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NO. 21.

A NOTE ON THE MANAGEMENT AND TECHNIQUE
OF DIET SURVEYS IN INDIA.

Indian Council of Medical Research

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सत्यमेव जयते

A Note on the Management and
Technique of Diet Surveys
in India

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INDIAN COUNCIL OF MEDICAL RESEARCH

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A NOTE ON THE MANAGEMENT AND TECHNIQUE OF DIET SURVEYS IN INDIA

INTRODUCTION

Occasional diet surveys had been carried out in India since the late twenties of the present century but from 1936 onwards, a large number of diet surveys were carried out in different parts of India. As no uniform schedule of enquiry was drawn up for collecting the necessary information, some difficulty was experienced in tabulation and presentation of the compiled data because the different items on which information was collected were not of a similar nature and the presentation of the collected data differed slightly in reports made by different workers. Further, it was left to every field worker to determine the period for which the surveys should be carried out. Consequently, at the Eighth meeting of the Nutrition Advisory Committee of the Indian Council of Medical Research held in New Delhi on the 7th December, 1942, the question of carrying out diet survey, with due regard to modern statistical technique in order to minimize some common sampling errors, was discussed and a note on the Statistical Control of Diet Surveys, was adopted at the Tenth meeting of the Nutrition Advisory Committee held in December, 1943. Subsequently, the note was printed and circulated as a sort of directive to the workers engaged in diet surveys in this country in order to ensure that the original data may be collected in a uniform way in order to allow of the results of the surveys carried out in different parts of the country being properly tabulated, analysed and presented in a uniform manner. During the compilation of the *Note on Dietary Surveys in India last year the members of the Sub-Committee had experienced some difficulty in tabulating the results of the surveys. Further, in view of the increase in number of Nutrition Organizations in the States, which are at present mainly responsible for carrying out dietary surveys in this country, the Committee at its Twentieth meeting held in July, 1950 decided that the brief note, referred to above, be revised and amplified in the light of past experience so as to make it more suitable for the field worker and formulate standard methods for conducting diet surveys.

PURPOSES OF DIET SURVEYS

Questions have often been asked by administrators and others as to the necessity of carrying out dietary surveys specially in a poor country with limited resources. These questions have probably arisen owing to an imperfect appreciation of the objects of diet surveys. One could do no better than to quote at some length the following statement from the comprehensive brochure: "Dietary Surveys, their Technique and Interpretation", published by the Food and Agricultural Organization of the United Nations in December, 1949.

“The modern science of nutrition has shown that diet has a far-reaching influence on health, and has tentatively established certain criteria of adequate nutrition. In terms of these criteria it has been found that a large proportion of the world’s population is inadequately fed. The starting point towards raising levels of nutrition must be a knowledge of what people eat, how far existing diets are satisfactory, and what the basic causes of inadequacy are ; knowledge of the relationship between diet and health is also of fundamental importance. The means of obtaining this information is the dietary survey, carried out alone or as part of wider nutrition surveys. By comparing the diets of various groups, those whose diet is most in need of improvement can be located and the fundamental causes of existing inadequacy brought to light. Such information is a basis not only for economic, agricultural and food management policies and programmes, but also for educational and other programmes to improve food habits and assure the best use of available supplies. The effects of programmes to improve diet and hence health can be assessed satisfactorily only by comparing food consumption and nutrient intake with nutritional status “before and after”—that is, by means of surveys.

“Through well-considered surveys, the percentage of the population that is inadequately fed can be ascertained ; and local surveys made in one particular area or among people of one particular class (social, economic, etc.) can be integrated into the national picture and can throw light on the distribution of food supplies in the country as a whole. One method of obtaining information on food consumption at the national level is the preparation of food balance sheets. Through this technique—encouraged by FAO in all its member countries—knowledge of the production, utilization and consumption of national supplies is made available, and policies and programmes can be initiated in the light of this knowledge. The data presented in a food balance sheet make possible a rough assessment of the adequacy of total available supplies in relation to the needs of the people, and this will in turn indicate the direction in which food supplies need to be adjusted. The sources of the various nutrients in the diet can be discovered, and the probable effect of any changes in national food supplies can be predicted.

“Food balance sheets, however, are concerned only with overall national figures and averages. Even when supplies appear to be on the average sufficient to provide the whole population with an adequate diet, considerable sections may be under- and mal-nourished. A clear and complete picture showing the variations in diet cannot be obtained, therefore, without surveys of the diets of the various groups.

“The relation between diet and health was the original basis for assessing physiological requirements of food ; and though refined clinical and biochemical methods have been developed for the study of physiological requirements, the dietary survey is still of fundamental importance in the investigation of the relationship between food and health. Little is known of this relationship in many areas throughout the world. More studies are needed to assess the adequacy of different kinds of diet and to throw further light on the problem of requirements. Methods of assessing nutritional status and of correlating dietary levels with clinical and

biochemical evidence of mal- and under-nutrition call for further investigation.

“Dietary surveys are thus needed for basic research, and at the same time are of practical value in developing nutrition programmes. A clear understanding of the effect on health of different kinds of diets consumed by groups living under different environmental conditions will enable local, national and international food policies to be planned on a sound, scientific basis”.

VARIABLES ASSOCIATED WITH DIETARY HABITS IN INDIA

It should be stressed at the beginning that in an under-fed country like India with the problem of over-population and consequent food shortage, it is essential to obtain a clear picture not only of the quantity and quality of food that people in various age, sex, economic, occupational and community groups in the different parts of the country ordinarily consume, but also to ascertain whether the quality or quantity of diet is changing for better or worse in any particular area, or in groups of population under study. This objective can only be achieved if dietary surveys of random samples of population of different communities, occupational, social or economic groups in different parts of the country are carried out systematically. To a public health worker, the dietary and nutrition survey reports are of as much importance in their programmes for nutrition work as the periodical epidemic reports of different areas are in their campaign for control of epidemics. It is realized that the task of compiling periodically a reasonably precise dietary map of India is by no means an easy task, but if dietary survey work is carried out on a planned basis it may be possible to complete the map.

The population of the Indian Union territory (excluding the State of Jammu and Kashmir and tribal areas in Assam) was enumerated as 356·89 millions at sunrise on the 1st of March, 1951. The total land area covered by census was 1,138,814 square miles, and a variety of staple foods and diets are consumed in different parts of this large country. There are well-cultivated areas which enjoy abundant rainfall or efficient irrigation ; there are bad areas with recurrent drought and no provision of irrigation in which the population lives permanently on the verge of famine. There are good years and bad years. There are areas in which the economic condition of large sections of the population fluctuates in accordance with the price of some cash crop. Finally, there are normal seasonal differences in the availability of foods which may influence, in some measure, the diet of almost the entire population.

There are other variables which influence dietary habits. These include religion, custom, occupation and economic status, which lead to horizontal and vertical differences in any given population group. Again, there are broad differences between urban and rural groups and between industrial and non-industrial urban groups. Thus, a survey of one community in a village may not indicate the average level of consumption in the village as a whole ; to obtain such information, the sample group surveyed would have to include all the communal, economic and other

groups in the village in the same proportion as in the whole village. On a larger scale, the investigation in any State of limited groups with special characteristics will not give a true picture of the diet of the State as a whole, though surveys of such groups often lead to results of interest and value. It therefore follows that on account of the presence of a large number of variables and the possibilities of wide range of the variation of each of variables the so-called averages of diet survey data do not allow of wide generalizations.

SAMPLING METHODS

It is evident that the sampling difficulties to which the numerous variables give rise cannot be solved to full satisfaction. The number of workers available for carrying out diet surveys is still limited and the resources of the States are also limited. In the circumstances only a small and statistically inadequate sample of the population has so far been studied. Further the choice of areas and groups for survey has been, unavoidably, influenced by numerous factors which would ordinarily interfere with satisfactory sampling.

Nevertheless, much can be done by careful thought to reduce errors and fallacies in diet surveys. If it is desired to investigate the dietary habits of any particular group, economic, communal, etc., care can be taken to ensure that the sample is preferably of a homogeneous type and representative of the group as a whole. The error of generalizing from surveys of groups which are atypical because of the existence of one or more of the numerous variables to which reference has been made, can be avoided. On the other side, it may be remarked that the influence of many variables should not be over-estimated. The majority of the population belongs to the poorer classes and consume a monotonous diet largely composed of a single cereal grain or a combination of cereal grains with very little of other classes of foods. Normally, within this large group in question, the diet may vary little from family to family and not much from season to season, and may not be greatly influenced by community. In practice the investigator often feels that the collection of data about the food intake of a few families for a few days provide an index of the consumption of millions of similar families in the same area throughout the entire year. Those engaged in carrying out dietary survey sometimes complain about what they regard as the useless extension of their labours. Why, they ask, should they go on weighing food for three weeks when it is the same everyday? The monotony and uniformity of dietary patterns very probably simplifies their study, justifies the carrying out of surveys with limited personnel on samples which may sometimes be inadequate from the standpoint of the academic statistician, but may justify the drawing of certain generalizations about the diet of the population as a whole from the limited number of surveys, covering say, a 1,000 or 1,500 families, which they have already carried out. Generalizations about the qualitative defects of Indian diets can certainly be made from this limited sample. But it would scarcely be accurate, in the statistical sense, to use these results as the basis of a quantitative assessment—i.e. to estimate the average calorie intake of the entire population, or to determine the proportion of the population which consumes insufficient food to cover its calorie requirements.

No hard and fast rules can be laid down for selection of areas and groups for survey. There are usually in any State several large areas in which dietary habits differ, particularly in respect of the staple cereal. Surveys should be carried out on sample groups in each of such areas. Smaller areas with distinctive dietary habits may also require separate and detailed study. In the selection of family groups for survey within any given area in which, in general, the same staple foods are consumed by the bulk of the population, attention must be given to the different variables referred to earlier in the text. In drawing up a satisfactory survey programme in any State, commonsense, combined with a knowledge of local conditions, must be applied.

A point has been raised from time to time that a marked disparity, in the number of families sampled in each of the economic groups, has often been noticed in the published reports on diet surveys even when each of such surveys was carried out by same set of investigators. In other words, in surveys comprising, say, four economic groups the usual order of finding has been 119 families in the poorest group, 81 in the next higher economic group, 33 in the next and 9 families only in the highest group, in the ascending order of economic status. It is this extreme inequality in numbers between the first and last group on which a stress has often been laid in interpreting the results. As will be seen afterwards it is difficult to avoid such a disparity in the number of families sampled in each group if the survey be intended to cover any particular area.

Either in industrial localities or townships where major portion of the residents are employed in factories the classification of families into different social and economic groups is often fairly easy as the population in such areas is partly under the control of employers and the income of each family can be ascertained with a fair degree of accuracy. In non-industrial urban areas, for obvious reasons, it is difficult to select same or approximately same number of families in each group. In rural areas the task becomes still more difficult and even with very careful inspection and choice it is often impossible to sample equal or similar number of families in each of the economic or social groups.

The fact may not be forgotten that the influence of the survey operation itself in any locality may tend to change the dietary habits or trends in some of the families. Tact and sympathy are required in order to obtain the willing co-operation of families for survey. The object of survey should be carefully explained at the beginning and families which appear unlikely to co-operate should not be included. Its psychological effect on individual families should be carefully noted. If the survey seems to upset normal food intake in any way (any experienced observer can note this within a few days) the family or families concerned should be left out of the survey. If a family presents an unduly small or large quantity of food, or any unusual type of food, for weighing during the survey, in spite of requests not to deviate from usual food habits, the survey of the family in question may be completed in accordance with the original plan of investigation, but the records may be rejected when the results of the enquiry are being analysed.

SIZE OF SAMPLE AND DURATION OF SURVEY

It is a widely accepted fact that the larger the number of samples in any one group of observations the higher is the statistical value of the arithmetic mean or average and more precise is the magnitude of the standard deviation. The existing resources in the country for large-scale dietary work are, however, very limited. In the circumstances a happy mean between the two extremes is to be sought in the determination of the size of the sample of the families that have to be surveyed in any particular investigation. No rigid rules can be laid down as to the number of families that should be sampled for any area, or class or community. Survey of five families only may even yield more useful information than results of investigation in fifty families. The number of families to be studied in different surveys will naturally depend on the nature of the investigation, the number of field workers available, etc. Normally about 30 families, representative of the group under investigation, should be aimed at. In studying food intake at different economic levels, at least 30 families at each level should be included. Even this practice may present difficulties in the case of families falling into the higher income groups, since such families are fewer in number than those belonging to lower income groups.

Most surveys in India have lasted from 7 to 21 days. A period of less than seven days may be regarded as inadequate, while the extension of surveys beyond three weeks does not seem to add much to the enquiry. The question of a suitable period to be recommended for diet surveys in general has been studied, in accordance with a recommendation of the Nutrition Advisory Committee, by Dr. C. Chandrasekar, Professor of Vital Statistics, All-India Institute of Hygiene & Public Health, Calcutta. In this investigation the extent of daily variation in food intake of groups of families surveyed some years ago in Chingleput and Travancore was studied. As a result of statistical analysis, the conclusion was reached that the extension of the period of survey from seven to ten days would not increase the value of the results obtained in proportion to the increase in labour involved. It was pointed out, that since food is often bought by families on one particular day in the week, a survey lasting one week would tend to cover a "dietary cycle". For these reasons a seven days period of survey may be recommended. The ten-day period of survey has the advantage that it greatly simplifies calculation of average intake per diem.

The repetition of a seven days survey at different seasons of the year is clearly desirable. The number of surveys throughout the year which are necessary to obtain a satisfactory picture of dietary habits can only be decided with knowledge of local conditions.

METHODS OF SURVEY

Dietary surveys are ordinarily carried out by any one of the following four methods :—

- (a) Oral questionnaire.
- (b) Checking of stock by inventory.

- (c) Weighment of raw foods.
- (d) Survey of cooked food.

The unit for enquiry can either be a family, a residential institution or an individual depending on the specific objects of the particular enquiry. From the point of view of precision, surveys of individual food intake yield the best results. But unless an intensive enquiry on any particular aspect of food intake is called for, surveys of individual consumers are not commensurate with the time and labour involved. Economically convenient and popular units are families, particularly for close study of dietary trends and inclinations in any area. The quality and composition of dishes served in a residential institution even of a homogeneous type are conditioned by a sort of compromise between, may be, slightly different tastes and economic condition of the consumers. In institutions like boarding houses and students' hostels the type of food served is influenced mainly by financial considerations and to a certain extent by the inclinations or preferences of the superintendent if he has control on the boarders or the catering contractor. In choosing the type of food various considerations other than nutritious qualities come in for consideration. Consequently, in the majority of surveys carried out in India, families have been taken, as units of enquiry. Individual surveys in a few families in such areas, where a large number of homogeneous type of families have been sampled, may yield some fruitful information about the distribution of particular foods such as milk to consumers in various age and sex groups.

(a) Oral questionnaire method

The investigator usually goes round with a schedule of information in a selected area interviewing the head of the household or the housewife enquiring about the nature and quantity of food eaten during the past 24 or 48 hours and making necessary entries in the schedule, a sample copy of which is attached at the end of this note as Appendix A.

Nutrition workers in India have all agreed that questionnaire method of diet survey cannot often be even reasonably accurate. As such this technique may not be resorted to except under the following circumstances :

- (i) To obtain an approximate picture of the dietary habits of a large section of the population within a very short time in a particular area, or
- (ii) to obtain information of a generalized nature pertaining to habitual lack or excess of certain kinds or classes of food in the diet of a particular group of people, or
- (iii) to ascertain dietary trends and inclination or disinclination for any particular type of foodstuffs in any particular area, or
- (iv) to obtain information on source of supply of foodstuffs, methods, storage and cooking practices, or
- (v) as a preliminary investigation for planning of a more detailed survey in any particular area.

(b) Checking of stock by inventory

Here the investigator takes an inventory of the food already existing in the house by actual weighing at the time of his visit and makes the necessary entries in the diary or booklet specially provided to each householder. The housewife or the head of the family are required to make the necessary entries of all purchases of the food made till the end of the period of enquiry. The investigator makes a final visit to the house and takes an inventory of the foodstuffs present in the house. It is desirable in the interest of good work that the investigator makes his visits to the house at least twice during the period of enquiry in order to ensure that the entries are being made regularly in the diary left with the householder.

This is a method which is and has been widely used in European and American countries. But it will be seen that this method of survey can be carried out only when the head of the family, or the mistress of the household, is literate enough to record all the purchases in the space provided for in the diary after properly weighing each individual item. Adoption of this method necessitates a good deal of reliance on the statement of householders as regards the purchase of foods. For the success for such a type of enquiry it is an essential preliminary that the householders should not only co-operate fully and whole-heartedly but also be educated enough to keep an account of the food that has been purchased during the period of enquiry. Even well-intentioned housewives may, justifiably owing to lack of practice, forget to record the purchase of any particular item or items of foods that have been bought and consumed. So the results of inventory methods of survey may at times be not as authentic as one would ordinarily expect.

(c) Weighment of raw foods

This is the method that has been practised by majority of the workers in this country with a few exceptions. By far this has proved to be a more reliable method of survey than any of the others. The investigator has possibly to stay in the village, or at a place closeby, so that he can be present to weigh the foods personally or check the weighment of raw foods immediately before cooking. In the routine practice of this technique, families have occasionally been found to exaggerate the amount of food by deliberately putting things out for weighing which were not likely to be cooked. Then again a tendency has been noticed amongst a few householders, who for various reasons, understate the amount of food actually cooked. But an average investigator keen on his duties, can easily find out whether any understatement or overstatement is being made. He can at the end of enquiry ignore the surveys carried out in such families when data are sent in for tabulation. A schedule for such a survey is shown in Appendix C.

It is admitted that a bigger staff is necessary for conducting this type of survey, but at the same time the fact remains that the primary data collected by this method are fairly reliable. The question of wastes from the kitchen, table and plates has also to be taken into account and this can be done by paying a visit to each of the families turn by turn to find out

if the left-overs from the plates are of any appreciable size. In some of the families who keep animal pets or maintain cows, part of the food may be given to the animals. Information of this nature should always be recorded in the register.

(d) Survey of cooked food

There are people with rigid views who seem to think that to calculate the average of a family's food intake on *per caput* consumption basis even after actual weighment of raw foods has no scientific value. Consequently survey of cooked foods have been urged. In this type of investigation the investigator, equipped with a few pairs of scales, visits the family, under survey, everyday for a defined period during all meal hours. The ideal method would be to ask the family to cook double the quantity of food that may be necessary for consumption and then to take equivalent quantities of each item in the menu as may be served on the plates of the individual members and weigh them. At times it may be possible with a little ingenuity on the part of the investigator to weigh the servings before they are passed on to the plates. In one of the published individual dietary *survey carried out in the United Kingdom "each subject was provided with a spring butter balance, weighing by $\frac{1}{2}$ or up to 2 lb. on which to weigh the food, a sheet of instructions and a set of forms on which to enter the result. This method of survey has also not been popular in this country for two principal drawbacks. Primarily because, it involves a good deal of time and individual attention, and secondly because the people are ordinarily very shy to eat before others. So far one survey of actual cooked food in a residential institution for adolescents has been made.

ASSESSMENT OF ECONOMIC STATUS

The data collected during dietary survey loses much of its value if approximate income of each of the families sampled are not determined. It has already been pointed out that in industrial areas, assessment of income is, comparatively, a simple matter but in rural areas this operation presents at times formidable difficulties. Experienced workers engaged in dietary survey in India are of the opinion that if enquiries about income are made at the beginning of the survey the rural folk look upon with suspicion on the activities of the investigating party. Any indiscretion in this matter might lead to a considerable dislocation of the survey ; if suspicion or prejudice arises, the field worker may lose the co-operation and sympathy of the families under investigation and the object of the survey might be jeopardized. Consequently it is always desirable to start collecting information pertaining to income after diet survey in an area has been completed in an atmosphere of trustfulness.

In attempting to assess the income of rural families the approximate area of land cultivated and the amount of crops produced can be noted and later on the value of the latter estimated and added to the total income. Difficulties, however, arise in the case of the earnings of agricultural labourers who constitute a major part of the rural population. Usually such people maintain no diary or statement of their income, but they can

*M.R.C. Special Report Series No. 257—HM 50 (London) 1947, p. 19.

state the rate of wages received and which statement can easily be verified locally. The main difficulty and that which often baffles the investigator is the calculation of the number of days in the year, any particular labourer was kept employed. Very often such persons are illiterate and even with best of intention they cannot remember the number of days they had worked on wages. For this purpose a rough and ready classification, e.g. 50, 100, 150, 200 and 250 days employment, can be employed in the calculation of wages of any particular agricultural labourers. The use of such classification to assess the income of labourers if resorted to in the assessment of income in any investigation should be explained in the report, so that future workers, in studying the report, can understand the method of classification followed.

The total income of a family is not an accurate index of its spending power, since families differ in size and composition. A family of six members with an income of Rs. 35/- p.m. is much poorer than a family of two members with a smaller income of say, Rs. 30/- only. It is not possible, in practice, to find sufficient numbers of families of similar age and sex composition at different income levels to enable comparisons of food intake at these levels to be drawn. Income per-consumption unit must, therefore, be estimated for such a purpose but unfortunately no reliable scale of cost-coefficients for individuals of different age and sex is available. In the circumstances, the League of Nations scale, though based on calories requirements, may be used for calculating income per consumption unit. Families can then be classified in different economic groups in accordance with income per consumption unit. The proportion of total income spent on food may if possible be included in the report.

The factor of indebtedness complicates the assessment of real income in almost any group of families, rural or urban. The collaboration in diet survey work of economic research workers, who can help in the elucidation of this problem, is highly desirable.

In the case of rural population the usual sources of income are sale or use of marketable commodities, wages in cash or kind, income from profession or calling and service, income from business, property, interest on loans and consideration in cash or kind for religious and other performances. The total income of the family should include the contributions received from members of the family carrying on business or serving outside the village. Keeping these items in mind one should carefully frame his questions to gather the information.

Prof. R. B. Lal of the All-India Institute of Hygiene & Public Health, Calcutta, has used the following method for assessment of economic conditions of a community during the health survey that he had carried out. The economic status of a family is expressed as "Index of Prosperity". For this purpose not only the income but the expenditure has also to be calculated in the following way :—

I. Expenditure

(a) Average annual *per capita* expenditure on consumption, which includes two main items, viz. (i) those having a direct influence on health and (ii) those having a remote or indirect influence.

(b) Average annual expenditure on production side. This has little influence on health directly. This includes items of expenditure on land taxes, manure, cattle, seed, irrigation and labour charges in connection with cultivation and on travelling for business pursuits, etc.

This is the "Index of Prosperity" which takes into account two factors, viz. (a) the level of consumption expenditure of the family and (b) the economic stability of the family. The former is determined by first arranging the families in descending order of expenditure on the average annual *per capita* consumption side and then dividing them into three equal groups representing the upper, middle and the lower third. The economic stability can be determined by subtracting total average of *per capita* expenditure from average of *per capita* income. Thus in the "Index of Prosperity" each of the three groups under (a) are sub-divided into five sub-groups as shown below.

- A—Savings above 15 per cent.
- B—Saving between 5 to 15 per cent.
- C—Saving or deficit within 5 per cent.
- D—Deficit between 5 to 15 per cent.
- E—Deficit above 15 per cent.

Thus there are 15 classes of families depending upon economic stability and consumption level as shown in a tabular form below :—

Consumption level	Economic stability				
	A	B	C	D	E
I (upper)	1	2	3	4	5
II (middle)	6	7	8	9	10
III (lower)	11	12	13	14	15

It will thus be seen that the above description of the economic status of a family is relative to the conditions of the community as a whole at a particular time and not to the fluctuations in money value at different periods and in respect of different communities.

A copy of the economic survey schedule used by the All-India Institute of Hygiene & Public Health, Calcutta, is shown as Appendix B.

STUDY OF INSTITUTIONAL DIETS

The largest number of surveys of institutional diets have been carried out in the State of Bombay. Institutional surveys, however, do not generally give an indication as to the dietary pattern of any particular community, economic or social groups even if the institution itself be catering to homogeneous group of persons following almost similar vocations in life. But such studies are still useful and informative. Such studies can

indicate the compromise that can be obtained between different communities as far as diet is concerned when the only limiting factor is the cost of the board. Moreover diets in institutions can more easily be corrected by nutrition workers than in individual families, as the population in the former place is under control. In carrying out surveys in institutions, most of the sampling and other difficulties encountered in family diet surveys do not arise. A copy of the form used by the Nutrition Officer, Bombay, for carrying out Institutional Survey is shown in Appendix D. Intake *per capita* or consumption unit can be determined by the daily weighing of foods, or more easily though perhaps less accurately by calculations based on weekly or monthly purchases of food and the number of consumers. In institutions it is possible to investigate the food intake of individuals, and to introduce refinements, such as the analysis of cooked foods, which are not feasible in family surveys. The relation between the incidence of certain diseases and the nature of the diet, and the effect of diet on growth, can also be investigated. On the other hand, since the inhabitants of institutions are usually living under controlled conditions study of their diet may not provide satisfactory information about the diet of the population in general.

ANALYSIS OF DATA AND CLASSIFICATION OF FOODS

In working of the data obtained in a series of surveys the families investigated may be grouped in various ways, namely, according to social, communal or occupational groups or income. Classification of families according to income does often give an indication as to how the dietary pattern can change with the increase in income. But the point at issue is, on what basis should the families be classified once the total income of each of the families in any particular investigation are known. Ordinarily one would be inclined to classify families on the basis of the total weekly, monthly or annual income. But the point has already been made out earlier in the text that even when two families have more or less the same income, they may not be able to spend the same amount for purchase of food per consumption unit. Therefore a more satisfactory method of classification would be to group families on the basis of purchasing power per (hypothetical) man value consumption unit. It may be argued that the consumption unit is calculated on the League of Nations classifications of the different members in a family on the basis of certain co-efficients for consumption of calories. It is admitted that such a classification is not very precise. But in the absence of cost co-efficients for various age and sex groups, this is the best alternative to fall back upon. Whatever method is used it must be clearly defined by every investigator in his report to allow of his data being interpreted accurately at any subsequent time after the survey has been carried out.

• Ordinarily one would expect that average food consumption per hypothetical consumption unit be stated in terms of proximate principles, calcium and other food factors according to the objectives of the survey and the interests of the investigator and the data available about composition of foods consumed with reference to their vitamin content. But as such a procedure in the case of every survey involves considerable amount

of time and personnel for calculation and also in spite of the labours involved the calculations from the table of food values may not be considered as highly accurate. Intake of certain main classes of foods should be shown. The following classification is suggested :—

- (a) Rice.
- (b) Wheat.
- (c) Other cereals.
- (d) Pulses.
- (e) Leafy vegetables.
- (f) Root vegetables.
- (g) Non-leafy vegetables.
- (h) Oils and fats.
- (i) Flesh foods and eggs.
- (j) Milk and milk products.
- (k) Fruits and nuts.
- (l) Sugar and jaggery (*gur*).
- (m) Condiments and spices.

Presentation of results under the above head saves labour and allows each investigator to analyse a large number of families with a limited staff. Condiments and spices are not important items of food and probably they may contribute very little in the shape of actual nutrients but they form an important item as far as Indian food is concerned. Probably the condiments and spices impart a taste to the rather poor diet and creates appetite for food. Consequently they deserve a separate class to themselves. For the purpose of collection of basic data it is advisable to record the weight in pounds and ounces, but preferably in terms of pound alone. Such a recording helps in totalling up, easily, the intake of food during the period of survey.

If the number of families in different social, occupational or economic groups included in any survey or series of surveys be 30 or over, the mean and standard deviation of any given series of observations pertaining to each individual family (e.g. intake of some particular article of diet or food factor) can be worked out and the standard error or difference calculated for assessing the significance of the difference. Those versed in more advanced statistical methods can subject the data to the analysis of variance, associate the level of consumption of any particular food or food factor with the incidence of certain clinical signs of deficiency disease, etc. But it must be pointed out that refined and laborious methods of statistical analysis may not be justified owing to the crudeness of the data obtained in diet surveys and the inevitable high margin of error. The application of such methods may give readers the impression that the basic data attain a degree of precision and accuracy the existence of which is not justified by commonsense and scientific reasoning.

There should be a column provided in the form for other foods with a blank oblong space where the investigator can include accessories of food like condiments, chutnies, pickles, etc. It is desirable that in this column a note be made by the investigator as to any peculiarities or special facts that may have been observed by him or her regarding trend of dietary habits, availability of foods, cooking of foods in an unusual way, etc. which may come to the notice of the investigator.

APPENDIX A.

QUESTIONNAIRE METHOD OF DIET SURVEY

Name of head of the family.....

Village/Town.....District.....

Ages of the members of the family { Males.....
Females.....

Occupation of the earning member.....

Total income : Weekly/Monthly/Annual.....

(a) How many meals taken { inside
outside

(b) Details of meals taken { 24 hours
48 hours

(c) Vegetarian/Non-vegetarian.

(d) Types, size and frequency of flesh foods (meat, fish, eggs) during one week.

(e) Average quantity of milk taken daily.

(f) Do all members eat flesh foods and/or milk. If not who does not ?

(g) What kind of cereals, pulses and vegetables are eaten generally ? Indicate size.

(h) If butter and ghee taken indicate approximately the total daily intake.

(i) Quantity of sugar and *gur* consumed daily.

(j) Are fruits generally eaten ? Amount and quantity of fruits.

APPENDIX B.

ALL-INDIA INSTITUTE OF HYGIENE & PUBLIC HEALTH, CALCUTTA.

Department of Epidemiology.

Economic Surveys Schedule.

Family No.

Year of Survey

Village
(Code No.)

Expenditure

A. on consumption

Value
Rs. a. p.

16

	Home produce		Cash purchase	
	Quantity	Value	Quantity	Value
1. Food (monthly basis)		Rs. a. p.		Rs. a. p.
(i) Cereals				
(ii) Pulses				
(iii) Vegetable				
(iv) Salt & spices				
(v) Sugar & sweets				
(vi) Milk, curd, etc.				
(vii) Butter, ghee, oil				
(viii) Meat, fish, egg, etc.				
(ix) Others				
Total (monthly)				
Total (annual)				

2. Fuel & light (yearly basis)
3. House rent or
House tax ,,
4. Clothing, bedding
& footwear ,,
5. Toilets, if any ,,
6. Furniture ,,
7. Education ,,
8. Medical advice
& medicines ,,
9. Travelling ,,
10. Ceremonies ,,
11. Payment for debt
discharge (Principal) ,,
12. Do. (Interest) ,,
13. Miscellaneous ,,

Total

APPENDIX B—(Contd.)

	Quantity					Value	
	Rs.	a.	p.				
B. On production (yearly basis)—							
1. Cattle							
2. Plough repairs, etc.							
3. Land taxes, if any							
4. Irrigation charges, if any							
5. Manure							
6. Labour charges							
7. Seed							
8. Miscellaneous							
				Total			
				Grand Total			
28. *Average annual income <i>per capita</i> in Rs.	-48	-60	-90	-120	-150	-175	-200
	1	2	3	4	5	6	7
				-250	-300	-350	over -350
				8	9	10	11
29. Average annual expenditure <i>per capita</i> in Rs.	-48	-60	-90	-120	-150	-175	-200
	1	2	3	4	5	6	7
				-250	-300	-350	over -350
				8	9	10	11
30. Average annual saving or deficit <i>per capita</i>							
31-32. Index of prosperity				A	B	C	D
	I	1	2	3	4	5	
	II	6	7	8	9	10	
	III	11	12	13	14	15	

*Note.—Rough work of show, how the figures have been arrived at should be made on the reverse. Income in money and kind should be shown separately and the various sources of income should be clearly indicated, so that use may be made of this information, if necessary.

APPENDIX C.—(Contd.)

INTAKE OF FOOD.—(Contd.)

Name of Foodstuffs	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	Total	Remarks
FATS, OILS & GHEE									
Butter Mustard oil, etc.									
MILK & MILK PRODUCTS									
FLESH FOODS									
FRUITS & NUTS									
SUGAR & JAGGERY (GUR)									
CONDIMENTS									
OTHER FOODS									

Special observation on food habits, availability of foods, economic factors, social customs related to foods, etc. Meals eaten outside, etc.

Signature of the investigator.

Period of Survey :
(Give exact date).

APPENDIX D.

Department of Nutrition, Government of Bombay.

Statement showing the total daily issue of foodstuffs for all the inmates, on ten consecutive working days.

(Date : From.....To.....)

Name and address of the Institution :—

Name of Foodstuff	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day	9th day	10th day	Remarks
Rice lbs.											
Wheat lbs.											
Other cereals* lbs.											
Pulses* lbs.											
Leafy vegetables* lbs.											
Root vegetables* lbs.											
Other vegetables lbs.											
Fruits* lbs.											
Sugar and jaggery lbs.											

Vegetable oils/fats	lbs.									
Butter and Ghee	lbs.									
Milk, Curds, etc.	lbs.									
Meat and Fish	lbs.									
Eggs	No.									
Other Foods*										
No. of inmates										

21

Total number of inmates : { Men..... ; Boys 1-5 Yrs..... ; 6-11 Yrs..... ; 12-14 Yrs..... }
 { Women ; Girls 1-5 Yrs..... ; 6-11 Yrs. ; 12-14 Yrs..... }

Approximate cost of food purchases per month :

* Please give names in detail.

APPENDIX D—(Contd.)

The menu for ten consecutive working days.

	Serving Time	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day	9th day	10th day
Breakfast (Morning tea, conjee, snacks, etc.)											
Mid-day meal											
Afternoon tea, snacks, etc.											
Evening meal											

To be filled in and returned to :—

The Assistant Director, In-charge Department of Nutrition,
C/o Haffkine Institute, Parel, Bombay 12.

The Sr. Nutritionist's Name :

Signature

Date of study :

Date

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