-effect of frequent physical pain was reported for 5.6 per cent of vasectomies performed in the State and sepsis or swelling that was successfully treated was reported for 1.8 per cent of vasectomies. The complaints of strain on nerves and a feeling of weakness was reported for 11.2 per cent of the cases in rural areas but only 5.6 per cent of cases in other urban areas and 4.4 per cent of cases in Greater Bombay. Thus a higher percentage reported adverse after-effects of the vasectomy operation in rural than in urban areas.

After the tubectomy operation, the percentage of rural women reporting no trouble was 84.1 against 91.4 for other urban areas and 92.4 for Greater Bombay. These percentages were higher than the corresponding percentages for vasectomy. For the State of Maharashtra, 87.5 per cent of the women reported no trouble after the tubectomy operation, 4.3 per cent reported minor troubles, 2.3 per cent reported general weakness, 1.1 per cent reported serious backache most of the time, 3.5 per cent reported menstrual trouble and 1.3 per cent reported sepsis or other serious complications.

Mean Parity and Mean Number of Living Children by Family Planning

Knowledge and Use in Relation to Educational Level and Community Type

The mean parity and mean number of living children are presented in this section by family planning knowledge and method used. These means are shown separately for each educational level and community. Tables 7.24 to 7.28 throw light on the differentials in the fertility levels of couples by family planning knowledge and use according to the level of education or community type.

Table 7.24 shows the mean parity and mean number of living children by broad age groups according to whether the women had any or no knowledge of contraceptive methods. There is the usual life cycle variation in these means over the age groups. Considering women aged 35 and above, in rural areas 85.4 per cent of the women knew about family planning and 14.6 per cent had no such knowledge. The mean parity of the former group of women was 5.24 against the mean parity of 3.99 for the latter. This difference could be attributed to some extent to the selectivity of sub-fecund and sterile women in the group with no knowledge of contraceptive methods and to breast-feeding and other practices accounting for larger birth intervals and a smaller parity in this group. However, the large mean parity in the group with no knowledge of contraceptive methods certainly indicates the potential for

further spread of family planning knowledge. The differentials in the mean number of living children were similar and were accounted for by the same factors.

The differentials in mean parity of women aged 35 or above, between those with and without knowledge of contraception, for other urban areas and for Greater Bombay were similar. The mean for women with no knowledge was less than the mean for women with knowledge of contraception and could be attributed to the reasons mentioned for rural areas. In other urban areas, 18.3 per cent of the women aged 35 years or over had no knowledge of contraception and had a mean parity of 4.14. In Greater Bombay, 15.2 per cent of these women had no knowledge of contraception and had a mean parity of 3.68. These figures reveal the scope for further spread of knowledge of family planning methods in urban areas also. The findings are confirmed by the figures on mean number of living children.

The mean parity and mean number of living children are given in Table 7.25 for three groups of couples by method used, those sterilized, those using other methods and those not using any method of family planning. To control for life cycle variations, only figures for women aged 35 and over are considered below. In rural areas, 54.8 per cent of these couples were sterilized and had mean parity of 5.52. Those using other methods were insignificant, 0.5 per cent and had a mean parity of 4.46. Finally those not using any contraceptive method formed 44.7 per cent with a mean parity of 4.49. The lower mean parity of the last group may be attributed to selective factors such as sub-fecundity and longer breast-feeding intervals. Those using other methods also had a lower mean parity than sterilized women because these methods are reversible and are used for both spacing and limiting the family size. These figures clearly reveal the scope for further family planning practice among women using no method since their average parity was high. The figures on mean number of living children support these findings.

In other urban areas and Greater Bombay, considering only women aged 35 years or more, similar differentials were found among the three groups of couples, those sterilized, those using other methods of contraception and those not using any method. Women not using any method constituted 48.1 per cent in other urban areas and had a mean parity of 4.24 while in Greater Bombay they formed 51.7 per cent with a mean parity of 3.50. Thus, in urban areas also, there is much scope for extending family planning services to the group of women who had a high mean parity. Similar findings emerge when the mean number of living children is considered.

The mean parity is given by the level of education of the woman in Table 7.26 for women with and without knowledge of contraceptive methods. The mean parities were generally lower among women with no knowledge since they tend to be selected for lower age and parity and an earlier stage of family formation. A gradient, by educational level, in mean parity is clearly seen for both groups of women in rural and other urban areas and Greater Bombay. For Maharashtra State, women with knowledge of family planning had a mean parity of 3.81 if illiterate, a mean parity of 3.00 if literate or with formal education below VII

standard, a mean of 2.32 if educated at least up to VII standard but not above SSC and a mean of 1.79 if educated above SSC. The corresponding means for women with no knowledge of contraception were 2.05, 1.42, 1.06 and 0.87. Hence the range of variation in the mean parity by educational level was substantial for both groups of women.

Table 7.27 shows the mean parity by the level of education of the wife separately for sterilized couples, couples using other methods and no method of contraception. For sterilized couples, the mean parity shows sharp gradations by educational level. In rural areas, illiterate women belonging to this group had a mean parity of 5.00, literate women and those educated below VII standard had a mean parity of 4.42, those educated at least to VII standard but not have SSC a mean parity of 4.02 and those educated above SSC a mean parity of 3.20. Thus there was a significant fall in the mean parity with increasing education, with the sharpest drop between education up to SSC and education above SSC.

The mean number of living children presented a similar gradation by the level of education although the range of variation was less. This was, perhaps, due to the reduced mortality risk for children borne by women having a higher educational level. Again the sharpest decline in the mean was between rural women with education up to SSC (3.83) and those with education above SSC (3.00). As regards couples using other methods of contraception, their numbers were small, their mean parities did not show consistent gradations and the range of their variation was also small by the educational level of the wife. Rural couples not using any method of contraception generally showed the expected gradient in their mean parity by the educational level of the wife although the range of variation was less than among sterilized couples.

A similar pattern of gradation in the mean parity and mean number of living children by the level of education of the woman was found in other urban areas and in Greater Bombay among sterilized couples. In other urban areas, among sterilized couples, illiterate women had a mean parity of 5.25, those literate or educated below VII standard had a mean parity of 4.54, those educated at least up to VII standard but not above SSC a mean parity of 3.59 and women educated above SSC a mean parity of 2.95. The corresponding figures for Greater Bombay were 5.26, 4.25, 3.61 and 3.07. In urban areas the decrease in the mean parity by the educational level of wives of sterilized couples was more evenly spaced than in rural areas but the range of variation was about the same. The gradation in the mean number of living children was similar to that observed in the mean parity but the range of variation was naturally less due to higher survival rates for children borne by women with more education. Again among urban couples using other methods of contraception, the numbers by the level of education of the wife were small, the gradient in the mean parity was not always consistent nor the range of variation in it large. Couples not using any method in urban areas showed the expected gradient in mean parity by the educational level of the wife although the range of variation was less than for sterilized couples.

The mean parity by community is given in Table 7.28 for sterilized couples, and couples using other methods and no method. The means for the latter two groups depended on the composition of women by age and

the stage of life cycle in each community. Hence these means cannot be directly compared. But it is instructive to compare the mean parity of sterilized couples by community as these couples had completed their families. In rural areas, there were no sharp differences in the mean parity of sterilized couples except that Hindus belonging to advanced castes had a slightly lower mean parity. In other urban areas, advanced caste Hindu couples had the lowest mean parity, couples belonging to intermediate caste Hindus and other religions except Islam had somewhat higher mean parities and all other communities had distinctly higher mean parities. In Greater Bombay, among sterilized couples, women belonging to other religions and advanced caste Hindus had the lowest mean parity and Muslims had the highest mean parity, excluding Scheduled Tribes couples who were too few in the sample. All the other communities had intermediate values for their mean parity. Thus Table 7.28 suggests that sterilization was accepted at a somewhat lower parity by advanced caste Hindu couples in rural and urban areas, and by women belonging to religions other than Hinduism and Islam in urban areas, whereas Muslim couples accepted it at a higher parity in both rural and urban areas.

Graph 7.1 : Cumulative Percentage of Couples Sterilized by Calendar Years: NFMS Maharashtra, 1980

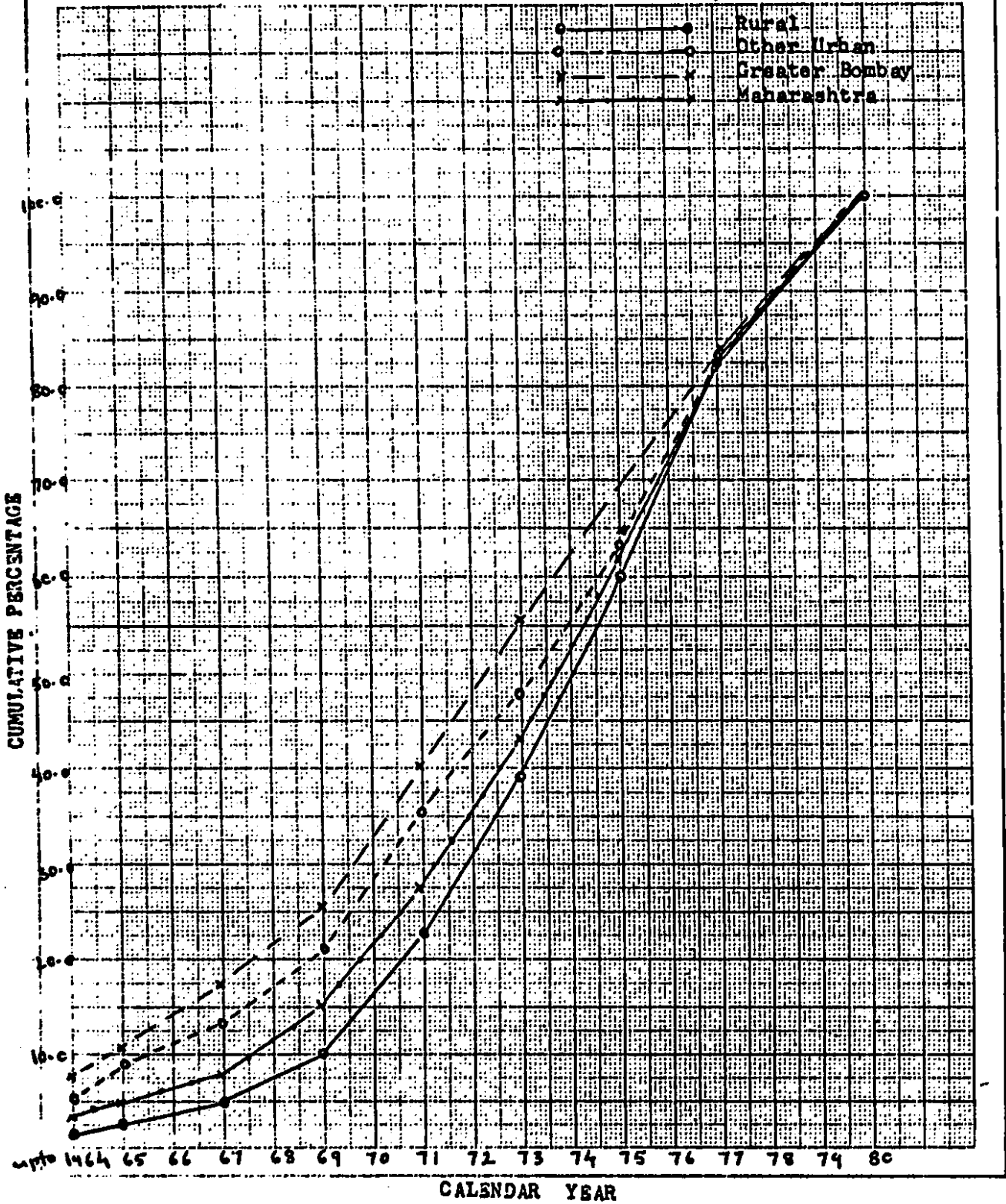


Table 7.1 : Percentage Distribution of Currently Married Women by Knowledge of Modern Contraceptive Methods

	Condom	Oral pill	IUD	Sterilization	All women
Aurangabad Division	6.9	2.0	5.0	65.5	1127
Nagpur Division	18.5	9.1	9.1	83.8	1686
Western Maharashtra	16.0	11.3	10.9	82.1	3254
Rural Maharashtra	15.0	9.0	9.3	79.5	6067
Urban excluding					
Greater Bombay	34.3	27.6	22.6	73.9	1635
Greater Bombay	57.3	51.7	37.9	83.5	1172
Urban Maharashtra	43.9	37.7	29.0	77.9	2807
Maharashtra State	24.1	18.0	15.5	79.0	8874

The total of percentages may be greater than 100.0 since some women knew about more than one method.

Table 7.2 : Percentage Distribution of Currently Married Women by Number of Contraceptive Methods Known

	No knowledge of any method	One method	Two methods	Three methods	Four methods	All women
Aurangabad Division	34.4	56.4	5.6	2.5	1.1	100.0=1127
Nagpur Division	15.0	64.4	9.2	8.0	3.4	100.0=1686
Western Maharashtra	17.6	61.3	9.2	7.0	4.9	100.0=3254
Rural Maharashtra	20.0	61.3	8.5	6.4	3.8	100.0=6067
Urban excluding						
Greater Bombay	19.3	43.4	12.0	10.2	15.1	100.0=1635
Greater Bombay	11.2	23.0	15.4	25.1	25.3	100.0=1172
Urban Maharashtra	15.9	34.9	13.4	16.4	19.4	100.0=2807
Maharashtra State	18.7	52.9	10.1	9.6	8.7	100.0=8874

Table 7.3 : Percentage Distribution of Currently Married Women by Number of Contraceptive Methods Ever-Used

	Never used any method	Used one modern method	Used two or more modern methods	All women
Aurangabad Division	77.4	22.5	0.1	100.0=1127
Nagpur Division	65.2	33.2	1.6	100.0=1686
Western Maharashtra	66.4	33.2	0.4	100.0=3254
Rural Maharashtra	68.2	31.2	0.6	100.0=6067
Urban excluding				
Greater Bombay	58.2	37.4	4.4	100.0=1635
Greater Bombay	58.2	38.0	3.8	100.0=1172
Urban Maharashtra	58.2	37.7	4.1	100.0=2807
Maharashtra State	65.0	33.3	1.7	100.0=8874

Table 7.4 : Percentage Distribution of Currently Married Women by Contraceptive Method Ever-Used

	Never used any modern method	Ever used			Sterilization	All Women
		Condom	Oral pill	IUD		
Aurangabad Division	77.4	0.7	0.1	0.2	21.8	1127
Nagpur Division	65.2	2.8	0.8	0.6	32.3	1686
Western Maharashtra	66.4	0.8	0.6	0.3	32.4	3254
Rural Maharashtra	68.2	1.3	0.5	0.3	30.4	6067
Urban excluding						
Greater Bombay	58.2	7.3	4.8	2.6	32.2	1635
Greater Bombay	58.2	5.7	5.4	3.4	31.7	1172
Urban Maharashtra	58.2	6.7	5.1	3.0	32.0	2807
Maharashtra State	65.0	3.0	2.0	1.2	30.9	8874

The total of percentages may exceed 100.0 if some women used more than one methods.

Table 7.5 : Percentage Distribution of Currently Married Women by Contraceptive Method Currently Used

	Steril- ization	IUD	Oral pill but not IUD	Condom but not pill or IUD	No modern method used	All women
Aurangabad Division	21.8	0.0	0.1	0.5	77.6	100.0=1127
Nagpur Division	32.3	0.0	0.2	0.8	66.7	100.0=1686
Western Maharashtra	32.4	0.1	0.2	0.6	66.7	100.0=3254
Rural Maharashtra	30.4	0.0	0.2	0.6	68.8	100.0=6067
Urban excluding						
Greater Bombay	32.2	1.2	1.1	3.3	62.2	100.0=1635
Greater Bombay	31.7	1.6	1.8	2.9	62.0	100.0=1172
Urban Maharashtra	32.0	1.4	1.4	3.1	62.1	100.0=2807
Maharashtra State	30.9	0.5	0.6	1.4	66.6	100.0=8874

Table 7.6 : Current and Ever User Rates Per 1,000 Married Couples (with Wife Aged 15 to 50) by Method of Contraception

	Condom			Oral pill			IUD			Coitus interruptus			Steril- ization Rate 0/00	No.of married couples 15-50
	Current user rate 0/00	Ever user rate 0/00	% Current users/ ever users	Current user rate 0/00	Ever user rate 0/00	% current users/ ever users	Current user rate 0/00	Ever user rate 0/00	% current users/ ever users	Current user rate 0/00	Ever user rate 0/00	% current users/ ever users		
Rural Maharashtra	7	13	51.9	2	5	40.6	-	3	15.0	-	-	66.7	304	6067
Urban excluding Greater Bombay	36	73	49.2	12	48	24.1	13	26	48.8	2	2	100.0	322	1635
Greater Bombay	29	57	50.7	18	54	33.3	16	34	47.5	3	7	50.0	317	1172
Maharashtra State	15	30	50.4	6	20	30.5	5	12	41.7	1	2	66.7	309	8874

- Negligible.

Table 7.7 : Rate of Non-Users of Contraception* Per 1,000 Married Couples (With Wife Aged 15 to 50) by Duration of Marriage

	Duration of marriage in years							Number, 'Duration not given'	No. of married couples 15-50
	0-4	5-9	10-14	15-19	20-24	25 or more	All durations		
Rural Maharashtra	983	870	598	428	367	464	681	443	6067
Urban excluding Greater Bombay	922	633	441	333	337	549	582	67	1635
Greater Bombay	906	646	491	456	395	527	583	6	1172
Maharashtra State	966	792	553	415	365	489	650	516	8874

* Non-users of the modern methods of sterilization, IUD, condom and the pill.

Table 7.8 : Percentage Distribution of Currently Married Women by Specific Age Groups, by Knowledge of Modern Contraceptive Methods* by Additional Children Wanted and Not Wanted

	Upto 24 years				25-34 years			
	No know- ledge	Knowledge of		Number of women	No know- ledge	Knowledge of		Number of women
		One method	Two or more methods			One method	Two or more methods	
Rural Maharashtra:								
Additional children wanted	19.7	52.5	27.8	100.0=1431	11.6	69.6	18.8	100.0= 851
Additional children not wanted	67.1	25.2	7.7	100.0= 584	11.7	66.0	22.3	100.0=1114
Urban excluding Greater Bombay :								
Additional children wanted	27.1	34.7	38.2	100.0= 317	16.7	38.9	44.4	100.0= 216
Additional children not wanted	43.6	28.7	27.7	100.0= 101	8.4	46.6	45.0	100.0= 371
Greater Bombay :								
Additional children wanted	10.4	15.3	74.3	100.0= 144	10.4	12.4	77.2	100.0= 201
Additional children not wanted	11.9	21.4	66.7	100.0= 42	4.9	26.9	68.2	100.0= 286
Maharashtra State :								
Additional children wanted	20.2	46.7	33.1	100.0=1892	12.3	55.3	32.4	100.0=1268
Additional children not wanted	60.7	25.4	13.9	100.0= 727	9.9	55.7	34.4	100.0=1771

* This includes sterilization, IUD, condom and the pill.
Ten cases of "age not given" are excluded from the table.

Table 7.8 : (Concl.d.)

	35 years and above			All ages					
	No know- ledge	Knowledge of		Number of women	No know- ledge	Knowledge of		Number of women	
		One method	Two or more methods			One method	Two or more methods		
Rural Maharashtra:									
Additional children wanted	24.1	64.9	11.0	100.0= 410	17.8	59.8	22.4	100.0=2692	
Additional children not wanted	12.2	73.4	14.4	100.0=1670	21.6	62.6	15.8	100.0=3368	
Urban excluding Greater Bombay :									
Additional children wanted	31.7	42.3	26.0	100.0= 104	24.3	37.4	38.3	100.0= 637	
Additional children not wanted	15.7	51.8	32.5	100.0= 523	15.8	47.5	36.7	100.0= 995	
Greater Bombay :									
Additional children wanted	25.3	18.7	56.0	100.0= 91	13.5	14.7	71.8	100.0= 436	
Additional children not wanted	13.0	29.2	57.8	100.0= 408	9.8	27.9	62.3	100.0= 736	
Maharashtra State :									
Additional children wanted	25.6	54.1	20.3	100.0= 605	18.4	50.8	30.8	100.0=3765	
Additional children not wanted	13.0	62.2	24.8	100.0=2601	18.7	54.7	26.6	100.0=5099	

Table 7.9 : Percentage Distribution of Currently Married Women by Specific Age Groups, by Contraceptive Method Currently Used, by Additional Children Wanted or Not Wanted

	Upto 24 years				25-34 years			
	Steri- lized	User of other modern method ⁺	Non- user [*]	Number of women	Steri- lized	User of other modern method ⁺	Non- user [*]	Number of women
Rural Maharashtra:								
Additional children wanted	1.3	0.9	97.8	100.0=1431	14.3	1.2	84.5	100.0= 851
Additional children not wanted	5.0	0.7	94.3	100.0= 584	48.2	1.3	50.5	100.0=1114
Urban excluding Greater Bombay :								
Additional children wanted	1.6	2.8	95.6	100.0= 317	9.7	8.3	82.0	100.0= 216
Additional children not wanted	15.8	5.0	79.2	100.0= 101	49.3	9.7	41.0	100.0= 371
Greater Bombay :								
Additional children wanted	0.0	4.2	95.8	100.0= 144	4.5	12.4	83.1	100.0= 201
Additional children not wanted	16.7	2.4	80.9	100.0= 42	46.2	8.7	45.1	100.0= 286
Maharashtra State :								
Additional children wanted	1.3	1.5	97.2	100.0=1892	12.0	4.2	83.8	100.0=1268
Additional children not wanted	7.2	1.4	91.4	100.0= 727	48.1	4.2	47.7	100.0=1771

+ Modern methods include sterilization, IUD, condom and the pill.

* 'Non-user' also includes user of traditional methods such as coitus interruptus.

Ten cases of "age not given" are excluded from the table.

Table 7.9 (Concl'd.)

	35 years and above				All ages			
	Steri- lized	User of other modern method ⁺	Non- user [*]	Number of women	Steri- lized	User of other modern method ⁺	Non- user [*]	Number of women
Rural Maharashtra:								
Additional children wanted	27.1	0.2	72.7	100.0= 410	9.4	0.9	89.7	100.0=2692
Additional children not wanted	61.6	0.6	37.8	100.0=1670	47.3	0.8	51.9	100.0=3368
Urban excluding Greater Bombay :								
Additional children wanted	18.3	1.9	79.8	100.0= 104	7.1	4.6	88.3	100.0= 637
Additional children not wanted	54.1	4.2	41.7	100.0= 523	48.5	6.3	45.2	100.0= 995
Greater Bombay :								
Additional children wanted	13.2	3.3	83.5	100.0= 91	4.8	7.8	87.4	100.0= 436
Additional children not wanted	52.0	3.4	44.6	100.0= 408	47.7	5.4	46.9	100.0= 736
Maharashtra State :								
Additional children wanted	23.5	1.0	75.5	100.0= 605	8.4	2.3	89.3	100.0=3765
Additional children not wanted	58.5	1.8	39.7	100.0=2601	47.6	2.6	49.8	100.0=5099

Table 7.10 : Percentage Distribution of Currently Married Women by Source of Condom and Oral Pill

	Condom					Oral pill				
	Bought from chemist	Free supply	Number reporting	Number not report-ing	Number of couples	Bought from chemist	Free supply	Number reporting	Number not report-ing	Number of couples
Rural Maharashtra	62.2	37.8	100.0= 74	7	81	70.4	29.6	100.0= 27	5	32
Urban excluding Greater Bombay	81.7	18.3	100.0= 109	11	120	78.9	21.1	100.0= 71	8	79
Greater Bombay	85.9	14.1	100.0= 64	3	67	85.5	14.5	100.0= 62	1	63
Maharashtra State	76.9	23.1	100.0= 247	21	268	80.0	20.0	100.0= 160	14	174

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Table 7.11 : Percentage Distribution of Ever Users of the Pill by Reported Inconvenience

	No inconvenience	Not avail-able	Costly	Nausea, headache, etc.	Fatten-ing	Ever users of pill
Rural Maharashtra	90.6	0.0	0.0	9.4	0.0	100.0 = 32
Urban excluding Greater Bombay	87.2	1.3	1.3	8.9	1.3	100.0 = 79
Greater Bombay	88.9	0.0	0.0	11.1	0.0	100.0 = 63
Maharashtra State	88.4	0.6	0.6	9.8	0.6	100.0 = 174

Table 7.12 : Percentage Distribution of Ever Users of IUD by Source of Device

	Fitted by private doctor	Fitted in Government, public or charitable hospital	Number reporting	Number not reporting	Ever users of IUD
Rural Maharashtra	-	-	100.0 = 16	4	20
Urban excluding Greater Bombay	56.4	43.6	100.0 = 39	4	43
Greater Bombay	69.2	30.8	100.0 = 39	1	40
Maharashtra State	60.6	39.4	100.0 = 94	9	103

- If the number of couples reporting is below 20, the percentage distribution is not shown.

Table 7.13 : Percentage Distribution of Ever Users of IUD by Reported Inconvenience

	No inconvenience	Bleeding	White Discharge	Physical trouble only	Irregular menses or pregnancy	Ever users of IUD
Rural Maharashtra	35.0	50.0	5.0	10.0	0.0	100.0 = 20
Urban excluding Greater Bombay	53.5	30.3	2.3	11.6	2.3	100.0 = 43
Greater Bombay	62.5	15.0	7.5	15.0	0.0	100.0 = 40
Maharashtra State	53.4	28.1	4.9	12.6	1.0	100.0 = 103

Table 7.14 : Percentage Distribution of Ever Users of IUD by Age at First Insertion of IUD

	Age of wife in years				Number in all ages	Number not reporting	Ever users of IUD
	19 and below	20-24	25-29	30 and above			
Rural Maharashtra	-	-	-	-	100.0 = 19	1	20
Urban excluding Greater Bombay	9.5	50.0	33.3	7.2	100.0 = 42	1	43
Greater Bombay	7.5	42.5	42.5	7.5	100.0 = 40	0	40
Maharashtra State	7.9	45.5	33.7	12.9	100.0 = 101	2	103

- If the number of couples reporting is below 20, the percentage distribution is not shown.

Table 7.15 : Percentage Distribution of Ever Users of IUD by Number of Children at First Insertion of IUD

	No of children				Number reporting	Number not reporting	Ever users of IUD
	1	2	3	4 or more			
Rural Maharashtra	-	-	-	-	19	1	20
Urban excluding Greater Bombay	33.3	35.7	16.7	14.3	42	1	43
Greater Bombay	45.0	17.5	25.0	12.5	40	0	40
Maharashtra State	34.7	26.7	18.8	19.8	101	2	103

- If the number of couples reporting is below 20, the percentage distribution is not shown.

Table 7.16 : Percentage Distribution of Ever Users of IUD by Shift from IUD to Other Methods

	No shift		Shift to condom	Shift to oral pill	Shift to sterilization	Shift to other methods	Ever users of IUD
	Current users	Others					
Rural Maharashtra	15.0	35.0	15.0	0.0	35.0	0.0	100.0 = 20
Urban excluding Greater Bombay	46.5	20.9	4.7	11.6	16.3	0.0	100.0 = 43
Greater Bombay	47.5	17.5	7.5	5.0	20.0	2.5	100.0 = 40
Maharashtra State	40.7	22.3	7.8	6.8	21.4	1.0	100.0 = 103

Table 7.17 : Percentage Distribution of Sterilised Couples* by Years Since Sterilization

	Years since sterilization									All years	Years since sterilization not given	Total sterilization
	Upto 2	3 to 4	5 to 6	7 to 8	9 to 10	11 to 12	13 to 14	15 to 16	Above 16			
Aurangabad Division	11.7	30.9	25.1	17.4	8.1	3.6	1.6	1.6	-	100.0 = 247	0	247
Nagpur Division	17.7	23.0	19.2	17.0	15.5	4.6	1.5	0.4	1.1	100.0 = 542	3	545
Western Maharashtra	14.4	24.0	21.3	15.9	12.1	6.2	3.1	1.6	1.4	100.0 = 1042	13	1055
Rural Maharashtra	15.0	24.6	21.2	16.4	12.6	5.4	2.4	1.3	1.1	100.0 = 1831	16	1847
Urban excluding												
Greater Bombay	16.7	19.7	16.2	14.4	12.1	7.6	4.4	4.0	4.9	100.0 = 526	1	527
Greater Bombay	16.3	19.2	8.9	16.3	11.7	10.8	6.5	3.5	6.8	100.0 = 369	3	372
Urban Maharashtra	16.5	19.4	13.2	15.2	12.0	8.9	5.3	3.8	5.7	100.0 = 895	4	899
Maharashtra State	15.5	22.9	18.6	16.0	12.4	6.6	3.3	2.1	2.6	100.0 = 2726	20	2746

* Currently married with wife aged 15 to 50.

Table 7.18 : Percentage Distribution of Sterilized Couples* by Age of Wife at Sterilization

	Age of wife at sterilization (in years)								Age at sterilization not given	Total sterilizations	Average age of wife at sterilization
	Upto 19	20-24	25-29	30-34	35-39	40-44	45-49	All ages			
Aurangabad Division	0.4	9.7	32.8	34.0	15.8	6.1	1.2	100.0 = 247	0	247	30.9
Nagpur Division	1.1	13.8	33.1	28.4	18.8	4.2	0.6	100.0 = 543	2	545	30.3
Western Maharashtra	1.2	13.0	31.6	32.6	16.0	4.6	1.0	100.0 = 1049	6	1055	30.4
Rural Maharashtra	1.1	12.8	32.2	31.5	16.8	4.7	0.9	100.0 = 1839	8	1847	30.4
Urban excluding Greater Bombay	1.9	19.6	37.8	27.9	10.5	2.1	0.2	100.0 = 526	1	527	28.7
Greater Bombay	0.3	14.6	41.7	30.2	12.4	0.8	-	100.0 = 371	1	372	29.1
Urban Maharashtra	1.2	17.5	39.4	28.9	11.3	1.6	0.1	100.0 = 897	2	899	28.9
Maharashtra state	1.1	14.3	34.5	30.7	15.0	3.7	0.7	100.0 = 2736	10	2746	29.9

* Currently married with wife aged 15 to 50.

Table 7.19 : Percentage Distribution of Sterilized Couples* by Age of Husband at Sterilization

	Age of husband at sterilization (in years)								All ages	Age at sterilization not given	Total sterilizations	Average age of husband at sterilization
	Upto 24	25-29	30-34	35-39	40-44	45-49	50-54	Above 54				
Aurangabad Division	-	6.9	29.6	29.1	23.5	8.1	2.4	0.4	100.0 = 247	0	247	37.3
Nagpur Division	0.7	12.1	28.2	25.9	22.3	8.1	2.0	0.7	100.0 = 544	1	545	36.6
Western Maharashtra	1.0	9.8	26.4	30.9	20.2	8.2	2.5	1.0	100.0 = 1051	4	1055	37.0
Rural Maharashtra	0.8	10.1	27.3	29.3	21.2	8.1	2.3	0.9	100.0 = 1842	5	1847	36.9
Urban excluding Greater Bombay	1.1	12.0	30.2	30.6	16.2	7.2	2.5	0.2	100.0 = 526	1	527	36.1
Greater Bombay	0.5	13.6	31.1	33.3	15.9	4.9	0.8	0.5	100.0 = 370	2	372	35.6
Urban Maharashtra	0.9	12.4	30.6	31.6	16.1	6.3	1.8	0.3	100.0 = 896	3	899	35.9
Maharashtra State	0.8	10.8	28.4	30.1	19.5	7.5	2.2	0.7	100.0 = 2738	8	2746	36.6

* Currently married with wife aged 15 to 50.

Table 7.20 : Percentage Distribution of Sterilized Couples* by Place of Sterilization

	Private hospital/ dispensary	Government or work- place hospital	Camp	All places	Place of steril- ization not given	Total steril- izations
Aurangabad Division	1.6	85.4	13.0	100.0 = 246	1	247
Nagpur Division	4.8	51.2	44.0	100.0 = 538	7	545
Western Maharashtra	12.8	71.6	15.6	100.0 = 1047	8	1055
Rural Maharashtra	9.0	67.4	23.6	100.0 = 1831	16	1847
Urban excluding Greater Bombay	25.4	69.8	4.8	100.0 = 524	3	527
Greater Bombay	32.2	67.0	0.8	100.0 = 369	3	372
Urban Maharashtra	28.2	68.7	3.1	100.0 = 893	6	899
Maharashtra State	15.3	67.8	16.9	100.0 = 2724	22	2746

* Currently married with wife aged 15 to 50.

Table 7.21 : Percentage Distribution of Sterilized Couples* by Number of Children Living at Sterilization

		No. of children living at sterilization (X)				Living children reported	Living children not reported	Total sterilizations	Average No. of children living at sterilization
		1	2	3	4 or more				
Aurangabad Division :	Percentage	1.6	6.9	23.2	68.3	100.0 = 246	1	247	4.2
	Cumulative Percentage (X+)	100.0	98.4	91.5	68.3				
Nagpur Division :	Percentage	0.9	8.3	25.0	65.8	100.0 = 544	1	545	4.2
	Cumulative Percentage (X+)	100.0	99.1	90.8	65.8				
Western Maharashtra :	Percentage	1.7	8.1	27.3	62.9	100.0 = 1051	4	1055	4.1
	Cumulative Percentage (X+)	100.0	98.3	90.2	62.9				
Rural Maharashtra :	Percentage	1.5	8.0	26.1	64.4	100.0 = 1841	6	1847	4.1
	Cumulative Percentage (X+)	100.0	98.5	90.5	64.4				
Urban excluding Greater Bombay :	Percentage	0.6	9.9	26.8	62.7	100.0 = 526	1	527	4.1
	Cumulative Percentage (X+)	100.0	99.4	89.5	62.7				
Greater Bombay :	Percentage	0.5	10.0	28.9	60.6	100.0 = 370	2	372	4.0
	Cumulative Percentage (X+)	100.0	99.5	89.5	60.6				
Urban Maharashtra :	Percentage	0.6	9.9	27.7	61.8	100.0 = 896	3	899	4.1
	Cumulative Percentage (X+)	100.0	99.4	89.5	61.8				
Maharashtra State :	Percentage	1.2	8.6	26.6	63.6	100.0 = 2737	9	2746	4.1
	Cumulative Percentage (X+)	100.0	98.8	90.2	63.6				

* Currently married with wife aged 15 to 50.

Table 7.22 : Percentage Distribution of Sterilized Couples* by Number of Sons Living at Sterilization

		No. of children living at sterilization (X)			Living sons reported	Living sons not reported	Total sterilizations	Average No. of living sons at sterilization
		1	2	3 or more				
Aurangabad Division :	Percentage	17.3	40.4	42.3	100.0 = 243	4	247	2.4
	Cumulative Percentage (X+)	100.0	82.7	42.3				
Nagpur Division :	Percentage	16.2	45.9	37.9	100.0 = 531	14	545	2.4
	Cumulative Percentage (X+)	100.0	83.8	37.9				
Western Maharashtra :	Percentage	18.2	44.5	37.3	100.0 = 1033	22	1055	2.4
	Cumulative Percentage (X+)	100.0	81.8	37.3				
Rural Maharashtra :	Percentage	17.5	44.4	38.1	100.0 = 1807	40	1847	2.4
	Cumulative Percentage (X+)	100.0	82.5	38.1				
Urban excluding Greater Bombay :	Percentage	22.9	39.8	37.3	100.0 = 515	12	527	2.3
	Cumulative Percentage (X+)	100.0	77.1	37.3				
Greater Bombay :	Percentage	21.7	41.8	36.5	100.0 = 359	13	372	2.3
	Cumulative Percentage (X+)	100.0	78.3	36.5				
Urban Maharashtra :	Percentage	22.4	40.7	36.9	100.0 = 874	25	899	2.3
	Cumulative Percentage (X+)	100.0	77.6	36.9				
Maharashtra State :	Percentage	19.1	43.2	37.7	100.0 = 2681	65	2746	2.4
	Cumulative Percentage (X+)	100.0	80.9	37.7				

* Currently married with wife aged 15 to 50.

Table 7.23 : Percentage Distribution of Vasectomies and Tubectomies by Post-Operational Troubles

Vasectomies

	No trouble	Other frequent physical pain	Strain on nerves, feeling of weakness	Sepsis or swelling after operation but cured now	Persistent swelling	Number of vasectomies
Rural Maharashtra	81.2	5.8	11.2	1.6	0.2	100.0 = 881
Urban excluding Greater Bombay	86.1	4.6	5.6	3.7	0.0	100.0 = 108
Greater Bombay	89.0	4.4	4.4	2.2	0.0	100.0 = 45
Maharashtra State	82.0	5.6	10.4	1.8	0.2	100.0 = 1034

Tubectomies

	No trouble	Minor trouble	General weakness	Serious backache most of the time	Menstrual trouble	Sepsis or other serious trouble	Number of tubectomies
Rural Maharashtra	84.1	5.6	3.7	1.7	3.7	1.2	100.0 = 939
Urban excluding Greater Bombay	91.4	2.4	0.0	0.0	4.3	1.9	100.0 = 415
Greater Bombay	92.4	3.1	1.2	0.9	1.5	0.9	100.0 = 326
Maharashtra State	87.5	4.3	2.3	1.1	3.5	1.3	100.0 = 1680

The table excludes 32 couples, of whom for 28 couples both husband and wife were sterilized and for 4 couples the sex of the sterilized was not given.

Table 7.24 : Percentage Distribution, Mean Parity and Mean Number of Children Living Per Currently Married Women by Age Group by Knowledge of Contraceptive Methods

Age group	Rural Maharashtra			Urban excluding Greater Bombay		
	Know-ledge	No know-ledge	All women	Know-ledge	No know-ledge	All women
Upto 24 years :						
Percentage	66.5	33.5	100.0 = 2015	68.9	31.1	100.0 = 418
Mean parity	1.18	0.47	0.94	1.39	0.67	1.17
Mean No. of children living	1.06	0.39	0.84	1.29	0.62	1.08
25 - 34 years :						
Percentage	88.3	11.7	100.0 = 1965	88.6	11.4	100.0 = 587
Mean parity	3.26	1.95	3.10	3.07	1.81	2.93
Mean No. of children living	2.80	1.69	2.67	2.77	1.64	2.64
35 years and above :						
Percentage	85.4	14.6	100.0 = 2080	81.7	18.3	100.0 = 627
Mean parity	5.24	3.99	5.06	4.79	4.14	4.67
Mean No. of children living	4.24	2.99	4.06	4.12	3.37	3.98
All ages :						
Percentage	80.0	20.0	100.0 = 6060	80.9	19.1	100.0 = 1632
Mean parity	3.41	1.26	3.05	3.37	2.17	3.14
Mean No. of children living	2.85	1.28	2.53	2.97	1.83	2.75
Age group	Greater Bombay			Maharashtra State		
	Know-ledge	No know-ledge	All women	Know-ledge	No know-ledge	All women
Upto 24 years :						
Percentage	89.2	10.8	100.0 = 186	68.5	31.5	100.0 = 2619
Mean parity	1.14	0.60	1.08	1.21	0.50	0.99
Mean No. of children living	1.07	0.55	1.02	1.10	0.43	0.89
25 - 34 years :						
Percentage	92.8	7.2	100.0 = 487	89.1	10.9	100.0 = 3039
Mean parity	2.81	2.00	2.74	3.14	1.93	3.01
Mean No. of children living	2.61	1.66	2.55	2.76	1.67	2.65
35 years and above :						
Percentage	84.8	15.2	100.0 = 499	84.6	15.4	100.0 = 3206
Mean parity	4.10	3.68	4.64	4.98	3.98	4.82
Mean No. of children living	3.70	2.99	3.59	4.13	3.07	3.97
All ages :						
Percentage	88.8	11.2	100.0 = 1172	81.4	18.6	100.0 = 8864
Mean parity	3.06	2.76	3.03	3.35	1.82	3.07
Mean No. of children living	2.81	2.26	2.75	2.86	1.46	2.60

Excludes 10 cases of age not reported.

Table 7.25 : Percentage Distribution, Mean Parity and Mean Number of Children Living Per Currently Married Women by Age Group by Contraceptive Currently Used

Age group	Rural Maharashtra			Urban excluding Greater Bombay				
	Steril- ization	Other methods	Not using	All women	Steril- ization	Other methods	Not using	All women
Upto 24 years :								
Percentage	2.4	0.8	96.8	100.0 = 2015	5.0	3.4	91.6	100.0 = 418
Mean parity	2.52	1.06	0.90	0.94	3.10	1.57	1.04	1.17
Mean No. of children living	2.35	1.00	0.80	0.84	2.90	1.57	0.96	1.08
25 - 34 years :								
Percentage	33.5	1.3	65.2	100.0 = 1965	34.6	9.3	56.1	100.0 = 587
Mean parity	3.86	3.04	2.71	3.10	3.84	2.24	2.48	2.93
Mean No. of children living	3.43	2.92	2.28	2.67	3.56	2.09	2.16	2.64
35 years and above :								
Percentage	54.8	0.5	44.7	100.0 = 2080	48.2	3.7	48.1	100.0 = 627
Mean parity	5.52	4.46	4.49	5.06	5.21	3.38	4.24	4.67
Mean No. of children living	4.56	3.91	3.44	4.06	4.54	3.08	3.50	3.98
All ages :								
Percentage	30.4	0.9	68.7	100.0 = 6060	32.3	5.6	62.1	100.0 = 1632
Mean parity	4.85	2.69	2.26	3.05	4.59	2.43	2.45	3.14
Mean No. of children living	4.10	2.50	1.84	2.53	4.09	2.26	2.10	2.75

Excludes 10 cases of age not reported.

Table 7.25 : (Concl'd.)

Age group	Greater Bombay				Maharashtra State			
	Steril- ization	Other methods	Not using	All women	Steril- ization	Other methods	Not using	All women
Upto 24 years :								
Percentage	3.8	3.7	92.5	100.0 = 186	2.9	1.4	95.7	100.0 = 2619
Mean parity	3.43	1.43	0.97	1.08	2.76	1.32	0.93	0.99
Mean No. of children living	2.71	1.43	0.93	1.02	2.54	1.29	0.83	0.89
25 - 34 years :								
Percentage	29.0	10.2	60.8	100.0 = 487	33.0	4.2	62.8	100.0 = 3039
Mean parity	3.96	2.14	2.26	2.74	3.87	2.35	2.60	3.01
Mean No. of children living	3.70	2.04	2.08	2.55	3.49	2.22	2.23	2.65
35 years and above :								
Percentage	44.9	3.4	51.7	100.0 = 499	51.9	1.7	46.4	100.0 = 3206
Mean parity	4.70	3.41	3.50	4.04	5.35	3.61	4.27	4.82
Mean No. of children living	4.22	3.24	3.06	3.59	4.51	3.31	3.39	3.97
All ages :								
Percentage	31.7	6.3	62.0	100.0 = 1172	31.0	2.5	66.5	100.0 = 8864
Mean parity	4.40	2.36	2.40	3.03	4.74	2.47	2.31	3.07
Mean No. of children living	3.99	2.26	2.16	2.75	4.08	2.32	1.92	2.60

Table 7.26: Percentage Distribution and Mean Parity Per Currently Married Woman by Education by Knowledge of Contraceptive Methods

Educational level	Rural Maharashtra			Urban excluding Greater Bombay		
	Know-ledge	No know-ledge	All women	Know-ledge	No know-ledge	All women
Illiterate:						
Percentage	78.5	21.5	100.0 = 4341	76.1	23.9	100.0 = 591
Mean parity	3.74	1.85	3.33	4.26	2.55	3.85
Literate upto 7th std.:						
Percentage	83.4	16.6	100.0 = 1466	82.0	18.0	100.0 = 534
Mean parity	2.73	0.98	2.48	3.46	2.44	3.28
7th std. to S.S.C.:						
Percentage	88.6	11.4	100.0 = 237	84.8	15.2	100.0 = 395
Mean parity	2.11	0.22	1.89	2.52	1.32	2.34
Above S.S.C.:						
Percentage	100.0	0.0	100.0 = 12	87.3	12.7	100.0 = 110
Mean parity	2.33	0.0	1.14	1.76	0.71	1.63
All levels:						
Percentage	80.0	20.0	100.0 = 6056	80.9	19.1	100.0 = 1630
Mean parity	3.41	1.62	3.05	3.37	2.17	3.14

Educational level	Greater Bombay			Maharashtra State		
	Know-ledge	No know-ledge	All women	Know-ledge	No know-ledge	All women
Illiterate:						
Percentage	77.4	22.6	100.0 = 354	78.1	21.9	100.0 = 5286
Mean parity	4.00	3.48	3.88	3.81	2.05	3.43
Literate upto 7th std.:						
Percentage	93.2	6.8	100.0 = 396	84.7	15.3	100.0 = 2396
Mean parity	3.37	1.85	3.27	3.00	1.42	2.76
7th std. to S.S.C.:						
Percentage	93.4	6.6	100.0 = 333	88.7	11.3	100.0 = 965
Mean parity	2.24	1.41	2.19	2.32	1.06	2.18
Above S.S.C.:						
Percentage	98.9	1.1	100.0 = 88	92.9	7.1	100.0 = 210
Mean parity	1.75	3.00	1.76	1.79	0.87	1.72
All levels:						
Percentage	88.8	11.2	100.0 = 1171	81.4	18.6	100.0 = 8857
Mean parity	3.06	2.76	3.03	3.35	1.82	3.07

Excludes 17 cases of educational level not given.

Table 7.27 : Percentage Distribution, Mean Parity and Mean Number of Children Living Per Currently Married Women by Educational Level by Contraceptive Currently Used

Educational level	Rural Maharashtra				Urban excluding Greater Bombay			
	Steril- ization	Other methods	Not using	All women	Steril- ization	Other methods	Not using	All women
Illiterate:								
Percentage	32.9	0.4	66.7	100.0 = 4341	36.4	1.0	62.6	100.0 = 591
Mean parity	5.00	3.00	2.51	3.33	5.25	3.33	3.05	3.85
Mean No. of living children	4.15	2.79	1.99	2.71	4.50	2.83	2.44	3.19
Literate upto 7th std.:								
Percentage	24.8	1.1	74.1	100.0 = 1466	36.5	3.2	60.3	100.0 = 534
Mean parity	4.42	3.19	1.76	2.44	4.54	3.59	2.50	3.28
Mean No. of living children	3.96	2.93	1.55	2.16	4.14	3.35	2.21	2.95
7th std. to S.S.C.:								
Percentage	19.4	6.3	74.3	100.0 = 237	24.6	12.4	63.0	100.0 = 395
Mean parity	4.02	2.00	1.33	1.89	3.59	2.41	1.84	2.34
Mean No. of living children	3.83	1.87	1.23	1.78	3.34	2.25	1.69	2.17
Above S.S.C.:								
Percentage	41.7	16.6	41.7	100.0 = 12	17.3	18.2	64.5	100.0 = 110
Mean parity	3.20	1.00	2.00	2.33	2.95	1.25	1.38	1.63
Mean No. of living children	3.00	1.00	2.00	2.25	2.89	1.25	1.35	1.60
All levels:								
Percentage	30.4	0.9	68.7	100.0 = 6056	32.3	5.6	62.1	100.0 = 1630
Mean parity	4.85	2.69	2.26	3.05	4.59	2.43	2.45	3.14
Mean No. of living children	4.10	2.50	1.84	2.53	4.09	2.26	2.10	2.75

Excludes 17 cases of educational level not given.

Table 7.27 : (Concl'd.)

Educational level	Greater Bombay				Maharashtra State			
	Steril- ization	Other methods	Not using	All women	Steril- ization	Other methods	Not using	All women
Illiterate:								
Percentage	34.2	0.6	65.2	100.0 = 354	33.4	0.5	66.1	100.0 = 5286
Mean parity	5.26	3.00	3.16	3.88	5.04	3.07	2.61	3.43
Mean No. of living children	4.64	3.00	2.76	3.40	4.22	2.82	2.09	2.81
Literate upto 7th std.:								
Percentage	39.9	4.8	55.3	100.0 = 396	29.9	2.2	67.9	100.0 = 2396
Mean parity	4.25	3.58	2.53	3.27	4.41	3.46	2.01	2.76
Mean No. of living children	3.85	3.37	2.27	2.95	3.98	3.23	1.78	2.47
7th std. to S.S.C.:								
Percentage	23.7	10.8	65.5	100.0 = 333	23.0	10.4	66.6	100.0 = 965
Mean parity	3.61	2.06	1.69	2.19	3.68	2.22	1.65	2.18
Mean No. of living children	3.47	1.94	1.61	2.08	3.49	2.08	1.54	2.04
Above S.S.C.:								
Percentage	15.9	19.3	64.8	100.0 = 88	18.1	18.6	63.3	100.0 = 210
Mean parity	3.07	1.59	1.49	1.76	3.03	1.39	1.45	1.72
Mean No. of living children	2.93	1.59	1.44	1.70	2.92	1.39	1.41	1.68
All levels:								
Percentage	31.7	6.3	62.0	100.0 = 1171	31.0	2.5	66.5	100.0 = 8857
Mean parity	4.40	2.36	2.40	3.03	4.74	2.47	2.31	3.07
Mean No. of living children	3.99	2.26	2.16	2.75	4.08	2.32	1.92	2.60

Table 7.28 : Percentage Distribution and Mean Parity of Currently Married Women by Caste-Cum-Religion by Contraceptive Currently Used

Caste-cum-religion	Rural Maharashtra				Urban excluding Greater Bombay			
	Steril-ization	Other methods	Not using	All women	Steril-ization	Other methods	Not using	All women
Advanced castes :								
Percentage	32.0	0.8	67.2	100.0 = 2606	32.4	9.0	58.6	100.0 = 680
Mean parity	4.68	2.57	2.13	2.95	4.00	2.39	2.17	2.78
Intermediate castes :								
Percentage	30.4	0.8	68.8	100.0 = 1214	36.2	4.1	59.7	100.0 = 318
Mean parity	4.90	3.00	2.18	3.01	4.70	2.15	2.29	3.16
Backward castes :								
Percentage	29.7	0.6	69.7	100.0 = 310	29.2	4.2	66.6	100.0 = 24
Mean parity	5.01	1.50	2.41	3.17	5.29	2.00	1.75	2.79
Scheduled Castes :								
Percentage	31.5	1.0	67.5	100.0 = 819	33.5	0.4	66.1	100.0 = 263
Mean parity	5.21	1.37	2.41	3.28	5.36	3.00	2.49	3.46
Scheduled Tribes :								
Percentage	27.2	0.6	72.2	100.0 = 701	23.7	1.7	74.6	100.0 = 59
Mean parity	4.93	2.75	2.32	3.03	5.43	3.00	3.57	4.00
Muslims :								
Percentage	21.0	1.5	77.5	100.0 = 343	26.1	3.5	70.4	100.0 = 203
Mean parity	4.86	5.00	2.84	3.29	5.23	3.72	2.93	3.56
Other religions :								
Percentage	43.7	1.6	54.7	100.0 = 64	33.8	9.1	57.1	100.0 = 77
Mean parity	4.82	6.00	2.14	3.37	4.50	2.00	3.20	3.53
All castes-cum-religions :								
Percentage	30.4	0.9	68.7	100.0 = 6057	32.3	5.6	62.1	100.0 = 1624
Mean parity	4.85	2.69	2.26	3.05	4.59	2.43	2.45	3.14

Excludes 39 cases of caste-cum-religion not given.

Table 7.28 : (Concl.)

Caste-cum-religion	Greater Bombay				Maharashtra State			
	Steril- ization	Other methods	Not using	All women	Steril- ization	Other methods	Not using	All women
Advanced castes :								
Percentage	34.7	7.5	57.8	100.0 = 642	32.5	3.3	64.2	100.0 = 3928
Mean parity	4.13	2.25	2.18	2.86	4.47	2.37	2.14	2.90
Intermediate castes :								
Percentage	36.1	3.6	60.3	100.0 = 83	31.8	1.6	66.6	100.0 = 1615
Mean parity	4.83	2.33	2.36	3.25	4.85	2.50	2.21	3.05
Backward castes :								
Percentage	58.3	0.0	41.7	100.0 = 12	30.6	0.9	68.5	100.0 = 346
Mean parity	5.00	0.00	1.40	3.50	5.03	1.67	2.34	3.16
Scheduled Castes :								
Percentage	37.9	3.5	58.6	100.0 = 116	32.5	1.1	66.4	100.0 = 1198
Mean parity	4.95	1.25	2.93	3.64	5.21	1.46	2.47	3.35
Scheduled Tribes :								
Percentage	28.6	0.0	71.4	100.0 = 7	27.0	0.6	72.4	100.0 = 767
Mean parity	5.50	0.00	3.60	4.14	4.97	2.80	2.43	3.11
Muslims :								
Percentage	17.7	5.3	77.0	100.0 = 209	21.5	3.0	75.5	100.0 = 755
Mean parity	5.38	4.09	2.77	3.30	5.10	4.18	2.84	3.37
Other religions :								
Percentage	30.6	7.1	62.3	100.0 = 85	35.4	6.2	58.4	100.0 = 226
Mean parity	3.77	1.16	2.09	2.54	4.37	1.93	2.48	3.12
All castes-cum-religions :								
Percentage	31.7	6.3	62.0	100.0 = 1154	31.0	2.5	66.5	100.0 = 8835
Mean parity	4.40	2.36	2.40	3.03	4.74	2.47	2.31	3.07

CHAPTER 8

INDIRECT ESTIMATES OF FERTILITY

AND MORTALITY LEVELS

Introduction

In the earlier chapters differentials in fertility and mortality measures were presented for the three rural regions and two urban zones of Maharashtra State. Since survey respondents tend to under-report to some extent births and to a larger extent deaths, the extent of such under-reporting is assessed and indirect estimates of fertility and mortality levels are presented in this chapter. For checking their validity these estimates are compared with available SRS rates. Based on the corrected age-specific mortality rates for ages 10 and above on the one hand and indirect estimates of infant and child mortality derived by the method of person years lived on the other hand, life tables are constructed for males and females in Maharashtra State for 1980.

Estimates of the level of mortality obtained from a survey depend on the reported age distributions of the population and of deaths. If, however, in the survey there is more relative under-reporting of deaths compared to the population, the mortality level may be under-estimated. In these circumstances, indirect methods of determining the mortality level, based on a stable or quasi-stable population model, may yield more reliable estimates of the death rate.

In surveys deaths are more likely to be under-reported than births due to various reasons. People are often reluctant to report a death in the family or they may not readily recall a traumatic event like an infant death. Sometimes the death is not reported because it is considered to be outside the family unit included in the sample. If a death leads to the break-up of the family into smaller units, then too the death may not be reported. Infant deaths are more likely to be forgotten than deaths to adults. Where there is social bias against females, female deaths may be less completely reported than male deaths. All these factors make data on deaths less reliable than on births. Two indirect methods due to Brass and Preston, with suitable modifications, are applied in this chapter to the NFMS data on the age distributions of the population and of deaths to obtain alternative estimates of the completeness of death reporting and the corrected mortality level.

As mentioned in Chapter 2, soon after the completion of the field work, a reinterview was conducted in a sub-sample of 44 villages and 33 urban blocks by the field supervisors to assess the response errors in selected items of information such as the numbers of births and deaths in the sample family during the two years preceding the date of the original interview. The birth and death rates, corrected for response errors on the basis of the reinterview data, are also presented in this chapter. They provide alternative checks on the mortality rates obtained by the indirect methods.

In this chapter, male and female life tables are constructed for Maharashtra State. For ages 10 and over, the age-specific death rates

from NFMS, corrected by indirect methods for under-reporting, are used. The infant and child mortality rates are indirectly estimated by applying the method of exposure years to children under age 10 from the birth histories of women. The central death rates are graduated graphically before constructing the life table. Using these life tables and the population aged 0 and 1, the birth rate is estimated by a reverse survival procedure. This provides yet another estimate of the birth rate.

The indirect estimates of the birth and death rates presented in this chapter give a fairly narrow range of credible and consistent values for the fertility and mortality levels of Maharashtra State in 1980.

Indirect Methods of Mortality Estimation

The two indirect methods used in this chapter are due to Brass and Preston. The Brass method (Brass 1975) is based on a stable population assumption and consists of fitting a straight line to partial birth and death rates for the population aged 'x' and above. In a stable population the schedules of age-specific birth and death rates remain constant over time. Therefore, the percentage age distributions of the population and the deaths remain constant and their numbers grow at the same rate 'r'. The partial birth rate is defined as the ratio of the number of persons turning exact age 'x' that year to those aged 'x' and over at mid-year. The partial death rate is likewise the ratio of deaths of those aged 'x' that year to those aged 'x' and above at mid-year.

Plotting the parital birth rates against parital death rates by age should yield a set of points scattered around a straight line, with an intercept equal to the growth rate 'r' of the stable population, and a slope of unity, if the reporting of deaths were complete at all ages and if there were no age mis-reporting. If, however, there were uniform relative under-reporting of deaths at all ages, the scatter would still be liner but the slope of the line would be greater than unity. The reciprocal of the slope would measure the degree of completeness of deaths reported relative to the population.

The Preston method (Preston 1980), on the other hand, uses the reported age distributions of male and female deaths and an external estimate of the growth rate. In a stationary population, the number of persons at exact age 'x' is equal to the number of deaths that occur to persons after reaching age 'x'. Therefore, in a stable population, with a constant age distribution and a growth rate 'r', the number of persons aged 'x' should equal the sum of deaths to persons at ages above 'x' weighted by the exponential of the product 'r' times 'x'. The completeness of death reporting is measured by a formula involving the estimated population aged 'x', the reported death rate and the assumed growth rate (see Appendix C).

An analysis of the results obtained from the application of these methods to NFMS data provided estimates of the degree of under-reporting and indirect estimates of the level of mortality. No attempt was made to smoothen either the age structure of the population or the reported age structure of deaths before applying these methods.

The Brass Method and Its Variants

Data on the reported age structure of the population and deaths were available by five year age groups. The number of persons aged 'x' ($n(x)$) was calculated by adding the number of persons in two adjacent age groups and dividing the sum by 10. For example the number of persons aged 5 was calculated by summing the number of persons in ages 0 to 4 and 5 to 9, and dividing this by 10. The number of persons aged 'x' and over ($N(x+)$) and the number of deaths to persons aged 'x' and over ($D(x+)$) were obtained by adding the numbers in the succeeding age groups. The partial birth and death rates for males and females are shown in Table 8.1.

These partial birth and death rates are plotted in Graph 8.1 for males and for females in Graph 8.2. The scatter of the points for males lies closely around a straight line, but it is not so for females where deviation is evident particularly for the age groups 55 and over. As the data for the age group 5+ is influenced by various factors such as the infant and child mortality rates and reporting errors, the age group 5 to 10 has been excluded from the following analysis.

The method of least squares was used to estimate the line of best fit. For males, the line was $y = .0255 + 1.03(x)$, and for females it was $y = .0232 + 1.69(x)$. The constant term in the equation estimates the rate of growth while the coefficient of 'x' (the slope of the line) determines the correction factor. The reciprocal of this factor gives the completeness of reporting. According to this method, the growth rate for males was about 2.5 per cent with 3 per cent under-reporting of deaths. The growth rate for females was 2.3 per cent with 41 per cent under-reporting.

As the growth rate given by this method was found to be too high, other modifications of the method were tried. The growth rate obtained from the crude birth and death rates of NFMS was 2.05 per cent. Using this growth rate as the value of the constant term in the regression, the method of least squares was applied. The estimated lines were $y = 0.0205 + 1.24(x)$ for males and $y = 0.0205 + 1.84(x)$ for females. Thus with the growth rate at 2.05 per cent for both males and females, the percentage of under-reporting was 19 for males and 46 for females.

In the first variant, the method of least squares was used to determine the growth rate that was common to all age groups and the extent of under-reporting. In the second variant, the method of least squares was used with a predetermined growth rate. Both the methods assume the population to be demographically stable. However, as the population was not stable in this period of declining death rates, the changing growth rate must also be taken into account. The growth rates corresponding to the different age groups were calculated using the inter-censal growth rates for appropriate periods and these were subtracted from their respective partial birth rates. The estimated growth rate, partial birth rate (PBR), and the partial birth rate less growth rate (PBR-r) by age are shown in Table 8.2 for each sex.

Graphs 8.3 and 8.4 show the partial birth rate less growth rate (PBR - r) plotted against the partial death rate. Keeping the intercept

at zero, the liner regression $y' = PBR - r$ on the partial death rate, estimated by the least squares method, was $y' = 1.25(x)$ for males and $y' = 1.87(x)$ for females. This method indicated a 20 per cent under-reporting for males and 47 per cent for females. These results were close to those determined by using a fixed growth rate of 2.05.

In a stable population at each age 'x', the partial birth rate (PBR) is equal to the sum of the partial growth rate (PGR) on the one hand and the product of the reported partial death rate (PDR) and the partial correction factor (PK) for under-reporting in ages 'x' and above on the other hand.

Hence $PBR = PGR + (PDR.PK)$

so that $PK = (PBR - PGR)/PDR$

where PBR = partial birth rate at age x,

PDR = reported partial death rate at age x,

PGR = partial growth rate for ages x+ and

PK = partial correction factor for ages x+.

Therefore, the ratio of (PBR - PGR) to PDR at each age should provide the partial correction factor PK above that age. As can be seen from Table 8.3, the median correction factor was 1.27 for males and 1.86 for females which corresponded to 21 per cent under-reporting for males and 46 per cent under-reporting for females. These results are close to those derived by the previous methods.

The Preston Method

The Preston method is based on the age distribution of deaths and an external estimate of the rate of growth. Using a growth rate of 2.05, the estimated death rate for each cumulative age group by sex was calculated. The ratio of these estimated death rates to the reported death rates gives the correction factor. As Table 8.3 shows, the median correction factor for males by this method was 1.32 and 1.82 for females. These corresponded to 24 per cent under-reporting for males and 45 per cent for females. These results are also close enough to those obtained earlier by variants of Brass method.

Corrected Death Rates for Ages 10 and Over and Comparison with SRS Rates

A summary of the correction factors determined by the different methods is given in Table 8.4. A consideration of all the previous estimates indicates that there was about 20 per cent under-reporting for males and about 46 per cent for females. Hence, the correction factor for under-reporting of deaths in NFMS was placed approximately at 1.25 for males and 1.85 for females.

A comparison of the reported death rates and the corrected death rates for the population above age 10 and for each cumulated age group, with the SRS rates reveals the extent to which these indirect methods can be relied upon to correct the death rate. The SRS data is expected to be relatively more reliable as it is based on a dual system of registration which maintains a periodic account of vital events. A continuing system of registration has the advantage of being able to record the occurrences of vital events better than a one point survey as

these events are less likely to be missed or forgotten. Moreover these events have a greater chance of being accounted for in such a dual reporting system than in a single report.

Table 8.6 compares the corrected and uncorrected NFMS, 1980 death rates with the SRS 1980 rates for ages 10 and above. While comparing the NFMS and SRS rates, it must be pointed out that SRS rates fluctuate from year to year due to the small sample size and augmentation of the sample in and after 1979. There may also be some under-reporting of deaths. The uncorrected NFMS rates are lower than SRS rates, showing that there was an undercount of deaths in NFMS relative to SRS. The SRS rates could be lower due to under-counting of deaths while the corrected NFMS rates could be higher due to over-correction by the indirect procedures. The net effect seems to yield corrected NFMS rates for males and females that are higher than the corresponding SRS rates. For males in ages 10 and above, the corrected NFMS death rate was 9.0 against 8.5 from SRS while for females the NFMS rate was 10.5 against 7.5 from SRS.

Table 8.6 compares, for cumulative age groups, the uncorrected NFMS death rates with the corrected rates using a constant correction factor for all ages for each sex and with the SRS rates. The male death rates have been corrected by a factor of 1.25 while the female rates have been corrected by a factor of 1.85. The SRS rates are slightly below the corrected NFMS rates in the first seven age groups but in the succeeding ages the SRS rates exceed the corrected NFMS rates. A possible explanation for this could be that as a major proportion of deaths occur in these ages, especially over age 45, the under-reporting would affect these ages to a greater extent whereas a uniform factor is used to correct all ages of NFMS rates.

Particular attention must be drawn to two characteristics of the data, revealed in the scatter of points in Graph 8.2. First the degree of under-reporting for females was greater than that for males. This is evident from the slope of the line fitted to the points. Secondly there was considerable age misreporting in the data. The plot for age 55 is an example of such age distortion. One explanation for this could be an age preference bias. Women above age 50 were to be excluded for the detailed questionnaire. This could partly explain why more women were returned as above this age.

Few mortality surveys have been conducted in India. Retrospective reporting of deaths appears to be less complete than births. Hence indirect methods of estimation of the death rate are essential to correct the rate. Another check is to reinterview a sub-sample of families to detect the response errors. This method was also used in NFMS, Maharashtra, 1980. About 3,000 families were reinterviewed for this purpose. The results of this check on the birth and death rates are presented later in this chapter.

Indirect Estimation of Infant Mortality Rate from NFMS Data on Birth

Histories of Women

Indirect estimates of age-specific mortality rates for ages 10 and above were obtained in the preceding sections of this chapter. In

constructing male and female life tables, the next step is to estimate infant and child mortality. This was done by the method of exposure years using the birth histories of women collected in NFMS.

The indirect method is based on the years of exposure to the risk of dying and the number of deaths that occurred in the five years preceding the date of interview from birth to exact age 5. The data on the birth histories of about 5,000 married women in reproductive ages obtained in NFMS were used. Living children below five years of age and those aged 5 to 9 years were taken into account separately in calculating the exposure years. To this sum, the exposure years of children born during the ten years preceding the interview but deceased at the time of the survey were added. For children who died in their first year of life during the last five years, the exact period of exposure in days and months was calculated. Similarly for births in the year preceding the interview, the exact period of exposure upto the date of survey was reckoned. These exposure years were calculated separately from birth to exact age 1, from exact age 1 to 2, from exact age 2 to 3, from exact age 3 to 4 and from exact age 4 to 5.

The death rates between exact ages 1-2, 1-3, 1-4 and 1-5 were obtained from data on the number of deaths and exposure years in these ages. Then the corresponding IMR (q_0) was estimated from each of these age groups using the West Model Life Tables (Coale and Demeny, 1966). The median value among these was chosen as the best estimate of q_0 . These estimates are summarized for comparison.

	1,000 q_0		
	Male	Female	Both Sexes (assumed)
Aurangabad Division	143	103	
Nagpur Division	136	113	
Western Maharashtra	102	95	
Rural Maharashtra	120	102	120
Urban excluding Greater Bombay	87	74	
Greater Bombay	56	54	
Urban Maharashtra	73	66	73
Maharashtra State	104	89	104

The q_0 value in rural areas for females was far below that for males. While females could have a slight advantage in infant survival rates, most of the difference stems from gross under-reporting of female infant and child deaths. Hence the male q_0 value of 104 was also adopted for females in the State.

The method of exposure years also provided child mortality rates between exact ages 1 to 5 for males and females which were utilized for constructing life tables. The mortality rates between exact ages 5 and 10 were taken from the corresponding West Model Life Tables (Coale and Demeny, 1966).

Male and Female Life Tables for Maharashtra, 1980

Male and female life tables were constructed for Maharashtra from the NFMS age-specific death rates. For ages 10 and above, these rates were adjusted by indirect methods as described in earlier sections. Child mortality between exact ages 1 and 5 and q_0 were obtained by the method of exposure years outlined in the last section.

The age-specific mortality rates for each sex were graduated graphically. To these graduated values of central death rates, the Reed-Merrell formula was applied to get the probabilities of dying between corresponding exact ages. The abridged life Table 8.7 for males and Table 8.8 for females were constructed from these probabilities of dying. Thus the life tables presented in this chapter are based on several assumptions, indirect estimates and data adjustments.

According to Tables 8.7 and 8.8, the life expectancy at birth was 58.1 years for males and 56.9 years for females in 1980 according to NFMS. At exact age 1, these expectancies rose rapidly to 63.8 years for males and 62.5 years for females since the probability of dying in the first year of life was high for both sexes. The life expectancy then declined steadily with age and at age 70, it was 10.7 years for males and 9.4 years for females.

The life table parameters from NFMS, 1980 are compared with those based on the Census for the decade 1961-71 in Table 8.9. In the 14 years between 1966 and 1980, male life expectancy had risen from 48.6 years to 58.1 years and female life expectancy from 49.0 years to 56.9 years. The census figures relate to Western Zone consisting of Gujarat, Maharashtra and Goa. The gain in years of life expectancy was 9.5 for males and 7.9 for females in this period.

Life expectancy has also been calculated for the period 1976-80 from SRS data. These are, respectively, 55.6 years for males and 57.1 years for females. For males, the NFMS life expectancy for 1980 was above the SRS for 1978 by 2.5 years which is reasonable. However, the NFMS female life expectancy was slightly below SRS. Also, for NFMS data, the Male life expectancy exceeded that for females whereas for SRS this relationship was reversed. In spite of these differences, the life expectancy figures by sex from both sources were close enough.

Separate estimates of rural and urban life expectancies by sex were made to obtain the rural-urban differentials. For this purpose, the rural and urban q_0 and child mortality rate between exact ages 1 to 5, obtained by the method of exposure years, were used.

For ages 10 and over, correction factors for adjusting mortality rates were obtained for rural and urban areas for males as follows. The death rates for both areas were corrected using the reinterview data as described in the next section. The ratio of the corrected to uncorrected death rate gave an initial correction factor as shown below :

	<u>Rural</u>	<u>Urban</u>
Corrected	11.72	6.42
Uncorrected	9.58	5.76
Initial correction factor	1.22	1.11

Giving the rural and urban areas a weightage of 65:35, in proportion to their populations, the correction factors were scaled upwards so that the overall factor for males was equal to the value of 1.25 that was obtained in the earlier sections by indirect methods. The revised correction factors turned out to be 1.29 for rural male death rates and 1.18 for urban male death rates. Following a similar procedure for females, a rural correction factor of 1.92 and an urban factor of 1.74 were obtained. These correction factors were applied to the age-specific mortality rates of males and females aged 10 and above. The rural and urban life tables were then constructed for each sex following the procedure outlined earlier.

The life table parameters for rural and urban areas are also given in Table 8.9. For 1980, in urban areas the male life expectancy was 62.1 years compared to 60.7 years for females whereas in rural areas the male life expectancy was 56.1 years against 55.1 years for females. Although male life expectancy was about a year more than female life expectancy in both rural and urban areas, the urban life expectancy exceeded the rural life expectancy by over five years for both sexes. The rural-urban differential narrowed down considerably by age 5.

Comparison for 1980 of NFMS Mortality Rates with SRS Rates

Earlier the mortality rates for ages 10 and over by sex from NFMS, 1980 were compared with SRS 1980 rates in Table 8.5. For both sexes together, the NFMS mortality rate was 9.8 against 7.9 from SRS (Table 8.10). The male mortality rate below age 10, from the life tables based on NFMS data, was 18.6 compared to 14.0 from SRS 1980 and for females the corresponding rate was 19.1 from NFMS against 16.2 from SRS. For both sexes combined, the mortality rate below age 10 was 18.8 from NFMS and 15.0 from SRS, 1980. Thus the 1980 NFMS rates were clearly higher than the 1980 SRS rates of mortality below age 10. The difference may be accounted for the most part both by possible under-enumeration in SRS and the over-correction of NFMS rates by indirect procedures of estimation. It should also be noted that rates from both sources are subject to sampling variations.

For all ages, the death rate for males was 11.6 from NFMS against 9.9 from SRS, 1980 and for females it was 12.8 from NFMS against 9.6 from SRS. For both sexes combined, the NFMS death rate was 12.2 against the SRS rate of 10.0 averaged over 1979-81. The indirect estimate of the death rate from NFMS, 1980 was above the SRS rate for 1980 and the average for 1979-81. This difference could arise from under-reporting of deaths in SRS or over-correction of the NFMS rate or more probably from a combination of both these factors.

Adjustment of the Birth and Death Rates for Response Errors

As mentioned in Chapter 2, in order to assess the response errors in reporting births and deaths during the two years preceding the date of interview, a sub-sample of 44 villages and 33 urban blocks were reinterviewed by the field supervisors. The sub-sample consisted of 2,192 rural families and 855 urban families. Comparing the answers given at the original interview and reinterview, the birth and death rates were adjusted for response errors. This method provided another set of independent estimates for the birth and death rates.

Unweighted estimates of the birth and death rates made from the individual and the family cards are shown in Table 8.11. The estimates from the individual cards were slightly but consistently higher than those made on the basis of the family cards. The weighted estimates of birth rates from the family cards were generally lower than the unweighted estimates. But the weighted estimates of death rates from the family cards were generally higher than the unweighted estimates.

Since families were selected with unequal probabilities, the weighted estimate was considered to be the appropriate one to be used. However, since this estimate was available only from family cards, to adjust for the more complete information contained in individual cards, the weighted rate from family cards was adjusted by the ratio of the unweighted estimate from individual cards to that from family cards. For instance, for Aurangabad Division, the weighted birth rate from family cards was 33.7. This was multiplied by the ratio (35.5/34.4) of the unweighted rate estimated from individual cards to that estimated from family cards. This yielded a weighted birth rate of 34.8 adjusted for individual cards. A similar adjustment was made on death rates for other rural regions and urban zones. The rates for rural and urban Maharashtra and for the State were obtained as weighted averages of those for the regions or zones. The weighted birth and death rates adjusted for individual cards are shown in the last two columns of Table 8.11.

The correction for response errors was made by comparing the rate based on the original interview with that based on the reinterview from the sub-sample of 3,047 families. Rural and urban estimates were made separately. The necessary calculations are shown in Table 8.12. For instance, from the sub-sample, the birth rate in rural areas was estimated as 32.124 from the reinterview against 30.773 from the original interview. Since villages or blocks with low death rates were over-represented in the sub-sample, the correction for response errors was taken to be the difference between the reinterview rate and the original interview rate. This difference of 1.4 in the birth rate was then added to the weighted and adjusted rate of 31.7 from Table 8.11 to obtain a corrected birth rate of 33.1 in rural areas from NFMS. Similar corrections were made to the rural and urban death rates to adjust for response errors. These adjustments and the corrected rates are shown in Table 8.12.

The birth rates, adjusted for response errors, were 33.1 for rural areas, 25.5 for urban areas and 30.4 for Maharashtra State. The corresponding death rates for the three domains were 11.9, 6.5 and 10.0. As mentioned earlier, under-reporting of deaths might arise not

only from recall lapse but also from a number of other circumstances. For this reason, the death rate corrected for response errors, may still be under-estimated. This may be especially true of urban areas where the corrected rate appears to be far below the corrected rural death rate.

An alternative estimate of the birth rate was obtained by the reverse-survival method. The number of persons aged 0 and 1 (between birth and exact age 2) from NFMS was multiplied by the ratio $2(l_0/2L_0)$ to obtain the births. This was done separately for rural and urban areas for both sexes together from the life tables. The birth rate estimated by the reverse survival procedure was 33.9 for rural areas, 25.1 for urban areas and 30.8 for Maharashtra State (Table 8.13).

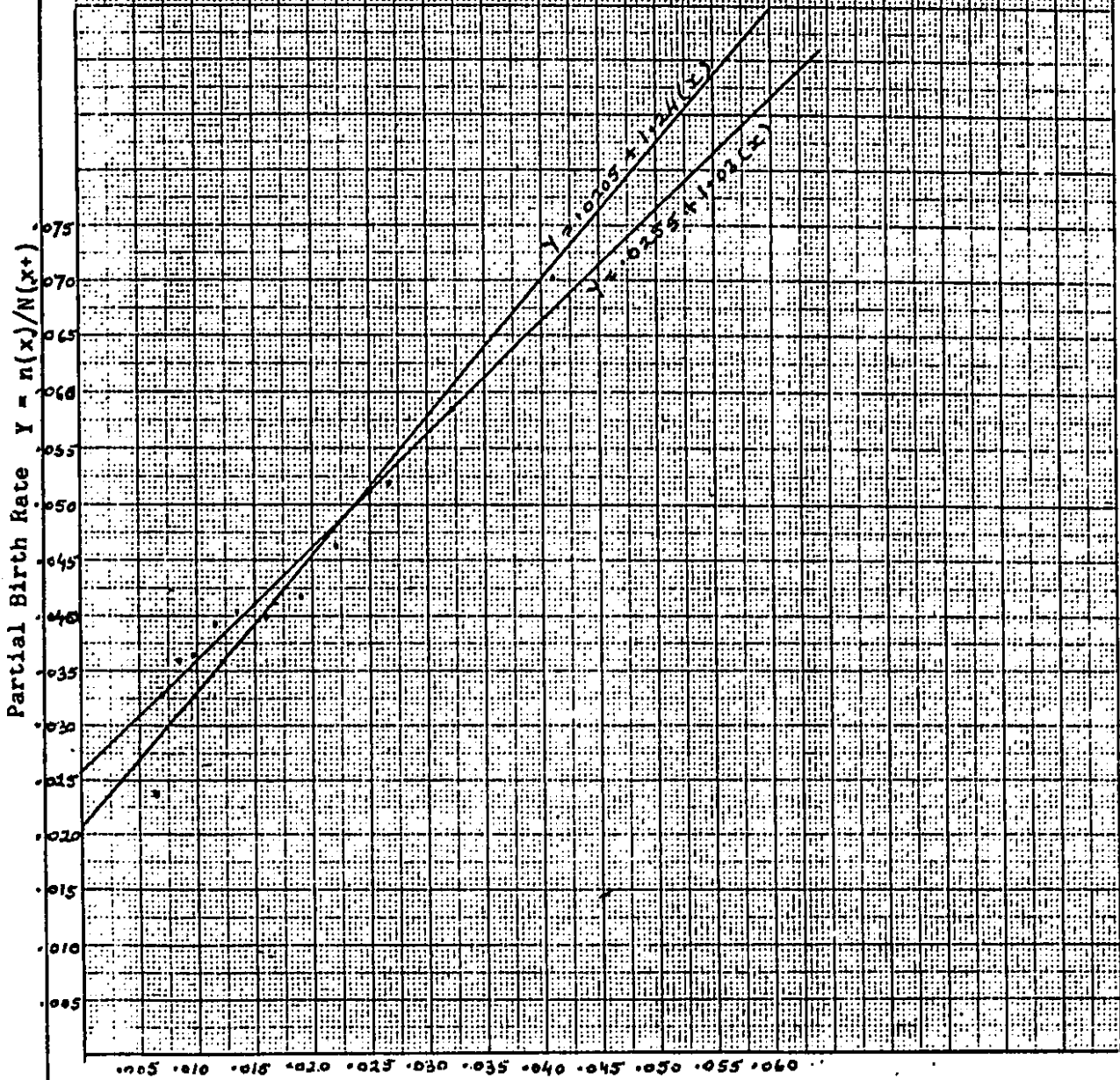
Table 8.13 compares the vital rates corrected for response errors with SRS rates. The rural birth rate from NFMS, corrected for response errors, was 33.1 against an average rate of 29.8 from SRS for 1979-81. By the reverse survival method applied to NFMS data the rate was 33.9. Since the correction for response errors is unlikely to over-correct the NFMS rate, the lower rate from SRS may be attributed mainly to undercount and sampling fluctuations in SRS. For urban areas, the birth rate from NFMS and SRS did not differ much. The NFMS birth rate, corrected for response errors, was 25.5 and by the reverse-survival method it was 25.1 against an average for 1979-81 of 25.0 from SRS. Compared to SRS, the higher rural birth rate in NFMS resulted in a somewhat higher birth rate for the State. The NFMS birth rate for the State was 30.4 corrected for response errors (and 30.8 by the reverse-survival method) against an average birth rate of 28.3 for 1979-81 from SRS.

The rural death rate from NFMS, corrected for response errors, was 11.9 compared to an average rate of 11.2 from SRS over 1979-81 (Table 8.13). The difference in the death rate between the two sources was larger for urban areas, 6.5 from NFMS and 7.5 from SRS. For the entire State, the NFMS death rate, corrected for response errors, was 10.0 against an average rate of 10.0 over 1979-81 from SRS.

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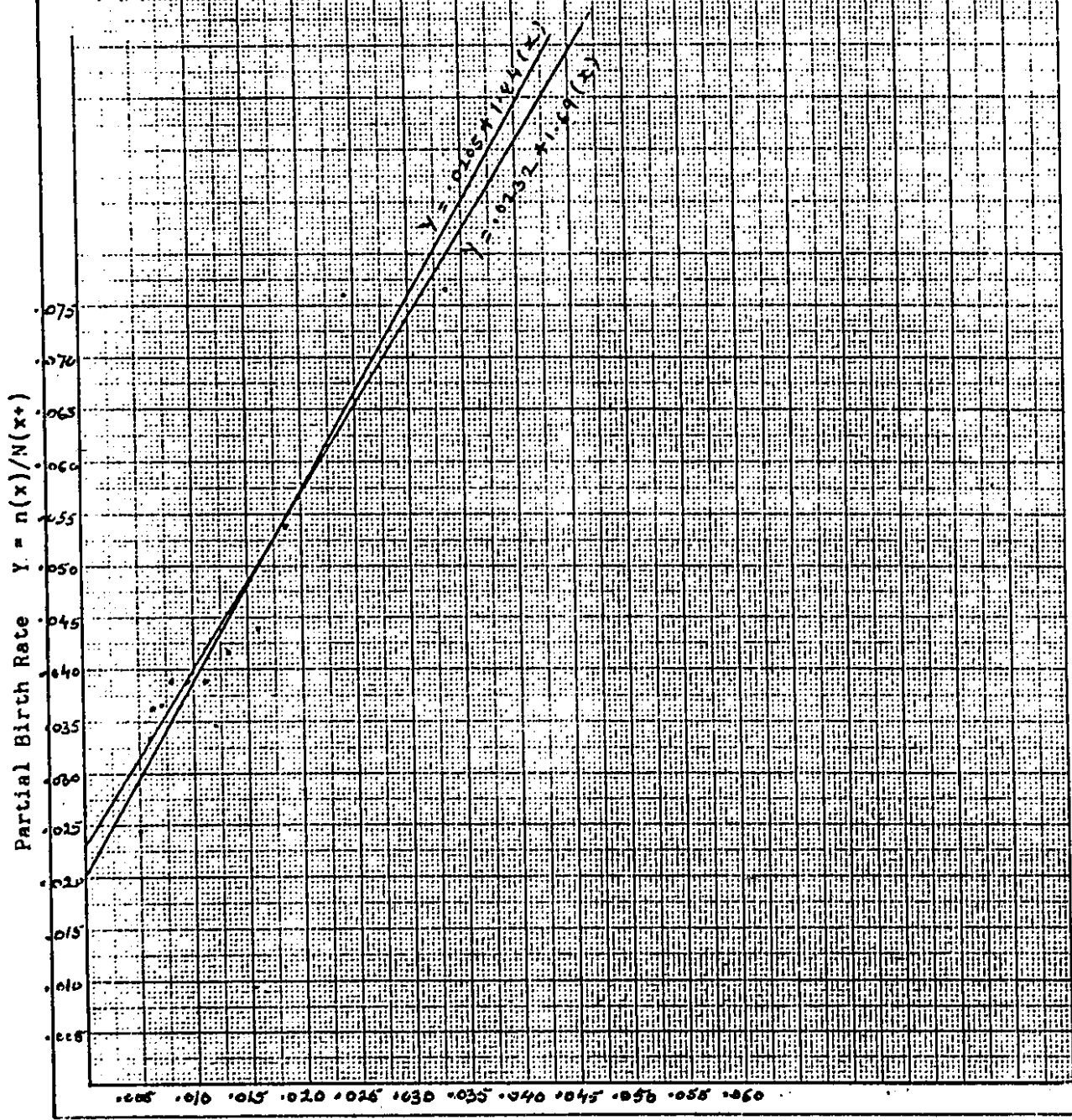
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Graph B.1 Regression of Partial Birth Rate on Partial Death Rate for Males, NFMS Maharashtra, 1980



Partial Death Rate $X = D(x+)/N(x+)$
See text for explanation

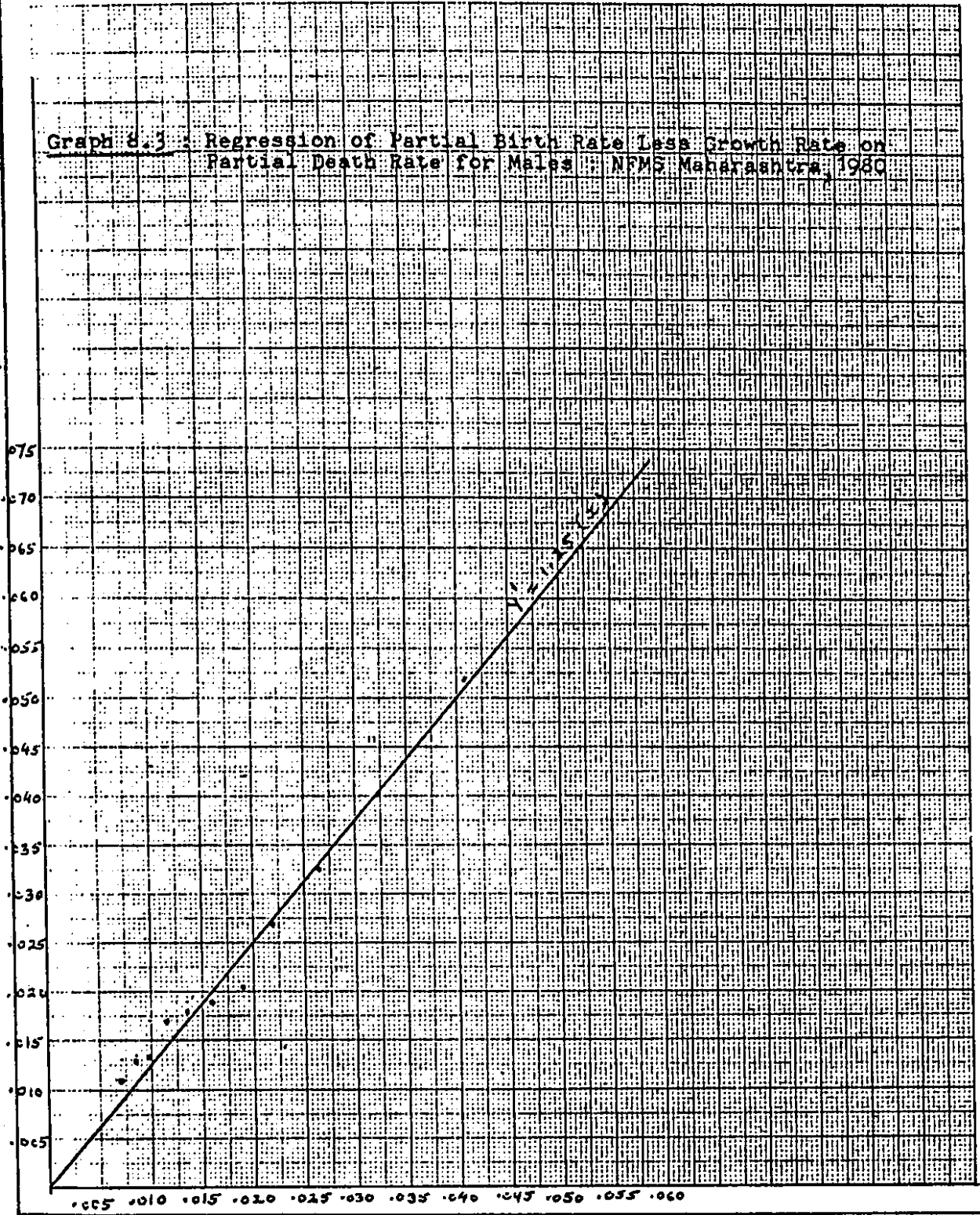
Graph 8.2—Regression of Partial Birth Rate on Partial Death Rate for Females : NFMS Maharashtra, 1980



Partial Death Rate $X = D(x)/N(x+)$
See text for explanation.

Graph 8.3 : Regression of Partial Birth Rate Less Growth Rate on Partial Death Rate for Males : NFMS Maharashtra, 1980

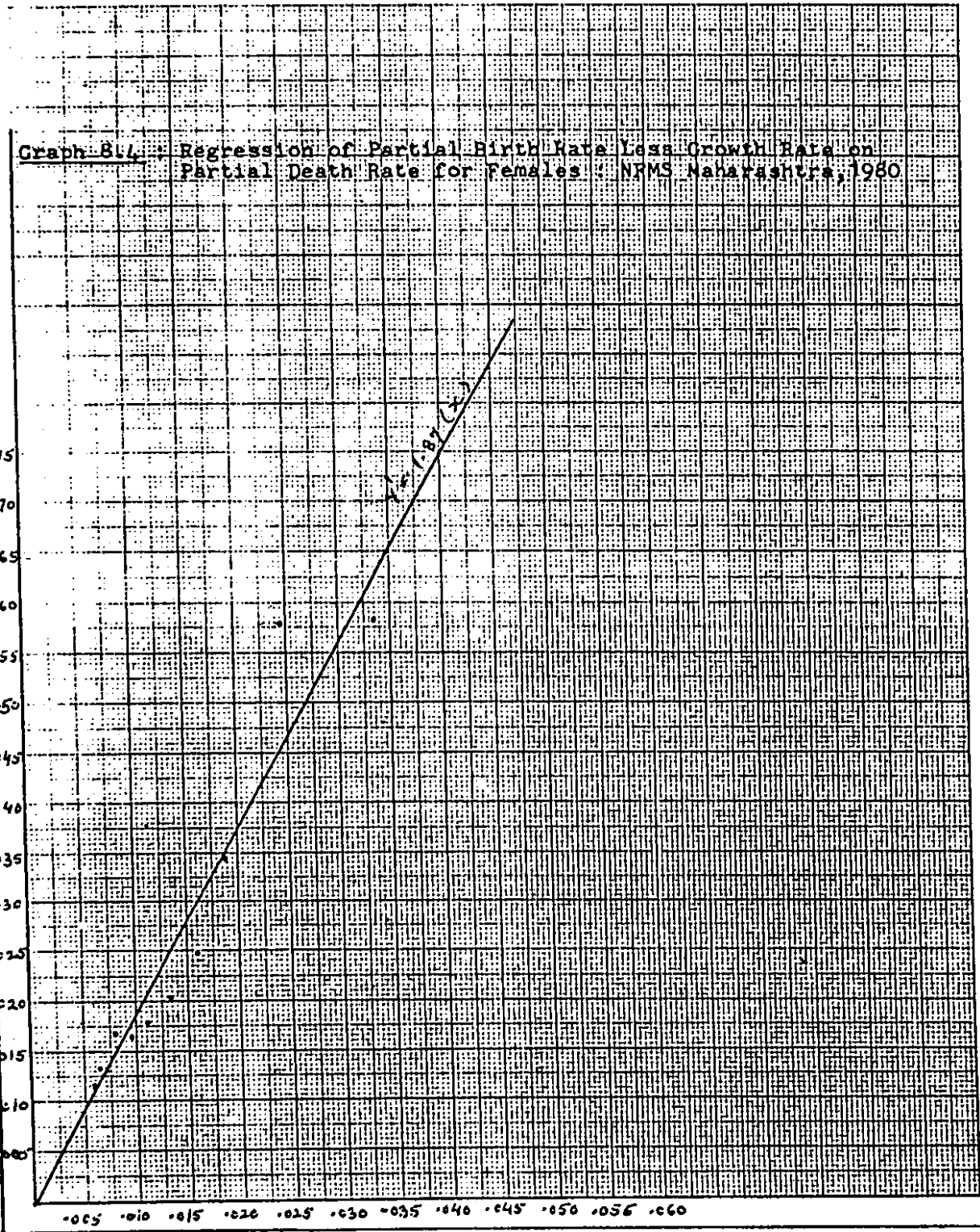
Partial Birth Rate Less Growth Rate $Y' = [n(x)/N(x+)] - r$



Partial Death Rate $X = D(x+)/N(x+)$
See text for explanation.

Partial Birth Rate Less Growth Rate $Y' = [b(x)/N(x+)] - r$

Graph 8.4. Regression of Partial Birth Rate Less Growth Rate on Partial Death Rate for Females : NFMS Maharashtra, 1980



Partial Death Rate $X = D(x+)/N(x+)$
See text for explanation

Table 8.1 : Partial Birth and Death Rates for the Application of Brass Method

Age 'X'	Males		Females	
	$n(x)/N(x+)$	$D(x+)/N(x+)$	$n(x)/N(x+)$	$D(x+)/N(x+)$
5	.0240	.0065	.0244	.0050
10	.0327	.0072	.0335	.0057
15	.0361	.0084	.0363	.0065
20	.0364	.0097	.0362	.0070
25	.0393	.0114	.0391	.0080
30	.0405	.0136	.0389	.0094
35	.0400	.0160	.0391	.0109
40	.0418	.0190	.0417	.0132
45	.0463	.0221	.0439	.0158
50	.0519	.0265	.0539	.0187
55	.0586	.0322	.0761	.0243
60	.0703	.0409	.0765	.0337

$n(x)/N(x+)$ = Partial Birth Rate. $D(x+)/N(x+)$ = Partial Death Rate. For definitions see text.

Table 8.2 : Partial Birth Rate Adjusted for Changing Growth Rate by Sex for Applying the Modified Brass Method

Age 'X'	Growth rate per 1000 r	Males (per 1000)		Females (per 1000)	
		PBR	PBR-r	PBR	PBR-r
10	21.8	32.7	10.9	33.5	11.7
15	23.0	36.1	13.1	36.3	13.3
20	23.0	36.4	13.4	36.2	13.2
25	22.4	39.3	16.9	39.1	16.7
30	22.4	40.5	18.1	38.9	16.5
35	21.2	40.0	18.8	39.1	17.9
40	21.2	41.8	20.6	41.7	20.5
45	19.2	46.3	27.1	43.9	24.7
50	19.2	51.9	32.7	53.9	34.7
55	18.3	58.6	40.3	76.1	57.8
60	18.3	70.3	52.0	76.5	58.2

PBR = Partial Birth Rate from Table 8.1.

'r' = Growth Rate per 1,000.

Table 8.3 : Correction Factor for Each Cumulated Age Group by Sex by Preston and Brass Methods of Indirect Estimation of Under-Estimation of Deaths

Age a and over	Males					Females				
	PDR	PBR - r	Preston Death Rate	K Brass	K Preston	PDR	PBR - r	Preston Death Rate	K Brass	K Preston
	b	c	d	c/b	d/b	e	f	g	f/e	g/e
10	7.2	10.9	9.9	1.51	1.37	5.7	11.7	10.9	2.05	1.91
15	8.4	13.1	11.3	1.56	1.35	6.5	13.3	12.1	2.05	1.86
20	9.7	13.4	12.9	1.38	1.33 ^m	7.0	13.2	12.8	1.89	1.83
25	11.4	16.9	14.9	1.48	1.31	8.0	16.7	14.4	2.01	1.80
30	13.6	18.1	17.3	1.33	1.27	9.4	16.5	16.8	1.76	1.79
35	16.0	18.8	20.4	1.17	1.28	10.9	17.9	19.5	1.64	1.79
40	19.0	20.6	24.5	1.08	1.29	13.2	20.5	23.7	1.55	1.80
45	22.1	27.1	29.1	1.23	1.32 ^m	15.8	24.7	28.9	1.56	1.83 ^m
50	26.5	32.7	35.5	1.23	1.34	18.7	34.7	35.9	1.86*	1.92
55	32.2	40.3	44.6	1.25*	1.39	24.3	57.8	43.9	2.38	1.81 ^m
60	40.9	52.0	-	1.27*	-	33.7	58.2	-	1.73	-

* = Median. m = Median lies between these values. K = Correction factor.
See text for explanation of the methods.

Table 8.4 : Comparison of Correction Factors for Males and Females by Several Indirect Methods

Method of estimation	Correction factor	
	Males	Females
1. Least squares with growth rate = 2.05	1.24	1.84
2. Least squares with changing growth rate	1.25	1.87
3. Brass method with changing growth rate (Median)	1.27	1.86
4. Preston method with growth rate = 2.05 (Median)	1.32	1.82

See text for explanation of the methods.

Table 8.5 : Comparison of Uncorrected and Corrected NFMS Death Rate with SRS Rate for Ages 10 and Over by Sex

	Death rate for ages 10 and over	
	Males	Females
1. Uncorrected, NFMS estimate	7.2	5.7
2. Corrected, NFMS estimate	9.0	10.5
3. SRS estimate for 1980	8.5	7.5

Table 8.6 : Comparison of Corrected and Uncorrected Death Rates by Sex by Cumulated Age Groups from NFMS, 1980 with Those from SRS, 1980

Age 'X' and above	Death Rate					
	Males			Females		
	Uncorrected NFMS	Corrected NFMS	SRS 1980	Uncorrected NFMS	Corrected NFMS	SRS 1980
10	7.2	9.0	8.5	5.7	10.5	7.5
15	8.4	10.5	9.8	6.5	12.0	8.7
20	9.7	12.1	11.5	7.0	12.9	10.2
25	11.4	14.2	13.8	8.0	14.8	11.6
30	13.6	17.0	16.4	9.4	17.4	13.5
35	16.0	20.0	19.3	10.9	20.2	15.8
40	19.0	23.7	23.0	13.2	24.4	19.2
45	22.1	27.6	28.3	15.8	29.2	23.5
50	26.5	33.1	35.3	18.7	34.6	29.7
55	32.2	40.2	46.6	24.3	45.0	37.6
60	40.9	51.1	61.7	33.7	62.3	46.4

See text for explanation.

Table 8.7 : Male Life Table for Maharashtra State

Age	n^m_x	n^q_x	l_x	n^d_x	n^L_x	T_x	e^o_x
0	0.1115	0.1036	100000	10360	92499	5809862	58.10
1	0.0119	0.0445	89640	3989	347815	5717363	63.78
5	0.0040	0.0198	85651	1696	424015	5369548	62.69
10	0.0020	0.0100	83955	840	417675	4945533	58.91
15	0.0019	0.0095	83115	790	413600	4527858	54.48
20	0.0019	0.0095	82325	782	409670	4114258	49.98
25	0.0021	0.0104	81543	848	405595	3704588	45.43
30	0.0030	0.0149	80695	1202	400470	3298993	40.88
35	0.0042	0.0208	79493	1653	393332	2898523	36.46
40	0.0055	0.0272	77840	2117	383907	2505191	32.18
45	0.0074	0.0364	75723	2756	371725	2121284	28.01
50	0.0103	0.0503	72967	3670	355660	1749559	23.98
55	0.0154	0.0743	69297	5149	333612	1393899	20.11
60	0.0302	0.2660	64148	17063	556165	1060287	16.53
70+	0.0934	1.0000	47085	47085	504122	504122	10.71

The m_x values of central death rates are from NFMS Maharashtra, 1980. They have been adjusted for incomplete reporting of deaths as discussed in the text.

Table 8.8 : Female Life Table for Maharashtra State

Age	n^m_x	n^q_x	l_x	n^d_x	n^L_x	T_x	e^o_x
0	0.1113	0.1036	100000	10360	92499	5691111	56.91
1	0.0125	0.0466	89640	4177	347292	5598612	62.46
5	0.0045	0.0223	85463	1906	422550	5251320	61.45
10	0.0035	0.0174	83557	1454	414150	4828770	57.79
15	0.0030	0.0149	82103	1223	407457	4414620	53.77
20	0.0025	0.0124	80880	1003	401892	4007163	49.54
25	0.0025	0.0124	79877	990	396910	3605271	45.14
30	0.0030	0.0149	78887	1175	391497	3208361	40.67
35	0.0035	0.0174	77712	1352	385180	2816864	36.25
40	0.0042	0.0208	76360	1588	377830	2431684	31.84
45	0.0056	0.0276	74772	2064	368700	2053854	27.47
50	0.0087	0.0426	72708	3097	355797	1685154	23.18
55	0.0145	0.0701	69611	4880	335855	1329357	19.10
60	0.0322	0.2813	64731	18209	556265	993502	15.35
70+	0.1064	1.0000	46522	46522	437237	437237	9.40

The m_x values of central death rates are from NFMS Maharashtra, 1980. They have been adjusted for incomplete reporting of deaths as discussed in the text.

Table 8.9 : Life Table Parameters from Census and NFMS Maharashtra, 1980 by Sex for Rural and Urban Areas

Region/Sex		e^0_0	e^0_5	e^0_{10}
Maharashtra State				
NFMS 1980	Males	58.10	62.69	58.91
Census 1961-71, Western Zone	Males	48.57	53.98	50.94
SRS, 1976-80	Males	55.60		
NFMS 1980	Females	56.91	61.45	57.79
Census 1961-71, Western Zone	Females	49.00	55.25	52.83
SRS, 1976-80	Females	57.10		
Urban Maharashtra				
NFMS 1980	Males	62.06	63.64	59.81
NFMS 1980	Females	60.74	62.42	58.70
Rural Maharashtra				
NFMS 1980	Males	56.07	62.16	58.39
NFMS 1980	Females	55.12	61.06	57.45

Census Parameters are taken from 'Census of India 1971, Paper I of 1977 - Life Tables' and NFMS parameters from Tables 8.7 and 8.8. The method of calculation of rural and urban estimates is discussed in the text. Gujarat, Maharashtra and Goa are included in the Western Zone in the Census Paper.

Table 8.10 : Comparison of Indirectly Estimated Death Rates from NFMS with SRS Rates for Ages upto 10, for Ages 10 and Over and for All Ages by Sex

Age		Male		Female		Persons
		Death rate	Percentage of population	Death rate	Percentage of population	Death rate
Below 10	NFMS *	18.6	28.0 ⁺	19.1	27.8 ⁺	18.8
	SRS 1980	14.0	24.93	16.2	24.45	15.0
10 and over	NFMS **	9.0	72.0 ⁺	10.5	72.2 ⁺	9.8
	SRS 1980	8.5	75.07	7.4	75.55	7.9
All ages	NFMS	11.6	100.0	12.8	100.0	12.2
	SRS, 1980	9.9	-	9.6	-	9.7
	SRS, 1979-81	10.1	-	9.9	-	10.0

* The central death rate calculated by the formula $(l_0 - l_{10}) / (T_0 - T_{10})$ from Tables 8.7 and 8.8.

** Adjusted rate for ages 10 and over taken from Table 8.5.

+ Percentages calculated from NFMS age distribution.

Table 8.11 : Estimation of CBR and CDR, Unweighted for Individual and Family Cards, Weighted for Family Cards and Adjusted for Events Reported in Individual Cards

	Unweighted				Weighted for family cards		Weighted and adjusted for individual cards	
	For individual cards		For family cards		CBR	CDR	CBR	CDR
	CBR	CDR	CBR	CDR				
Aurangabad Division	35.5	10.6	34.4	10.2	33.7	11.8	34.8	12.2
Nagpur Division	33.9	9.2	33.0	9.1	33.2	10.0	34.1	10.1
Western Maharashtra	31.4	7.4	30.7	7.3	28.7	8.6	29.4	8.7
Rural Maharashtra	32.8	8.5	32.0	8.3	30.9	9.6	31.7*	9.7*
Urban excluding Greater Bombay	26.0	7.7	25.9	7.6	24.6	6.4	24.7	6.4
Greater Bombay	23.2	5.4	22.7	5.3	23.9	5.4	24.4	5.5
Urban Maharashtra	24.9	6.7	24.6	6.7	24.1	5.8	24.5*	5.8*
Maharashtra State	30.1	7.9	29.5	7.8	28.5	8.2	29.2*	8.4*

* Weighted average of regions/zones.

Table 8.12 : Correction Term from Reinterview by Difference Method and Vital Rates Corrected for Response Error

	Rural		Urban		Maharashtra State	
	CBR	CDR	CBR	CDR	CBR	CDR
Reinterview	32.1	7.3	23.7	6.5	-	-
Original	30.8	5.1	22.7	5.0	-	-
Correction term by difference	1.4	2.1	0.9	0.7	-	-
Weighted and adjusted rate*	31.7	9.7	24.5	5.8	29.2	8.4
Correction term	1.4	2.1	1.0	0.7	1.2	1.6
Corrected rate	33.1	11.9	25.5	6.5	30.4	10.0

* Weighted and adjusted rate taken from Table 8.11.

Table 8.13 : Comparison of NFMS Rates Corrected for Response Error With SRS Rates for Relevant Years

	Rural		Urban		Maharashtra State	
	CBR	CDR	CBR	CDR	CBR	CDR
NFMS weighted rates corrected for response error *	33.1	11.9	25.5	6.5	30.4	10.0
Reverse-survival estimate of CBR †	33.9	-	25.1	-	30.8**	-
SRS, 1980	30.9	10.9	25.9	7.1	29.3	9.7
SRS, 1979-81	29.8	11.2	25.0	7.5	28.3	10.0

* Estimates are taken from Table 8.12.

** Weighted average.

† This was based on reverse-survival of the number of living children aged 0 and 1 as obtained from NFMS. The method is described in the text.

QUALITY OF DATA AND RESPONSE ERRORS

Introduction

In Chapter 3 the demographic profile from NFMS was compared with that from the 1971 and 1981 Censuses in order to examine the representativeness of the sample, to establish the trends in demographic variables and to find the differences in the definitions used in the census and the survey. In Chapter 8 the completeness of reporting deaths in the family was assessed by indirect methods and the birth and death rates were corrected for response errors on the basis of NFMS reinterview data. In this chapter, the quality of the data from NFMS, Maharashtra and the errors in response are further assessed. The key variables for which an assessment of quality is made are the reported age of the individual, numbers of births and deaths reported in the two years preceding the interview, family composition by male and female adults and non-adults, immigrants and births in the last two years, and outmigrants and deaths in the last two years.

Digital preference and age bias are measured by such indices as the age ratio, Myers' index and Whipple's index by sex for each domain of study. Response errors in the other characteristics are measured using the data from the original interview and the reinterview of a sub-sample of about 3,000 families. This analysis confirms some of the observations made in the earlier chapters regarding the relative quality of data on these variables.

Quality of Age Returns

The quality of age returns was assessed from data collected in the family questionnaire which was generally answered by the head of the family. The age ratio is the number of individuals in a particular age in years (or months) to the average number in the two adjacent ages (or months). For instance, the ratio of 1.15 shown for males under the second column "6 months" in Table 9.1 is the number of male infants aged 6 months to the average number aged 5 and 7 months. From this table, it is seen that the preference ratio for 12, 18 and 24 months for both males and females was much higher than for 6 months. Also the ratios for these three ages were larger for Aurangabad Division than for any other domain, indicating a poorer quality of age returns from this rural region.

At age 5, the age ratio was near unity for both sexes, perhaps more due to age misreporting than due to reduced digit preference. The female preference for age 20 was more than the male preference for this age. For both males and females, the digital preferences for ages 30, 35, 40 and 45 were large. For females, the preference for age 50, was much less than for ages 45 or 55. This could be ascribed to the fact that an additional questionnaire was to be canvassed for currently married women aged 50 or below in NFMS so that some women preferred to give their actual age above 50 rather than to round it off to 50 years. There was marked rounding-off at ages 60, 65 and 70 among both males and females. The age ratio for females was, however, larger than for males at these

ages. On the whole, the data reveal marked preference to ages 12 months and 24 months among infants and to multiples of 5 years among those aged 10 and over. This age rounding-off was more drastic in older ages among both sexes.

Among males and females aged 10 to 49, the digital preference is analysed in terms of conventional indices due to Myers and Whipple in Table 9.2. In each domain, for both sexes, the most preferred digit was 0 (19.2 per cent males and 18.8 per cent females returning ages ending in 0) followed by ages ending in digit 5 (18.7 per cent males and 18.4 per cent females returning ages ending in 5). The digits 2 and 8 were more balanced. The other digits were in deficit, below 10 per cent. Myers' index for the state was 19.8 for males and 18.7 for females and Whipple's index 233 for males and 229 for females. Contrary to expectations, the female index was slightly lower than the male index for two reasons. The ages of currently married women were checked for consistency and corrected to some extent on the basis of their reproductive histories. The information on the ages of family members was generally obtained from the head of the family who was mostly a male. Using his age as pivot, the head reported the ages of other members. For instance, he might report that his wife was four years younger than him. Hence the head's age was possibly subject to more digital preference than that of other family members and this could also affect the digital preference of males.

The rural indices were above the urban indices of digital preference. Myers' index in rural areas was 20.1 for males and 20.4 for females while in urban areas it was 19.2 for males and 15.6 for females. Whipple's index showed similar differentials, although the rural-urban differentials in digital preference were not large.

Response Errors

To assess the response errors, NFMS was immediately followed by a reinterview of a sub-sample of 44 villages and 33 urban blocks consisting of 2,192 and 855 sample families respectively. Information was obtained in the reinterview only on a limited set of variables such as the number and composition of usual family members and the numbers of births and deaths to them during the two years preceding the date of the original interview.

The number of births reported in the original interview to usual members of the family by the number reported in the reinterview is shown in Table 9.3 to examine the gross response error. Of the 1,454 rural families reporting no births during the preceding two years in the original interview, 97.2 per cent reported no birth in the reinterview. Of 646 families reporting one birth in the original interview, 93.7 per cent reported one birth in the reinterview. Similarly among the 79 families reporting 2 births in the original interview, 91.2 per cent reported 2 births in the reinterview. Among the 9 families reporting 3 births, only 77.8 per cent reported 3 births in the reinterview. Only four families reported four births in both interviews. The percentage of identical responses seems to decrease with increasing number of births reported. This relationship suggests that the error in the perception of the reference period might increase when more events are reported. A

similar pattern of error was found for urban areas and for the State.

Table 9.4 shows the gross response error in the number of deaths to usual members of the family during the two years preceding the date of the original interview by the number of deaths reported in the same period at reinterview. In rural areas, of the 2,058 families reporting no death in the original interview, 97.3 per cent reported no death in the reinterview whereas among the 128 families reporting one death at the time of the original interview, 94.5 per cent reported one death in the reinterview. This pattern may again be attributed to errors in the perception of the reference period of two years preceding the date of the original interview. A similar pattern is observed for urban areas and for the State.

The composition of the family in terms of the average number of the male and female adults and non-adults, and the family size as estimated from the interview and the reinterview of the sub-sample are presented in Table 9.5. The difference in the averages between the interview and the reinterview is a net difference, since random variations are cancelled to a large extent in the averages. The percentage difference between the reinterview and the original interview for all the compositional variables and family size was generally below 1.0 per cent showing that there were no systematic biases between the interview and the reinterview. Only the average number of male non-adults was less in the reinterview compared to the original interview. For all other variables, the average from the reinterview was more than that from the interview. This is, perhaps indicative of a somewhat superior investigation at the time of the reinterview, which was done by the supervisor. Table 9.5 shows that the net errors in the estimates from the interview and the reinterview were rather small and that response errors varied randomly rather than systematically.

The gross response error is summarized for selected variables by two indices in Table 9.6. The off-diagonal proportion is the proportion of non-identical responses. However, this is a poor measure of gross response error since it depends on the number of categories in the answer. The more the non-zero response categories the larger should this proportion be. This index is also affected by the distribution of the responses over the categories. When most of the responses fall in one or two categories, this proportion would be small than when the responses are well distributed over all the categories. For these reasons, it is inappropriate to compare the off-diagonal proportion for different variables.

It is more valid to compare the response error defined as:

$100 - 100$ (measure of association), with the Crammer measure of association given by

$$\sqrt{\frac{x^2}{n(k-1)}}$$

where n = the number of observations and
 k = the number of non-zero response categories and
 x^2 = Chi-square measure of deviance
(Srikantan, 1979).

The percentage response error is shown in Table 9.6 for selected characteristics in rural and urban areas and for the State. In rural areas, family composition by sex and by whether adult or non-adult had the least response error. The number of non-adults by sex had less response error than the number of adults. The number of births to usual members of the family in the preceding two years had a larger response error and the number of deaths to usual numbers had the largest response error. Immigrants and births in the last two years, outmigrants and deaths in the last two years had response errors between those for the numbers of births and deaths. The same ranking of variables by response errors was found for urban areas and for the State.

These results clearly establish that the count of the usual members of the family was least subject to response errors. The number of births reported in the last two years contained larger response errors but the number of deaths reported in the last two years contained the largest response errors. These findings bear out the observations made in Chapter 8 regarding the larger errors involved in the estimation of the death rate compared to the birth rate from data collected in a family survey such as NFMS, Maharashtra.

REFERENCE

Srikantan, K.S. (1979). *An Evaluation of the Fiji Fertility Survey Based on the Post-Enumeration Survey*. Occasional Papers, No.21. World Fertility Survey : London.

Table 9.1 : Age Ratios* at Selected Months for Those Under 2 Years and for Selected Ages For Those Above 2 Years of Age by Sex

	6 months	12 months	18 months	24 months	5 years	10 years	15 years	20 years	25 years
Males									
Aurangabad Division	1.09	7.56	5.50	15.00	1.01	1.67	0.97	1.80	2.68
Nagpur Division	0.44	1.89	2.00	1.30	0.89	1.61	1.20	2.18	2.26
Western Maharashtra	1.50	3.35	5.76	3.70	0.92	1.33	1.39	1.72	2.15
Rural Maharashtra	1.00	3.55	3.90	3.10	0.93	1.46	1.19	1.73	2.28
Urban excluding									
Greater Bombay	1.37	2.19	3.00	2.67	0.96	1.36	1.17	1.29	2.19
Greater Bombay	2.00	3.60	12.00	0.70	0.87	1.50	1.15	2.16	1.75
Urban Maharashtra	1.57	2.65	4.29	1.44	0.92	1.41	1.17	1.61	1.98
Maharashtra State	1.15	3.27	3.96	2.38	0.93	1.45	1.18	1.68	2.17
Females									
Aurangabad Division	3.00	6.80	2.20	4.67	0.93	1.44	1.10	2.64	1.97
Nagpur Division	0.89	1.91	2.75	1.77	1.05	1.37	0.77	2.59	1.98
Western Maharashtra	1.00	4.79	4.00	2.00	1.65	1.30	1.18	2.45	3.09
Rural Maharashtra	1.46	4.03	3.22	2.24	1.25	1.34	1.04	2.52	2.52
Urban excluding	1.09	3.00	5.33	2.83	1.07	1.34	1.25	2.18	1.84
Greater Bombay									
Greater Bombay	0.33	1.60	8.67	1.80	0.75	1.22	0.90	1.42	2.08
Urban Maharashtra	0.70	2.46	6.17	2.36	0.94	1.29	1.10	1.85	1.93
Maharashtra State	1.23	3.56	3.80	2.28	1.12	1.32	1.06	2.27	2.29
Males									
	30 years	35 years	40 years	45 years	50 years	55 years	60 years	65 years	70 years
Aurangabad Division	5.37	2.77	5.41	3.79	4.56	5.86	5.30	7.50	4.62
Nagpur Division	6.26	4.11	4.57	5.00	6.82	3.78	13.82	10.00	22.50
Western Maharashtra	4.69	3.44	4.92	5.23	7.55	4.48	6.44	14.90	20.00
Rural Maharashtra	5.21	3.46	4.91	4.89	6.58	4.42	7.61	11.51	13.45
Urban excluding									
Greater Bombay	5.11	4.27	7.52	4.28	5.18	3.35	9.52	18.86	15.67
Greater Bombay	3.18	3.77	5.94	4.60	3.75	3.33	6.67	4.75	7.33
Urban Maharashtra	4.20	4.02	6.73	4.42	4.48	3.34	8.33	11.33	12.89
Maharashtra State	4.82	3.66	5.45	4.71	5.76	4.00	7.78	11.47	13.32
Females									
Aurangabad Division	4.51	2.22	3.14	3.91	1.88	5.23	7.48	41.00	8.80
Nagpur Division	5.19	2.54	7.57	5.31	3.09	5.04	82.67	24.50	15.00
Western Maharashtra	4.00	3.97	6.03	6.54	1.67	7.14	13.14	25.20	39.67
Rural Maharashtra	4.35	3.20	5.73	5.60	1.95	6.04	14.38	27.00	26.80
Urban excluding									
Greater Bombay	3.56	4.03	5.12	3.36	1.52	11.16	38.67	15.14	15.33
Greater Bombay	2.38	2.21	4.35	3.49	2.53	3.36	8.91	9.43	24.00
Urban Maharashtra	2.99	3.06	4.75	3.41	1.85	6.51	19.41	12.29	17.50
Maharashtra State	3.79	3.15	5.37	4.60	1.91	6.16	15.45	20.13	23.57

* $2(\text{Number in age } x (\text{months/years})) / (\text{Sum of numbers in ages } (x-1) \text{ and } (x+1))$.

Table 9.2 : Digit Preferences in Age Reporting as Measured by Myers' and Whipple's Indices

	Male/ Female	Ending Digit										Myers' Index*	Whipple's Index**
		0	1	2	3	4	5	6	7	8	9		
Aurangabad Division	M	19.9	7.1	10.3	5.8	5.6	17.0	9.0	9.3	10.8	5.2	18.0	217
	F	18.5	7.4	10.9	8.1	8.9	17.8	8.2	5.2	9.2	5.7	17.3	215
Nagpur Division	M	20.5	5.6	10.4	6.5	8.1	19.9	7.3	5.7	10.4	5.6	21.1	252
	F	20.5	5.6	12.5	6.6	7.3	16.7	8.5	6.7	10.3	5.4	20.0	239
Western Maharashtra	M	18.9	6.5	10.1	6.2	7.0	19.0	8.3	8.0	10.9	5.1	18.7	237
	F	19.5	7.4	12.0	6.5	6.9	20.5	6.5	6.0	9.1	5.6	22.0	246
Rural Maharashtra	M	19.8	6.5	10.3	6.3	7.1	19.1	7.1	7.7	10.8	5.3	20.1	238
	F	19.7	6.9	11.8	6.8	7.4	19.0	7.3	6.1	9.5	5.6	20.4	239
Urban excluding Greater Bombay	M	18.7	6.0	11.4	7.1	6.8	17.9	7.2	7.2	11.1	6.5	19.2	238
	F	17.8	7.1	11.2	7.0	7.3	18.0	7.9	7.9	9.5	6.3	17.0	223
Greater Bombay	M	17.5	6.0	11.1	7.6	6.7	18.2	8.5	6.4	12.4	5.7	19.2	209
	F	16.1	7.9	11.2	7.1	8.2	16.4	8.4	7.4	10.4	6.9	14.1	196
Urban Maharashtra	M	18.2	6.0	11.3	7.3	6.8	18.1	7.8	6.9	11.9	6.2	19.2	225
	F	17.1	7.4	11.2	7.1	7.7	17.3	8.1	7.7	9.9	6.6	15.6	212
Maharashtra State	M	19.2	6.3	10.7	6.7	7.0	18.7	7.3	7.4	11.1	5.6	19.8	233
	F	18.8	7.1	11.6	6.9	7.5	18.4	7.6	6.6	9.6	5.9	18.7	229

* Myers' Index = $1/2 \times$ the sum of absolute deviations from 10 per cent.

** Whipple's Index = $5(f_{25} + f_{30} + \dots + f_{60}) / (f_{23} + f_{24} + f_{25} + \dots + f_{61} + f_{62}) \times 100$ where f_i denotes the frequency of age 'i'.

Table 9.3 : Births to Usual Members of Families During Two Year Period as Reported at Interview by the Number as Reported at Reinterview

Number of births reported at interview	Number of births reported at reinterview																																																																																																																																																																																																																																		
	Rural						Urban						Maharashtra State																																																																																																																																																																																																																						
	0	1	2	3	4	Total	0	1	2	3	4	Total	0	1	2	3	4	Total																																																																																																																																																																																																																	
0	1413	37	4	0	0	1454	650	7	2	0	0	659	2063	44	6	0	0	2113		97.2	2.5	0.3	0.0	0.0	100.0	98.6	1.1	0.3	0.0	0.0	100.0	97.6	2.1	0.3	0.0	0.0	100.0	1	18	605	21	2	0	646	2	166	2	0	0	170	20	771	23	2	0	816		2.8	93.7	3.2	0.3	0.0	100.0	1.2	97.6	1.2	0.0	0.0	100.0	2.4	94.5	2.8	0.3	0.0	100.0	2	0	5	72	2	0	79	0	1	21	1	0	23	0	6	93	3	0	102		0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0
	97.2	2.5	0.3	0.0	0.0	100.0	98.6	1.1	0.3	0.0	0.0	100.0	97.6	2.1	0.3	0.0	0.0	100.0	1	18	605	21	2	0	646	2	166	2	0	0	170	20	771	23	2	0	816		2.8	93.7	3.2	0.3	0.0	100.0	1.2	97.6	1.2	0.0	0.0	100.0	2.4	94.5	2.8	0.3	0.0	100.0	2	0	5	72	2	0	79	0	1	21	1	0	23	0	6	93	3	0	102		0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																			
1	18	605	21	2	0	646	2	166	2	0	0	170	20	771	23	2	0	816		2.8	93.7	3.2	0.3	0.0	100.0	1.2	97.6	1.2	0.0	0.0	100.0	2.4	94.5	2.8	0.3	0.0	100.0	2	0	5	72	2	0	79	0	1	21	1	0	23	0	6	93	3	0	102		0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																						
	2.8	93.7	3.2	0.3	0.0	100.0	1.2	97.6	1.2	0.0	0.0	100.0	2.4	94.5	2.8	0.3	0.0	100.0	2	0	5	72	2	0	79	0	1	21	1	0	23	0	6	93	3	0	102		0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																									
2	0	5	72	2	0	79	0	1	21	1	0	23	0	6	93	3	0	102		0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																												
	0.0	6.3	91.2	2.5	0.0	100.0	0.0	4.4	91.2	4.4	0.0	100.0	0.0	5.9	91.2	2.9	0.0	100.0	3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																															
3	0	0	2	7	0	9	0	0	0	2	0	2	0	0	2	9	0	11		0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																		
	0.0	0.0	22.2	77.8	0.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	18.2	81.8	0.0	100.0	4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																																					
4	0	0	0	0	4	4	0	0	0	0	1	1	0	0	0	0	5	5		0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																																																								
	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	100.0	100.0	Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																																																																											
Total	1431	647	99	11	4	2192	652	174	25	3	1	855	2083	821	124	14	5	3047		65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																																																																																														
	65.3	29.5	4.5	0.5	0.2	100.0	76.3	20.4	2.9	0.3	0.1	100.0	68.3	26.9	4.1	0.5	0.2	100.0																																																																																																																																																																																																																	

Table 9.4 : Deaths to Usual Members of Families During Two Year Period as Reported at Interview by the Number as Reported at Reinterview

Number of deaths reported at interview	Number of deaths reported at reinterview														
	Rural					Urban					Maharashtra State				
	0	1	2	3	Total	0	1	2	3	Total	0	1	2	3	Total
0	2003	52	3	0	2058	794	6	0	0	800	2797	58	3	0	2858
	97.3	2.5	0.2	0.0	100.0	99.3	0.7	0.0	0.0	100.0	97.9	2.0	0.1	0.0	100.0
1	2	121	5	0	128	1	49	2	0	52	3	170	7	0	180
	1.6	94.5	3.9	0.0	100.0	1.9	94.2	3.9	0.0	100.0	1.7	94.4	3.9	0.0	100.0
2	0	0	5	0	5	0	0	3	0	3	0	0	8	0	8
	0.0	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0
3	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1
	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Total	2005	173	13	1	2192	795	55	5	0	855	2800	228	18	1	3047
	91.4	7.9	0.6	0.1	100.0	93.0	6.4	0.6	0.0	100.0	91.9	7.5	0.6	0.0	100.0

Table 9.5 : Average Number of Male Adults, Female Adults, Male Non-Adults, Female Non-Adults in the Family and Average Family Size at Interview and Reinterview

Composition by	Interview			Reinterview			Percentage difference *		
	Rural	Urban	Maharashtra State	Rural	Urban	Maharashtra State	Rural	Urban	Maharashtra State
Male adults	1.99	1.98	1.98	2.01	2.00	2.00	1.0	1.0	1.0
Female adults	1.97	1.85	1.94	1.99	1.86	1.95	1.2	0.4	1.0
Male non-adults	1.24	1.08	1.19	1.23	1.09	1.19	-0.8	0.9	0.0
Female non-adults	1.18	0.95	1.12	1.19	0.96	1.13	0.8	1.0	0.9
Family size	6.36	5.87	6.22	6.41	5.91	6.27	0.8	0.7	0.8

* $100 \times (\text{Reinterview average}) / (\text{Interview average}) - 100.$

Table 9.6 : Measure of Association¹, Response Error² and Off-Diagonal Proportion³ for Specified Variables

	Rural			Urban			Maharashtra State		
	Measure of association	Response error percentage	off-diagonal proportion	Measure of association	Response error percentage	off-diagonal proportion	Measure of association	Response error percentage	off-diagonal proportion
Male adults	0.956	4.4	0.033	0.946	5.4	0.016	0.954	4.6	0.029
Female adults	0.936	6.4	0.047	0.922	7.8	0.021	0.921	7.9	0.039
Male non-adults	0.975	2.5	0.023	0.985	1.6	0.013	0.979	2.1	0.020
Female non-adults	0.963	3.7	0.025	0.976	2.4	0.016	0.966	3.4	0.023
Married females (15-50)	0.948	5.2	0.030	0.953	4.7	0.021	0.935	6.5	0.028
Births to usual members	0.868	13.2	0.042	0.917	8.3	0.018	0.878	12.2	0.035
Deaths to usual members	0.825	17.5	0.028	0.851	14.9	0.011	0.846	15.4	0.023
Inmigrants and births in last two years	0.846	15.4	0.049	0.906	9.4	0.019	0.861	13.9	0.041
Outmigrants and deaths in last two years	0.830	17.0	0.047	0.877	12.3	0.027	0.797	20.3	0.042

1 = Measure of association = $\sqrt{X^2/n(k-1)}$ where k is the number of non-zero response categories and n the number of observations.

2 = Response error = 100 - 100(measure of association).

3 = Proportion of responses for which the answers given at the interview and reinterview were not identical.

APPENDIX A
SAMPLE DESIGN, ESTIMATION PROCEDURE,
SAMPLING ERROR, DESIGN EFFICIENCY
AND NON-RESPONSE

Introduction

The technical appendix presents the details of the sampling design. The estimation procedure is developed, the sampling errors for key characteristics are calculated and the efficiency of the sampling design is assessed. The rural and urban designs are presented separately since they were based on different patterns of information.

The estimation formulae appropriate for the rural and urban designs are first developed. These weighted estimates are compared with self-weighted estimates and suitable estimation procedures are devised to minimise the load on tabulations. Finally the sampling errors for key characteristics are obtained in accordance with the sampling design and simple random sampling. From these calculations the "design effect" and the efficiency of the design are assessed. It is found that the sampling design adopted is more efficient for the estimation of vital rates than for differentials in mean family size and similar demographic averages.

Non-response in Greater Bombay was much larger than in villages and other urban centres. The single most important reason for non-response was that the respondent could not be contacted during the field visit. To ascertain whether there was any bias due to non-response, the representativeness of the sample has been examined in Chapter 3.

Rural Design

The rural sample families were chosen in three stages, first selecting 50 talukas out of a total of 232, then selecting 2 villages within each chosen taluka and finally interviewing 50 families from each village. This number was determined mainly on the basis of a projected duration of a week's stay in the village which appeared to be optimal in relation to travel costs and arrangements for stay.

A list of talukas was prepared by districts and arranged alphabetically within each district. From this frame, 50 talukas were selected with probability proportional to their 1971 Census population. The list of talukas thus selected are shown in Table A.1. Inspection of this list shows a satisfactory geographical spread of the talukas over the 25 rural districts of Maharashtra. This spread is also evident from Map 2.1 of Chapter 2.

From each of the 50 sample talukas, 2 villages were selected, again with probability proportional to the 1971 Census population from an alphabetically ordered list. The frame for selection of villages in each taluka was available from the District Census Handbook. Of the 100 chosen villages, 10 were dropped because they had fewer than 80 households and 5 were dropped as they were inaccessible or because the

village population was mainly tribal or largely Kannada speaking. These 15 villages were substituted by other villages chosen by the same procedure. The sample villages used for this survey are listed in Table A.1.

From each chosen village, a sample of about 65 families was selected to allow for substitution. The larger villages were divided into a few distinct segments on the basis of the electoral rolls of registered voters and the sample size of 65 voters was then allocated proportionately to the segments. The names of voters were selected systematically, from each village, with a random start, from the voters list. The families of the 65 voters so selected constituted the sample for the village.

Of the 65 chosen families, 50 were to be interviewed. The extra 15 selected families served as substitutes when sample families did not exist, could not be traced or had moved out. Strict instructions were issued to the interviewers to spread the sampling units over all portions of the sample list of families and not to interview contiguously from any one segment of the list. Moreover, to avoid bias, the interviewers were instructed not to leave out large families from the sample.

The electoral rolls were kept at the District Collector's Office. The selection of families was done there by the supervisor, the sample list of families with their addresses was copied by him for each village and then given to the interviewer for conducting the survey interviews.

As this was a family survey, the institutional population, such as inmates of jails, was excluded at its location. However, if such a person did belong to a usual family which was selected in the sample, then (s)he was to be enumerated in that family as a usual member.

Urban Design

In the urban areas, families were chosen in four stages, using urban centres, wards and pages of the electoral rolls as intermediate stages. Fifty-two urban centres were chosen with probability proportional to their 1971 Census population with replacement. The selected centres were retained according to their multiplicity of selection. For instance, Greater Bombay was selected 22 times, Pune city 6 times, and Nagpur and Aurangabad 4 times each. For each selection of the urban centre, two blocks were to be chosen. Thus 44 blocks were chosen from Bombay, 12 from Pune City, 8 each from Nagpur and Aurangabad, etc. The staff of the Population Research Centre, Gokhale Institute of Politics and Economics, selected the urban centres. Their list and number of blocks chosen from each centre are given in Table A.1.

Electoral wards in the selected urban centres were used as blocks and the requisite number was chosen systematically with a random start. In each chosen ward, seven pages from the electoral rolls were again selected systematically with a random start. One voter was selected from each page and his family address identified. One cluster of six families

consisting of the chosen family and the five following ones constituted the sample from the chosen page. For the sample block, this provided 42 families including substitutes, of which 25 families were to be interviewed.

The selection of the required number of blocks and clusters of families was done by the supervisor at the District Collector's Office where the electoral rolls are kept. He copied the list of names and addresses in the selected clusters of families which was then given to the interviewer. As was done for the rural sample, in the urban sample persons residing in institutions were enumerated only if they belonged to a usual family that was interviewed in the survey.

Twenty-five families were to be interviewed out of the sample of 42 families. The twenty-five interviews were determined on the basis of four or five days stay in the town which seemed optimal in relation to the travel cost. The seventeen additional families served as substitutes for families which were not traceable or had moved out. As it was feared that there might be more sample losses in Greater Bombay than in other urban centers, clusters of ten, instead of six, families were formed in Greater Bombay. Again clusters were chosen from each block. This provided a list of 70 families out of which 25 were to be interviewed.

To ensure an adequate spread of the families over the selected block, interviewers were instructed to obtain interviews from all the seven clusters and to get not more than five interviews from any one cluster. In order to avoid any bias in the sample, interviewers were warned against leaving out large families from the interview.

Rural Sample Estimation

For the National Fertility and Mortality Survey, as described earlier, the rural sample was chosen in three stages by selecting talukas, villages and families. An unbiased estimate of the rural aggregate is given by $\sum x(i,j,k) \cdot w(i,j,k)$ summed over the sample units,

where (i,j,k) = the index for the selected family (k) within the selected village (j) within the selected taluka (i);
 x is the value of the characteristic and
 w the weight for the selected family.

For the rural design,

$1/w(i,j,k)$ = expected number of times that the family (i,j,k) was selected in the sample

$$= (50P(i)/P) \cdot (2P(i,j)/P(i)) \cdot (50V(i,j,k)/V(i,j));$$

where P stands for the population and V for the number of voters and the indices i, j and k have the same meaning as before.

On the assumption that the proportion of voters to the population varies little from village to village, the inverse of the weight becomes roughly proportional to the number of voters in the family.

Thus, according to the rural design, any family characteristic should be reweighted inversely by the number of voters in the family to obtain an unbiased estimate of the population aggregate.

As the number of voters in the family was not readily available from the voters list, the number of adults 21 years and over in the family, as gathered in the survey, was used as its estimate. In fact, the families in the rural sample were reweighted by $96/A(i,j,k)$, rounded to the nearest integer, where A is the number of adults 21 years and over in the family (i,j,k). This gave a two digit weight for the family.

For a sub-sample of 20 villages, in two sets of 10 each, Table A.2 compares the CBR, CDR and mean family size obtained by the appropriate weighted formula given above, with the corresponding unweighted estimate. These calculations were carried out by hand to assess the effect of the weighting and to estimate the sampling error, which is discussed in a later section.

The CBR was estimated as the ratio of the mean annual number of births per family to the mean family size and the CDR as the ratio of the mean annual number of deaths per family to the mean family size. The comparison of the weighted and unweighted estimates is summarized.

	Mean family size		CBR		CDR	
	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted
First sub-sample of ten villages	5.6	6.5	32.2	32.3	9.8	8.1
Second sub-sample of ten villages	5.5	6.8	30.4	31.7	10.2	8.6
Combined sub-sample of twenty villages	5.6	6.6	31.3	32.0	10.0	8.4

First, it is seen that because of the selection of families from the voters list, the larger families were over-represented in the sample, the unweighted mean family size being 6.6 against a weighted mean of only 5.6. Second, the CBR was slightly but systematically over-estimated in the unweighted compared to the weighted calculations while the CDR was systematically and moderately under-estimated in the unweighted calculations.

On the basis of these important findings, it was decided to use the weighted estimate for obtaining the CBR and CDR for different segments of the rural sample. However, as the weighting procedure added substantially to the computer work load, it was also decided to use the

unweighted cross-tabulations for comparing differentials by other characteristics such as children ever born, living children and contraceptive use since the slight systematic biases, introduced thereby, would cancel out in the differentials.

Urban Sample Estimation

As described previously, the urban families were chosen in four stages selecting successively urban centres, wards, pages of electoral rolls and a cluster of families from each selected page. An unbiased estimate of the urban aggregate is $\sum x(i,j,k,l) \cdot w(i,j,k,l)$ summed over the sample units,

where (i,j,k,l) = the index for the selected cluster of families (l) in the selected page (k) in the selected ward (j) in the selected urban centre (i);

x is the value of the characteristic and w the weight for the selected cluster of families. For the urban sample design,

$1/w(i,j,k,l)$ = expected number of times that the cluster of families was selected in the sample

$$= (P(i)/P) \cdot (n(i)/N(i)) \cdot (7/N(i,j)) \cdot (n(i,j,k)/N(i,j,k))$$

where P stands for the population, $n(i)$ and $N(i)$, the sample and total number of wards in the i^{th} urban centre, $N(i,j)$ the number of pages in the voters list for the ward (i,j) and $n(i,j,k)$ and $N(i,j,k)$ are the number of voters in the selected sample cluster and in the selected page (i,j,k) of the voters list. Since Greater Bombay formed a separate stratum for the analysis, the formula was simplified for this domain.

As a cluster of 6 consecutive families (10 families in Greater Bombay) constituted the sample from the selected page of the voters list, the number of voters in the cluster was assumed to have a constant ratio to the total number of voters in that page of the list. Hence the last factor in the above formula was disregarded and the weighting factor therefore depended only on the urban centre and the ward. On this basis the weights for the wards were calculated and are shown by their identification codes in Table A.3 for the chosen urban centres.

For a sub-sample of 20 sample blocks, in two sets of ten each from urban centres other than Greater Bombay, and an equal sample from Greater Bombay, the unweighted and weighted CBR, CDR and mean family size were calculated by hand in order to assess the effect of the weighting and to calculate the sampling errors which is discussed later. The means are shown in Table A.4. Since the families were selected with roughly equal chance within the page of the voters list the weighting was applied only for the ward estimate. The CBR was calculated as the ratio of the mean annual number of births per family to the mean family size and the CDR as the ratio of the mean annual number of deaths to the mean family size. The results are summarized.

	Mean family size		CBR		CDR	
	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted
Other Urban						
I sample of 10 blocks	6.4	6.4	29.6	30.4	7.8	7.8
II sample of 10 blocks	6.2	6.2	32.2	32.3	7.3	7.7
Combined sample of 20 blocks	6.2	6.3	31.3	31.4	7.5	7.8
Greater Bombay						
I sample of 10 blocks	6.3	6.4	22.8	23.8	3.7	3.8
II sample of 10 blocks	6.3	6.1	19.2	19.4	5.2	4.9
Combined sample of 20 blocks	6.2	6.2	21.2	21.7	4.4	4.3

The biases in the unweighted estimates, revealed by the above figures, are neither large nor systematic when compared to the weighted estimates. However, to maintain uniformity, the procedure decided for the rural areas was used for the urban areas also. The CBR and CDR were estimated using weighted means whereas differentials in the fertility measures, such as the children ever born, were estimated using unweighted cross-tabulations. As explained earlier, this was done to ensure that the vital rates are free from any bias in estimation while the differentials, which remain unaffected by systematic biases, are cross-tabulated easily using simple counts or averages.

In combining the rural and urban vital rates to obtain the rates for the State as a whole, the proportions of the rural and urban populations from the provisional population totals of 1981 Census were used. These proportions of rural and urban populations were 0.65 and 0.35 respectively. Nearly the same proportions of rural and urban families were observed in the NFMS sample population.

Sampling Error and Design Efficiency

The sampling error is a measure of the variation of the sample estimate from the population value which it estimates. Since all units of the universe are not completely enumerated in the survey, it is essential to provide the sampling error in order that valid inferences about the population parameters might be drawn from the sample. Also the estimation of the sampling error in key characteristics permits the

comparison of the efficiency of different sampling designs.

From a properly designed and chosen probability sample, the sampling error can be estimated. However, like the formula for the estimation of a parameter, the formula for its sampling error has to be developed precisely according to the sampling design.

The sampling error is defined here as the standard deviation of an estimate arising from random variations due to the probability selection of a sample of units from the universe of study.

Sampling Error According to the NFMS Design

The sampling errors for rural areas, Greater Bombay and other urban areas are estimated in this section for three key parameters, CBR, CDR and mean family size.

As described in the section on estimation in the rural sample, for obtaining the village estimates, families were weighted inversely in proportion to the number of adults aged 21 years and over and the villages carried approximately equal weights. Hence the sampling error was calculated from the weighted village estimates for a sub-sample of twenty villages given in Table A.2, by the formula for equal probability selection of villages.

The sub-sample estimate of CBR (from data on births occurring in two years) was 31.14 with a sampling error of 1.8587. For a sample of 100 villages, the sampling error, reduced by the factor $\sqrt{(20/100)}$, was 0.8313. Thus a 95 per cent confidence interval for CBR would be 29.5 to 32.8, for the estimate based on the rural sample.

Using the same procedure for CDR, the estimate (from data on deaths occurring in two years), based on a sub-sample of 20 villages, was 9.81 with a sampling error of 1.0470. For a sample of 100 villages, the sampling error was calculated as

$$1.0470 \cdot \sqrt{(20/100)} = 0.4683.$$

Hence a 95 per cent confidence interval for this estimate would be 8.9 to 10.8.

Calculations based on the sub-sample of 20 villages show that, for the actual sample design, the mean and sample design, the mean and sampling error for family size are respectively 5.62 and 0.1328. For 100 villages the sampling error would be 0.0594 and 95 per cent confidence interval for the mean family size would be 5.5 to 5.7 members.

These estimates provide an indication of the errors due to sampling the rural families and are summarized below :

<u>Parameter</u>	<u>Estimate \pm s.e.</u>	<u>95% confidence interval</u>
CBR	31.14 \pm 0.8313	29.5 to 32.8
CDR	9.81 \pm 0.4683	8.9 to 10.8
MFS	5.62 \pm 0.0594	5.5 to 5.7

Since births and deaths in a two year period are comparatively rare events, the sampling error for CBR and CDR are proportionately larger than for the mean family size. In drawing inferences about all rural families from the sample, due allowance should be made for the sampling fluctuations in terms of the sampling error.

Similar calculations were made for Greater Bombay and other urban areas. As given in Table A.4, a sub-sample of 20 blocks was used in each of the two urban zones for estimating the sampling error in CBR and CDR. Since families within blocks were chosen with roughly equal chance, unweighted averages provided estimates for blocks. The block level estimates were weighted according to the sampling design. The unweighted standard deviation of the family size was calculated for a sub-sample of 100 families from each zone. The results are summarized.

Parameter	Estimate + s.e.	95% confidence interval
<u>Other Urban Areas</u>		
CBR	31.33 + 1.2712	28.8 to 33.9
CDR	7.48 + 0.6310	6.2 to 8.7
MFS	6.25 + 0.1157	6.0 to 6.5
<u>Greater Bombay</u>		
CBR	21.20 + 1.2703	18.7 to 23.7
CDR	4.39 + 0.6598	3.1 to 5.7
MFS	6.17 + 0.0918	6.0 to 6.4

Both CBR and CDR are less but the mean family size is larger for urban compared to rural areas. However, since the sample sizes were smaller for the two urban zones and since the zones were more heterogeneous, their sampling errors are generally larger than for rural areas.

Sampling Error According to Simple Random Sampling (SRS)

It is useful to calculate and compare the sampling error according to the sampling design with that according to SRS in order to ascertain the loss or gain in efficiency due to the actual design that was adopted to suit the available pattern of information and the needs of the field organization. The SRS estimates were made for a sub-sample of 20 villages from the rural areas and of 20 blocks from each of the two urban zones.

The rural birth rate was estimated from the 20 village sub-sample as 31.14. The proportion of births to the total population in the two year survey reference period was, thus, .062. Treating this as a binomial distribution, the sampling error of the annual crude birth rate for SRS would be

$$= (1/2) \sqrt{((.062) (.938) / n)} = 0.0014816$$

where n, the number of persons in the sub-sample, was 6623. Similarly the estimated CDR from the sub-sample of 6623 persons from 20 villages

was 9.81. Treating this as a binomial distribution, the SRS/ sampling error of CDR would be

$$(1/2) \sqrt{((.020) (.980)/6623)} = 0.0008601.$$

Based on a sub-sample of 250 families from 5 villages, the weighted mean and variance of family size were calculated as 5.64 and 5.82. Thus family size appears to approximate the Poisson distribution. For a sub-sample of 1000 families from 20 villages the SRS sampling error of the estimated mean family size would be 0.0763.

Similarly SRS sampling errors in CBR and CDR were estimated from a sub-sample of 20 blocks each from Greater Bombay and other urban areas, using the calculations made earlier, from Table A.4 for the actual sampling design. The unweighted standard deviation of the family size calculated earlier for a sub-sample of 100 families from each zone was used for obtaining the SRS sampling error in the mean family size for a sub-sample of 20 blocks from that zone.

The SRS estimates sampling error in the three key parameters are summarized below for sub-samples of 20 villages/blocks.

	<u>CBR</u>	<u>CDR</u>	<u>MFS</u>
Rural	1.4816	0.8601	0.0763
Urban (Other)	2.1563	1.0801	0.1501
Greater Bombay	1.8049	0.8356	0.1449

The sample size being the same, the SRS sampling error for an estimate might differ from its sampling error for the actual design because the variability of the characteristic in the whole "universe" might be different from its variabilities between and within villages. However, the cost of interviewing the same number of families in SRS would be much higher than in the actual multi-stage design since SRS sampling would require the preparation of a master frame of families and since the travel cost to such a randomly selected sample of families spread over the entire State would be enormous. Both these aspects, sampling variability and cost of field work, have to be considered in comparing sampling designs. As discussed in the next section, comparison of any design with SRS provides a suitable yardstick for this purpose.

Design Effect and Efficiency of the Sampling Design

The sampling error according to the design may be compared with that from SRS, in order to ascertain the loss or gain in efficiency resulting from the actual design adopted. The loss in efficiency arises from the clustered selection of families by stages such as talukas/towns and villages/blocks and gains are made by using ancillary information by such procedures as stratification and probability selection. However, it has to be recognized that the cost of interviewing an equal sized SRS sample would be much higher than the actual cost of a clustered multistage design.

The comparisons were made in terms of the design effect (Deff) which is the ratio of the sampling error of an estimate from the actual

sample to that from SRS. They are based on sub-samples of 20 villages/blocks from rural Maharashtra, urban areas other than Greater Bombay and Greater Bombay. The sampling errors of the actual design and SRS, calculated in the preceding two sections, were used. Deff for the three key characteristics are summarized.

	<u>CBR</u>	<u>CDR</u>	<u>MFS</u>
Rural	1.25	1.22	1.74
Urban (Other)	1.02	1.01	1.34
Greater Bombay	1.04	1.17	0.94

Deff for the rural design shows that, for both CBR and CDR, the actual sampling error was not more than 25 per cent above that of SRS, in spite of the three-stage clustered selection of rural families. The rather large sample of 50 families from each chosen village had effectively controlled the sampling error in the vital rates since births and deaths per family were more variable within rather than between villages.

Deff for the mean family size was much larger, being 1.74. The larger sample size of 50 families chosen from each village had reduced the efficiency of this estimate since the ratio of the between to within village variation in this character was larger than for the number of births or deaths per family.

Except for the estimate of mean family size in other urban areas, the urban Deff's are close enough to unity, showing that the design adopted was about as efficient as SRS. The mean family size in other urban areas had a Deff of 1.34, arising from a larger ratio of between to within urban centre variation.

The actual sampling design used appears to be more efficient for the estimation of vital rates than for differentials in mean family size and similar demographic averages. Such divergent results are not unusual in survey research. As the main purpose of this survey is to estimate vital rates, the choice of the multi-stage design and the determination of the number of villages/blocks and families within villages/blocks to be chosen appear, by and large, to be reasonable, if not exactly optimal.

Non-response in the Survey

If non-respondent units are selective with regard to demographic characteristics and the extent of non-response is large, the survey estimates based on the interviewed units may be biased. However, if the percentage non-response is small, the bias in the survey estimate will be negligible. Where the percentage non-response is large, it is necessary to examine the representativeness of the units interviewed in the survey. These twin issues of non-response and representativeness of the sample have been discussed in earlier chapters.

In this Appendix, the data on the extent of non-response are presented in Tables A.5 to A.7. The universe of study is the households and persons who are usually available for interview during the reference

period. Hence non-response is calculated as a percentage to the number of units eligible for interview, which is the effective sample less those falling outside the universe of study due to such reasons as family not traceable, left the place or transferred.

The percentage non-response calculated on this basis was only 12.1 for villages and 12.9 for other urban centres against 22.6 for Greater Bombay (Table A.5). The single most important reason for non-response was that the respondent could not be contacted during the field visit. The percentage of non-respondents giving this reason ranged between 59.4 for Nagpur Division and 79.4 for other urban centres (Table A.6). Since repeated call-backs were not possible during the short field visit, the non-response was large in this survey due to non-contact. The percentage refusals was lower in villages (2.8) compared to other urban centres (11.7) and Greater Bombay (21.3). This was the second main reason for non-response, though far less important than non-contact during the field visit. Other reasons for non-response were less important.

In the interviewed households, there was some non-response among the eligible women for whom an additional questionnaire was to be filled. The percentage non-response among eligible women in interviewed households was 6.5 for villages, 2.6 for other urban centres and 0.5 for Greater Bombay (Table A.7).

Table A.1 : List of Villages and Urban Centres Selected in the Sample

<u>Rural Sample</u>				
District	Taluka	Name of village	1971 Census count	
			Population	Households
1	2	3	4	5
<u>Aurangabad Division</u>				
Aurangabad	Kannad	Aurela	1216	250
		Karanjkheda Jagir	4359	775
Beed	Paithan	Bihemandwa	4113	740
	Gangapur	Maliwadgoan	1316	220
	Patoda	Gomalwada	1479	304
		Suppa	1138	198
	Majalgaon	Savargaon	1647	293
Nanded	Kandhar	Sultanpur	861	131
		Shiwani Janga	1112	203
		Katkalamba	1848	335
Parbhani	Jintur	Asegaon	2670	414
		Deosadi	537	104
	Pathri	Ambegeon Chaaharum	1083	177
Osmanabad	Ahmedpur	Vita Bk.	1686	266
		Ujeni	1796	311
	Osmanabad	Gothala	627	105
		Kolhegaon	829	135
		Takwiki	1625	274
Total : 18 villages				
<u>Nagpur Division</u>				
Akola	Akola	Ghota	1089	210
		Kanheri	1915	413
	Mangrulpir	Dapura Bk.	1129	210
		Falegaon	739	145
Amravati	Washim	Tarodi	762	142
	Amravati	Bhatkuli	4640	929
		Yavli	2934	520
	Daryapur	Jawardi	473	96
		Mahimapur	413	82
Buldhana	Chikhali	Gangalgaon	1591	278
		Karatwadi	443	86
	Malkepur	Chandur Biawa	4368	791
		Dharangaon	2975	529
Chandrapur	Gadchiroli	Gadchiroli	7884	1474
	Rajura	Vihirgaon	1379	244
	Warora	Dongergaon	1384	326
Bhandara	Gondia	Pirli	936	187
		Bihiriya	1121	216
	Sakoli	Chhipiya	2785	490
		Arjuni	4743	897
		Bortola	658	109

Table A.1 (Contd.)

District	Taluka	Name of village	1971 Census count	
			Population	Households
1	2	3	4	5
Nagpur	Katol	Savargaon	4325	884
		Pimpalgaon Raut	763	158
Wardha	Ramtek	Khat	2491	522
	Wardha	Palasgaon	1136	228
Yeotmal	Kelapur	Chikhalwardha	1137	243
		Karmana	475	86
	Yeotmal	Nandura Kh. Parwa	503 783	94 141
Total : 29 Villages				
<u>Western Maharashtra</u>				
Thane	Bhiwandi	Paygaon	1529	248
		Narpoli	10262	2291
Kolaba	Shri- vardhan	Ranavali	1021	214
		Shirvane	389	93
Ratnagiri	Mangaon	Degaon	796	158
		Wawe-Diwali	942	154
	Khed	Musad	1641	295
		Shirgaon	1774	329
Sawantwadi	Madure	1546	308	
	Nemale	2058	398	
Pune	Dhond	Dapodi	1055	172
		Ravangaon	2042	305
	Indapur	Lasurne	9783	1670
Ahmednagar	Haveli	Tawashi	1880	335
		Katraj	2696	411
	Jamkhed	Kondhava Bk.	2754	482
		Nandnaji	5960	996
Nagar	Shiur	1971	319	
	Kapurwadi	3222	505	
	Nandgaon	1165	210	
Shrirampur	Belapur Kh.	3557	655	
	Nipani Wadgaon	8788	1824	
Satara	Khatav	Katarkhatav	4074	654
		Rajapur	2206	368
	Koregaon	Naygaon	893	155
Sangli	Kavathe- Mahankal	Rui	1545	271
		Kumthe	1359	241
	Walwa	Sonapur	974	181
Sangli	Kavathe- Mahankal	Alkud (M)	815	134
		Dhalgaon	3657	633
	Walwa	Walwa	9164	1529
		Navkhed	1810	315

Table A.1 (Concl'd.)

District	Taluka	Name of village	1971 Census count	
			Population	House-holds
1	2	3	4	5
Solapur	Malshiras	Purandwade	5501	1234
		Ekshiv	3916	685
	Mohol	Bhoire	1337	226
Kolhapur	Ajra	Mohol	12248	2154
		Chimane	2576	453
	Bavda	Parpoli	561	114
		Umbarde	2407	472
		Tithavali	1558	276
	Hatkanangale	Male	1359	236
		Alte	7378	1272
Nasik	Dindori	Ahiwantwadi	1052	172
		Ambegaon	1096	179
	Kalvan	Saraledigar	628	88
		Surgana	Umbarthan	1148
	Dhulia	Sakri	Mani	433
Degaon			1914	289
Jalgaon	Pachora	Pangaon	999	172
		Galan Kh.	1512	246
	Jamner	Nagar Deole Bk.	9469	1645
		Garkhede Kh.	1035	219
		Palaskhede Bk.	1342	240

Total : 53 Villages
Total Rural : 100 Villages

Urban Sample

Name of urban centre	Number of blocks selected	1971 Census population
Greater Bombay	44	5970575
Alore (Dist. Ratnagiri)	2	3369
Aurangabad	8	150483
Badnera (Dist. Amravati)	4	27477
Dombivali	4	51108
Ichalkaranji (Dist. Kolhapur)	4	87731
Nagpur	8	866076
Pauni (Dist. Bhandara)	4	17781
Pune City	12	856105
Pune Cantt.	4	77774
Satara	4	66433
Shirgaon (Dist. Ratnagiri)	2	3172
Sholapur	4	398361
Total	104	

Table A.2 : Comparison of Unweighted and Weighted CBR, CDR and Mean Family Size from the Rural Sub-sample

Sub-sample village	District	Sample population	CBR		CDR		MFS	
			Un-Weighted	Weighted	Un-Weighted	Weighted	Un-Weighted	Weighted
1. Ghota	Akola	305	27.9	25.1	18.0	18.9	6.1	5.6
2. Vita Bk.	Parbhani	368	36.7	33.3	9.5	7.1	7.4	6.1
3. Dharangaon	Buldhana	310	41.9	45.0	4.8	4.7	6.2	5.7
4. Katarkhatav	Satara	326	29.1	29.9	7.7	9.3	6.5	5.2
5. Garkhede Kh.	Jalgaon	338	44.4	44.4	1.5	1.6	6.8	6.3
6. Asegaon	Prabhani	346	36.1	33.8	5.8	5.3	6.9	5.7
7. Nemale	Ratnagiri	320	34.4	32.5	7.8	9.7	6.4	5.8
8. Bihamandwa	Aurangabad	314	23.9	26.7	8.0	10.6	6.3	5.4
9. Ranavali	Kolaba	274	32.8	38.8	10.9	16.1	5.5	4.7
10. Paygaon	Thana	360	16.7	13.1	8.3	10.5	7.2	5.9
Ten villages		3261	32.3	32.2	8.1	9.8	6.5	5.6
11. Parpoli	Kolhapur	277	34.3	34.0	10.8	10.4	5.5	4.6
12. Degaon	Dhulia	426	38.7	32.5	5.9	5.1	8.5	6.9
13. Ahiwantwadi	Nasik	421	28.5	23.6	11.9	15.7	8.4	6.8
14. Lasurane	Pune	300	26.7	24.3	6.7	9.5	6.5	5.4
15. Nandnaj	Ahmednagar	339	31.0	25.4	10.3	7.9	6.8	5.3
16. Nandura	Yeotmal	279	44.8	47.3	5.4	5.3	5.6	5.0
17. Rui	Satara	355	25.3	27.0	5.6	11.2	7.1	5.5
18. Galan	Jalgaon	321	35.8	35.5	9.3	7.5	6.4	5.6
19. Alte	Kolhapur	343	30.6	29.8	7.3	9.6	6.9	5.9
20. Suppa	Bhir	301	21.6	20.6	13.3	20.1	6.0	5.0
Ten villages		3362	31.7	30.4	8.6	10.2	6.8	5.5
Twenty villages		6623	32.0	31.3	8.4	10.0	6.6	5.6

Based on a sample of 50 families per village drawn from the voters' list except for Lasurane which had a sample of 46 families.

CBR - Births per 1,000 population; CDR - Deaths per 1,000 population;
MFS - Mean family size.

The formula used for calculating the mean is $\frac{\sum Wx}{\sum W}$,
where $W = 1$ for the unweighted mean
= $96 / (\text{number of family members aged 21+})$ rounded to the nearest integer for the weighted mean.

The CBR is calculated as the ratio of the mean number of births per family to the mean family size and the CDR as the ratio of the mean number of deaths per family to the mean family size.

Table A.3 : Weights for Estimation by Urban Sample Blocks (Wards)

Centre/Sample block number (1)	Weight (2)	Centre/Sample block number (3)	Weight (4)
<u>Alore</u>		<u>Nagpur</u>	
Dist.: Ratnagiri Code 03		Dist.: Nagpur Code 17	
Tal. : Chiplun Code 4		Tal. : Nagpur Code 3	
43	30	41	10
44	30	42	8
		43	9
		44	9
		45	9
		46	10
		47	5
		48	13
<u>Aurangabad</u>		<u>Pauni</u>	
Dist.: Aurangabad Code 22		Dist.: Bhandara Code 20	
Tal. : Aurangabad Code 4		Tal. : Bhandara Code 3	
41	12	41	20
42	13	42	20
43	12	43	20
44	12	44	20
45	9		
46	13		
47	10		
48	12		
<u>Badnera</u>		<u>Pune Cantonment</u>	
Dist.: Amaravati Code 15		Dist.: Pune Code 13	
Tal. : Amaravati Code 1		Tal. : Pune City Code 4	
41	13	53	19
42	17	54	16
43	13	55	17
44	19	56	12
<u>Dombivali</u>		<u>Pune City</u>	
Dist.: Thana Code 04		Dist.: Pune Code 13	
Tal. : Kalyan Code 2		Tal. : Pune City Code 4	
41	59	41	6
42	59	42	2
43	65	43	9
44	59	44	4
		45	6
		46	4
		47	11
		48	7
		49	5
		50	10
		51	6
		52	5
<u>Ichalkaranji</u>			
Dist.: Kolhapur Code 05			
Tal. : Hatkanangale Code 3			
41	13		
42	19		
43	32		
44	20		

Table A.3 :(Concl'd.)

Centre/Sample block number (1)	Weight (2)	Centre/Sample block number (3)	Weight (4)
<u>Satara</u>		<u>Sholapur</u>	
Dist.: Satara Code 07		Dist.: Sholapur Code 08	
Tal. : Satara Code 3		Tal. : Sholapur Code 3	
41	15	41	22
42	15	42	16
43	15	43	13
44	18	44	20
 <u>Shirgaon</u>			
Dist.: Ratnagiri Code 03			
Tal. : Chiplun Code 4			
41	29		
42	28		
 <u>Greater Bombay</u>			
Dist.: Greater Bombay Code 01			
41	33	63	37
42	21	64	41
43	26	65	33
44	37	66	38
45	26	67	36
46	29	68	38
47	29	69	50
48	35	70	60
49	30	71	42
50	34	72	39
51	35	73	51
52	34	74	65
53	27	75	30
54	27	76	61
55	25	77	41
56	37	78	35
57	33	79	76
58	38	80	41
59	30	81	44
60	44	82	88
61	30	83	48
62	34	84	48

Table A.4 : Unweighted and Weighted CBR, CDR and Mean Family Size Estimated for (1) Urban Centres Excluding Greater Bombay and (2) Greater Bombay Using 20 Blocks Each

Urban Excluding Greater Bombay						
Urban Centre/Block		Sample Population	CBR	CDR	MFS	Weight
Sub-Sample I						
Nagpur	1	151	9.9	0.0	6.0	10
	4	184	29.9	10.9	7.4	8
	8	160	25.0	6.2	6.4	13
Aurangabad	3	169	35.5	3.0	6.8	12
	6	230	54.4	8.7	9.2	13
	8	138	36.2	14.5	5.5	12
Pune	3	124	28.2	20.2	5.0	9
	7	116	30.2	12.9	4.6	11
	10	146	24.0	3.4	5.8	10
	14	175	20.0	2.9	7.0	16
10 Blocks	Unweighted	1593	30.4	7.8	6.4	
	Weighted	1593	29.6	7.8	6.4	
Sub-Sample II						
Shirgaon	1	169	35.5	0.0	6.5	29
Alore	1	154	19.5	9.7	6.2	30
Sholapur	2	181	19.3	8.3	7.2	16
	4	128	35.2	3.9	5.1	20
Pauni	1	153	32.7	6.5	6.1	20
	4	146	20.5	10.3	5.8	20
Ichalkaranji	2	158	44.3	3.2	6.3	19
	3	137	40.2	11.0	5.5	32
Badnera	1	180	38.9	16.7	7.2	13
	2	159	37.7	6.3	6.4	17
10 Blocks	Unweighted	1565	32.3	7.7	6.2	
	Weighted	1565	32.2	7.3	6.2	
20 Blocks	Unweighted	3158	31.4	7.8	6.3	
	Weighted	3158	31.3	7.5	6.2	

Table A.4 (Concl.d.)

Greater Bombay

Urban Centre/Block		Sample Population	CBR	CDR	MFS	Weight
Sub-Sample I						
	4	191	36.6	2.6	7.6	37
	8	158	34.8	6.3	6.3	35
	12	168	17.9	0.0	6.7	34
	16	177	17.0	2.8	7.1	37
	20	173	31.8	0.0	6.9	44
	24	165	18.2	0.0	6.6	41
	28	137	21.9	3.6	5.5	68
	32	143	17.5	17.5	5.7	39
	36	140	14.3	0.0	5.6	61
	40	146	24.0	6.8	5.8	41
10 Blocks	Unweighted	1598	23.8	3.8	6.4	
	Weighted	1598	22.8	3.7	6.3	
Sub-Sample II						
	1	129	23.3	7.8	5.2	33
	5	171	35.1	5.8	6.8	26
	9	161	31.1	6.2	6.4	30
	13	140	14.3	0.0	5.6	27
	17	165	21.2	3.0	6.6	33
	21	158	3.2	6.3	6.3	30
	25	154	9.7	3.2	6.2	33
	29	149	13.4	0.0	6.0	50
	33	145	27.6	10.3	5.8	57
	37	146	13.7	6.8	5.8	41
10 Blocks	Unweighted	1518	19.4	4.9	6.1	
	Weighted	1518	19.2	5.2	6.0	
20 Blocks	Unweighted	3116	21.7	4.3	6.2	
	Weighted	3116	21.2	4.4	6.2	

CBR - Births per year per 1,000 Population.

CDR - Deaths per year per 1,000 population.

MFS - Mean Family size.

Weights are from table 3 according to the sampling design.

Twenty-five families within each block were selected in clusters with roughly equal chance within the chosen page of the voters' list.

Table A.5 : Number of Sample Families Selected, Substitutes Not Utilized, Families Outside the Universe of Study and Percentage Non-Response

1	Selected (including substitutes) utilized	Substitutes not utilized	Effective sample	Outside the universe of study			Sample eligible for interview	Non-response	
				Family not trace- able	Left the place	Trans- ferred		Number	%
	2	3	4	5	6	7	8	9	10
Aurangabad Division (11 villages)	740	60	680	18	45	14	603	53	8.8
Nagpur Division (28 villages)	1868	168	1700	42	75	3	1580	180	11.4
Western Maharashtra (38 villages)	2538	188	2350	65	84	9	2192	296	13.5
Rural Maharashtra (77 villages)	5146	416	4730	125	204	26	4375	529	12.1
Urban excluding Greater Bombay (46 blocks)	2004	276	1728	183	134	20	1391	180	12.9
Greater Bombay (35 blocks)	2899	1407*	1492	263	91	9	1129	254	22.6
Urban Maharashtra (81 blocks)	4903	1683	3220	446	225	29	2520	434	17.2

* This consists of 523 substitutes not used and 884 non-family residents living in dormitories and institutions. Number of villages and blocks from which the non-response rates were calculated are shown in parentheses in the first column.

The necessary information was not available for 7 sample villages in Aurangabad Division; for one village in Nagpur Division and for 15 villages in Western Maharashtra; for 14 sample blocks in other urban areas and 9 blocks in Greater Bombay.

Table A.6 : Percentage Distribution of Non-Response of Families by Reason

	Reasons for non-response							All reasons
	Refusal	Could not be con-tacted	Dead	Living on farm	Living alone	Other		
Aurangabad Division (11 villages)	9.4	66.0	5.7	7.5	5.7	5.7	100.0 = 53	
Nagpur Division (28 villages)	0.0	59.4	5.0	7.2	7.8	20.6	100.0 = 180	
Western Maharashtra (38 villages)	3.4	70.3	3.0	2.7	9.8	10.8	100.0 = 296	
Rural Maharashtra (77 villages)	2.8	66.2	4.0	4.7	8.7	13.6	100.0 = 529	
Urban excluding Greater Bombay (46 blocks)	11.7	79.4	0.0	NA	8.3	0.6	100.0 = 180	
Greater Bombay (35 blocks)	21.3	71.7	0.0	NA	1.6	5.5	100.0 = 254	
Urban Maharashtra (81 blocks)	17.3	74.8	0.0	NA	4.4	3.5	100.0 = 434	

NA : Not applicable.

See foot-notes to Table A.5.

Table A.7 : Number of Eligible Women Interviewed and Not Interviewed, Percentage Non-Response and Percentage Distribution of Non-Response by Reason

	No. of eligible women	No. of women interviewed	Per cent non-response	No. of women not interviewed	Reason for non-interview							
					Reason not given	Newly married	No child	Gone out	Living on farm	Could not be contacted	Refused	
Aurangabad Division	1127	1009	10.5	118								
Per cent				100.0	27.2	16.9	22.9	19.5	0.8	4.2	8.5	
Nagpur Division	1686	1632	3.2	54								
Per cent				100.0	25.9	18.5	29.6	24.1	0.0	1.9	0.0	
Western Maharashtra	3254	3032	6.8	222								
Per cent				100.0	11.3	27.5	28.3	23.9	3.2	4.0	1.8	
Rural Maharashtra	6067	5673	6.5	394								
Per cent				100.0	18.0	23.1	26.9	22.6	2.0	3.8	3.6	
Urban excluding Greater Bombay	1635	1593	2.6	42								
Per cent				100.0	28.4	21.5	14.3	26.2	0.0	4.8	4.8	
Greater Bombay	1172	1166	0.5	6								
Per cent				100.0	66.6	0.0	16.7	16.7	0.0	0.0	0.0	
Urban Maharashtra	2807	2759	1.7	48								
Per cent				100.0	33.3	18.7	14.6	25.0	0.0	4.2	4.2	

APPENDIX B

INDIRECT ESTIMATION OF MEAN PARITY OF EVER MARRIED WOMEN

In this appendix the method of indirect estimation of the mean parity of ever married women from that of currently married women is described. Since information of fertility and family planning, in surveys conducted in India, is generally collected only from currently married women, it is necessary to indirectly estimate the mean parity of ever married women. The mean parity of all women could then be estimated by multiplying the mean parity of ever married women by the proportion of ever married to all women. In converting the mean parity of ever married to that of all women, the assumption is made that the number of illegitimate births is negligible, which appears valid in current Indian conditions.

The basic data needed are the numbers of currently married, ever married and all women and the mean parity of currently married women, specific for all age groups in reproductive ages. The method of indirect estimation of the mean parity of ever married from that of currently married women was tested for validity and accuracy on the data given in *Fertility Differentials in India, 1972*, published by the Office of the Registrar General, Government of India (1976), for rural and urban Maharashtra. From this survey the mean parity for currently married and ever married women are available by the age group of women. The numbers currently married and ever married were estimated from this source. The number currently married in an age group was obtained up to a scale factor, as the ratio of the percentage of births in that age group to the age specific fertility for that age group. This is given in column (2) of Table B.1. The proportion of ever married to currently married in an age group was calculated as the ratio of the mean parity of ever married to that of currently married for that age group and then the number ever married was obtained, upto the same scale factor. This is shown in column (3) of Table B.1.

The time spent in currently married state was calculated as

$$\sum_{t=1}^{i-1} C_t + (C_i/2),$$

shown in column (4) and similarly the time spent in ever married state was calculated as

$$\sum_{t=1}^{i-1} E_t + (E_i/2),$$

shown in column (5). The ratio of column (4) to (5) is the proportion of time spent in currently married state by ever married women and is a close measure of the exposure of ever married women to child-bearing.

In column (7), the mean parity of currently married women is shown from *Fertility Differentials in India, 1972*. In column (8), column (7) is multiplied by the proportion of time spent in currently married state obtained in column (6), to get the indirect estimate of the mean parity of ever married women. In the next column, the direct estimate taken from *Fertility Differentials in India, 1972* is given for comparison.

As can be seen from Table B.1, the indirect estimates of mean parity for ever married women are very close to the direct estimates in both rural and urban areas, differing at most by 0.02 live births per woman. This simple procedure yields entirely satisfactory results and can be applied to data on children ever borne by currently married women by age groups, if the numbers of ever married and all women by these age groups are also available from the same survey.

Table B.1 : Comparison of the Indirect Estimate of Mean Parity of Ever Married Women with the Direct Estimate

Age group	$1000C_1/B^*$	$1000E_1/B^*$	$1000(\sum C_{i-1}^* + 1/2C_1)$ B	$1000(\sum E_{i-1}^* + 1/2E_1)$ B	Proportion of time spent in married state (4)/(5)	Mean parity of currently married women	Mean parity per ever married woman	Indirect estimate (6)x(7) (8)	Direct esti- mate + (9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
<u>Rural Maharashtra</u>									
15-19	553	553	276	276	1.0000	0.29	0.29	0.29	
20-24	944	961	1025	1033	0.9923	1.31	1.30	1.30	
25-29	933	965	1964	1997	0.9835	2.73	2.68	2.69	
30-34	974	1030	2917	2995	0.9740	3.83	3.73	3.75	
35-39	804	892	3806	3956	0.9621	4.61	4.44	4.44	
40-44	622	738	4519	4771	0.9472	5.10	4.83	4.84	
45-49	521	681	5091	5480	0.9290	5.15	4.78	4.79	
<u>Urban Maharashtra</u>									
15-19	392	392	196	196	1.0000	0.34	0.34	0.34	
20-24	1024	1035	904	910	0.9934	1.33	1.32	1.32	
25-29	1099	1103	1966	1979	0.9934	2.59	2.57	2.58	
30-34	1030	1075	3031	3068	0.9879	3.78	3.73	3.71	
35-39	900	964	3996	4088	0.9775	4.62	4.52	4.54	
40-44	667	788	4779	4964	0.9627	5.20	5.01	5.02	
45-49	477	745	5351	5730	0.9339	5.38	5.02	5.02	

Notes : C_i = Number currently married.

B = Number of births.

E_i = Number ever married.

* = Estimated from source.

+ = From source.

Source : Fertility Differentials in India, 1972, Office of the Registrar General (1976).

APPENDIX C

BRASS AND PRESTON METHODS FOR INDIRECT

ESTIMATION OF THE DEATH RATE

The indirect methods make the following assumptions :

1. The population is demographically stable or quasi-stable;
2. The proportion of under-reporting of deaths is the same for all age groups; and
3. There is no age misreporting.

Brass Method

In a stable population

$$b = r + Kd \quad \dots(1b)$$

where b = birth rate, d = death rate, r = growth rate and K is the correction factor. If there is no under-reporting $K = 1$.

Using partial birth and death rates equation (1b) can be written as

$$n(x)/N(x+) = r + K D(x+)/N(x+) \quad \dots(2b)$$

Where $n(x)$ = number of persons of exact age x ,
 $N(x+)$ = number of persons aged x and over,
 $D(x+)$ = number of deaths to persons aged x and over,
 $n(x)/N(x+)$ = partial birth rate and
 $D(x+)/N(x+)$ = partial death rate.

$$\text{Therefore, } K = [n(x) - r \cdot N(x+)]/D(x+) \quad \dots(3b)$$

The completeness of reporting C is given by $C = 1/K$. K times the reported death rate gives an estimate of the actual death rate.

Preston Method

In a stable population the following relation holds :

$$B = \sum_{x=0}^w D^*(x) \exp(rx) \quad \dots(1p)$$

where B = number of births to the population in a year/period,
 $D^*(x)$ = number of deaths to the persons aged x in that population
 and
 r = growth rate of the stable population.

If there is under-reporting of deaths then equation (1p) becomes :

$$B = K \sum_{x=0}^w D(x) \exp(rx) \quad \dots(2p)$$

where K = correction factor,
 $D(x)$ = reported number of deaths to persons aged x .

If N = population at mid-year or mid-period,
 b = birth rate for that year/period, and
 d^* = death rate for that year/period

then $Nb = B$

and $b = r + d^*$ for a stable population.

Substituting this in equation (2p) :

$$N(r + d^*) = K \sum_{x=0}^w D(x) \exp(rx) \quad \dots(3p)$$

If there is under-reporting, then $d^* = Kd$, where d is the observed death rate.

With D = total number of reported deaths = $\sum_{x=0}^w D(x)$,

the reported death rate $d = D/N$.

Substituting this into equation (3p),

$$D(r + Kd)/d = K \sum D(x) \cdot \exp(rx). \quad \dots(4p)$$

Solving for K we derive the equation :

$$K = (r/d) / [\sum d(x) \cdot \exp(rx) - 1] \quad \dots(5p)$$

where $D(x)/D = d(x)$.

The completeness of registration is given by $C = 1/K$ and K times the reported death rate gives the corrected death rate.