CHAPTER IV

DIETARY HABITS AND DISEASES

I BASIC CONCEPTS

II DIET SURVEY IN INDIA: TECHNIQUES AND RESULTS
The main source of nourishment for the human body is 'Food', which is defined as the substance, which yields heat or energy to build up new tissues and to repair worn-out tissues as well as to regulate body processes. The quality as well as quantity of food play an important role in the struggle for existence. The resistance power of the body is also directly related to the nutritional status of the person and it is also one of the fundamental rights of the human being without distinction of race, religion, political belief or economic and social condition.

Human beings live within an atmosphere which is full of all types of microbes, they therefore need sufficient stamina to withstand the onslaught of these micro-organisms. Requirements of various nutrients vary according to age, physical work and other physiological conditions. A good diet is thus defined as one which yields nutrients daily in proper amounts to satisfy the body needs; such a diet is termed as "Balanced Diet". The primary work of food is of course to satisfy hunger,
while, fulfilling the body requirements is secondary. Hunger causes stunting of growth and it also decreases the capacity to work, increases susceptibility to infection and is also responsible for change of social behaviour.

NECESSITY FOR FOOD

The human body is constantly doing work even though one might be asleep. The body is kept warm, the heart keeps beating, breathing and many other actions are going on in our body, all these actions could be called the internal work of the body, while actions such as studying, taking exercise, walking etc. are called external work. Whether the work is internal or external, it consumes energy and the main purpose of food is to make up the resultant loss. The resistance power of the body, which enables it to fight diseases, entirely depends upon the energy which the body gets from the food which one eats. The main functions of food have thus been grouped as under: (a) to provide material (energy) for growth and repair of tissues, (b) to provide 'fuel' which liberates muscular energy and heat, and (c) to maintain good health and provide sufficient resistance power.

The necessity for food varies according to age, sex, body size, climate, activity etc. Children generally need more food due to the demands of growth and also because they are generally more active. Pregnancy, lactation and adolescent age always require additional food to cover the increased
physiological stress caused by the unusual condition of the body.

BALANCED DIET

A balanced diet may be defined as a diet which contains all the essential nutrients, by which the body regulates all the functions properly. No one article of food contains all these vital nutrients in proper proportion, so that a mixed diet is essential, because the deficiency of a particular constituent in one food can be balanced by its adequacy in others.

The Nutrition Advisory Committee of the Indian Council of Medical Research recommended in 1944 the dietary allowances of various nutrients for different population groups. These allowances were based partly on the recommendations of the League of Nations, the National Research Council of the United States of America, the National Research Council of Canada, the Medical Research Council of the United Kingdom and also partly data collected by Indian workers.¹

The concepts of human nutrients requirements are always changing with newer knowledge, so that as a result of data gathered over the last 25 years, the review of nutrient allowances for Indians has long become overdue. The nutrition expert

group of the Indian Council of Medical Research, at its meeting held in June 1968 has therefore recommended a fresh allowance of different nutrients for different groups of people of the country. A brief review of the recommended allowances is given in Table 4.1.

### Table 4.1

**DAILY ALLOWANCES OF NUTRIENTS FOR INDIANS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Particulars</th>
<th>Calories</th>
<th>Prot-</th>
<th>Cal-</th>
<th>Iron</th>
<th>Vitamin A</th>
<th>Thiamine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>gm</td>
<td>eins</td>
<td>gm</td>
<td>mg</td>
<td>mg</td>
<td>mg</td>
</tr>
<tr>
<td>Man</td>
<td>Sedentary work</td>
<td>2400</td>
<td>55</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Moderate work</td>
<td>2900</td>
<td>55</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Heavy work</td>
<td>3300</td>
<td>55</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td>Woman</td>
<td>Sedentary work</td>
<td>2000</td>
<td>45</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Moderate work</td>
<td>2300</td>
<td>45</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Heavy work</td>
<td>3000</td>
<td>45</td>
<td>1.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Pregnancy</td>
<td>2300</td>
<td>100</td>
<td>1.5</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>Lastation</td>
<td>2700</td>
<td>110</td>
<td>2.0</td>
<td>20-30</td>
<td>3000-4000</td>
<td>1-2</td>
</tr>
</tbody>
</table>

NUTRITIVE VALUE AND DIET

DIFFERENT FOOD-STUFFS AND THEIR VALUE

Cereals, which are the principal constituents of the diet in the study region, yield 350 calories per 100 gms, they also contain 7 to 11 per cent of protein and about 60-75 per cent of carbohydrates. All the cereals are also a good source of the vitamin-B group. Foods of animal origin are rich in proteins, various vitamins and iron, while milk is a good source of protein and vitamin-B group, especially riboflavin and also calcium.

Vegetables generally contain fair amounts of calcium and iron which are physiographically significant, they also contain small amounts of the B-group vitamins. The chief value of vegetables is the supply of carotene vitamin A and of ascorbic acid. But all these quantities are variable and much loss occurs in cooking.

So far as fruits are concerned, ascorbic acid (vitamin C) is the only essential nutrient which people get through them. Meat is of course of particular value because it contains protein of high biological value and large amounts of fat and iron, while fish supplies animal protein and fat-soluble vitamins. Eggs are naturally rich in essential nutrients.

A diet deficient in essential nutrients produces malnutrition, manifesting itself in various forms of ill-health
and diseases. Many people do not get sufficient food throughout their life and as a result, they are under-weight, lacking in energy and having a low capacity for work.

COOKING AND WASTAGE

All civilised people cook their food and cooking effectively removes most pathogenic organisms from food, but they may be added again by a cook who is unclean in her habits. Cooking wastage occur in two ways: firstly, nutrients may be leached out of the tissues of either plant or animal foods and discarded in the cooking water where wastage of minerals and water-soluble vitamins may occur; secondly, heat may also destroy some of the vitamins present.

IMPORTANT FOOD STUFFS

RICE: Rice which is used as a staple cereal by a majority of the people in the region, is principally a source of carbohydrates which give energy to the body. Although rice contains only 7 per cent protein, its quality is good enough and the body can utilize rice protein better than wheat protein.

Vitamin A is not found in rice but vitamin B is fairly available in the outer layers of the grain, the quantity of this vitamin decreasing with increasing degree of polishing of rice. Further, the B vitamins easily dissolve in water, so that washing of rice results in a loss in the amount of nutrients.
JOWAR, RAGI AND BAJRA: Jowar contains nearly 10 per cent fair quality protein, so that in this respect it is better than rice. Like other cereals, jowar is also very rich in carbohydrates and in the content of B vitamins, but it is a poor source of mineral salts, so that it is desirable to consume, in addition, mineral-rich foods like milk and green leafy vegetables.

PULSES: Pulses have a predominant place in the diet of the people of the study region; in fact, a variety of pulses is used, like green gram, red gram, Bengal gram, black gram and peas.

Pulses contain as much as 20-30 per cent protein which is more than in other protein foods like eggs, flesh foods, fish etc. Moreover, proteins of pulses are much cheaper than those of animal origin, but the quality is inferior.

Beside protein, pulses also contain fair amounts of minerals like calcium and iron. Vitamins of the B group and vitamin C are not normally found in pulses, but when they are allowed to germinate, significant amounts of vitamin C are elaborated.

VEGETABLES AND THEIR IMPORTANCE

Vitamins and minerals are the main nutrients present in vegetables. A substance called "Carotene", normally found in vegetables is converted into vitamin A in the body. Usually
vegetables whose fleshy protein is deep green, yellow or orange in colour can be said to be rich in carotene. Thus, green leafy vegetables, carrots, ripe 'papaya' and mango, yellow pumpkin etc. are rich in carotene. Vegetables like 'palak', drumstick leaves, coriander leaves and 'amaranth' contain plenty of carotene.

Riboflavin, a member of the B-vitamins which is normally present in costly foods such as milk is also found in good amount in leafy vegetables.

Vitamin C which is needed by the body to keep the gums, teeth and bones in a healthy condition is found in good amount in most vegetables like tomato, 'gogu', 'palak', etc. More vitamin C is contained in the outer green leaves than in the inner whiter leaves of the cabbage. Usually vegetables contain more of vitamin C, when they are in the fresh state, and some loss of this vitamin occurs when they are stored. In this connection, it is desirable to say that amongst the vegetables 'mala' is the richest source of vitamin C.

In addition to vitamins, vegetables also contain fair amounts of mineral salts, but they are generally poor in protein content; however, those belonging to the bean family like the French beans contain more of protein than other vegetables.

LEAFY VEGETABLES: It is often argued that leafy vegetables are the poor man's food and are bad for health. But these are
the only foods which are less expensive and more nutritious. Leafy vegetables are rich in iron and their physiological role is equally important. Blood is red because of the presence of a substance called "haemoglobin" in it. This substance takes up oxygen into the lungs and circulates in the tissues. Iron is the important constituent of haemoglobin and therefore an iron-deficient individual becomes anaemic and looks pale.

Besides iron, leafy vegetables also contain good amounts of calcium which is necessary for the proper growth of bones. Some essential vitamins are also found in leafy vegetables. The leaves contain good amount of carotene, which is converted into vitamin A in the body. Vitamin C is also found in good quantity. Beside these, riboflavin and folic acid and vitamin K are also found.

Milk: The first food that an infant takes after birth is milk and interestingly milk is the only food that is relished by persons of all ages. People consume milk in a variety of ways, which all are ingredients of a good nutritious diet.

Cow's milk contains more than twice the amount of protein contained in mother's milk, while buffalo milk contains more fat than cow's milk. A noteworthy feature in milk is the complete availability of the nutrients contained in it, to the body.

About 87 per cent of milk is just water, the protein content of milk being only 3 or 4 per cent, but this is of good
quality, so that the presence of milk in a vegetarian diet improves its overall nutritional quality.

Besides fat, milk also contains vitamin A, but its content depends entirely on the feed of the animals. When butter is removed from the milk, vitamin A comes along with it. Riboflavin which is required to keep the eyes and skin in healthy condition is also found in milk. Significant amounts of calcium are also found in milk; on the other hand milk is a very poor source of iron.

BEVERAGES: Beverages, like coffee, tea and cocoa which are commonly consumed throughout the region are taken mainly as stimulants or to get rid of a feeling of tiredness.

Actually there is not much nutritional value in coffee powder and tea leaves except for a small supply of some B-vitamins. The nutritive value of prepared coffee or tea is really due to the milk and sugar that are added. Drinks like tomato juice and lime juice which are quite commonly taken in summer, are a good source of vitamin C while juices of tomato and mango also contain carotene.

BREAST MILK: Breast milk is the natural food for the infant. The foetus depends on the mother for its nutritional requirements. In the study region infants belonging to the poor socio-economic segments are breast fed for several months.
NUTRIENTS FOR DIFFERENT CLASSES OF PERSONS

DIET FOR PREGNANT WOMEN

Many people do not easily appreciate that by the time of birth, the infant is already 9 months old. The child in fact grows more rapidly inside the mother's womb than after birth, so that a good diet is very essential for a pregnant woman.

Before the onset of pregnancy, a woman needs enough food to keep up only her own health. But as she becomes pregnant, she needs additional food to enable the foetus to grow normally in the womb and in addition, she is also in need of foods specially rich in particular nutrients.

There are no rules stating that particular foods alone should or should not be taken. All the cereals are energy-yielders, but differ in their vitamins and mineral contents, so that a mixed diet will be more nutritious. A pregnant woman should take 60 gms of pulses every day which will provide enough proteins for the proper growth of tissues and muscles of the foetus.

Leafy vegetables provide iron, needed for the proper formation of blood both in the mother and the foetus. In addition to iron, these vegetables also contain good amounts of vitamins A and C.
At least two glasses of milk should be taken by the pregnant woman in some form or the other - as coffee or curds or as any other preparation. It is also better to use jaggery in place of sugar.

As the pregnancy progresses, the need for nutrients becomes greater and the intake of foods like leafy vegetables and pulses should therefore be more, specially during the last three months of pregnancy. If the diet is nutritionally inadequate, the foetus will grow at the expense of the mother and the mother's health will naturally go down. The infant would also be born under-weight and its subsequent growth would not be satisfactory while the mother would also become anaemic.

Thus as soon as a woman knows that she is pregnant she must begin including in her daily diet two glasses of milk, some 80 grams of pulses and adequate amounts of leafy vegetables. This supplement in diet will in fact be much cheaper in the long run, as one could prevent ill-health in pregnancy by dietary means and thus avoid costly treatment for deficiency diseases at a later stage.

DIET FOR NURSING WOMEN

After birth the new-born depends entirely on breast milk; the nursing mother should, therefore, take enough nutritious food to be able to provide adequate quantity of milk for her infant.
During lactation the mother requires more calories than a normal woman, due to extra needs for secreting the milk and for synthesizing the nutrients in the milk. It is not true to say that good nutrition increases the breast output but there is no doubt that it enables the woman to reach her maximum lactation potential. Requirements of protein are high during this period; good quality protein should therefore be consumed during such days. A mixed cereal diet including rice, wheat, ragi and bajra would be better than a single-cereal based diet. Besides this, it is also desirable that the diet of the nursing woman contain three handfuls of pulses daily with adequate amounts of vegetables.

INFANT FEEDING

Mother's milk is the ideal food for infants and at least for a period of six months the infant solely depends on it. After this period the nutritional requirements cannot be met by mother's milk alone. Building up of blood cells and teething call for essential nutrients such as iron and vitamin C. Moreover as the infant grows, nutritional needs will also progressively increase and at the same time the milk output by the mother would be on the decrease. About three glassfuls of milk are secreted in the first six months, which will meet the infant's needs. Similarly, only two glassfuls of mother's milk would be available as against four glassfuls needed by the infant when it is one year old.
In many families in the region the infant gets no food other than mother's milk till the second year, such children have a stunted growth and are susceptible to diseases. Malnutrition results in physical and mental retardation and growth of such children will also be unsatisfactory. Actually many mothers do not think in terms of supplementary foods. Often they can afford these foods, but do not use them because of ignorance.

Diet of Industrial Worker

Due to the nature of his work, the industrial worker's diet should be rich in proteins, carbohydrates, fats, vitamins and salts. The worker who does strenuous work needs more energy and he gets this mainly from cereals and fat-available foods. As compared to cereals, fat gives more than twice the number of calories per gram, but fat provides only calories and some vitamins, while cereals provide in addition to calories, proteins, mineral salts and vitamins. It would therefore be better and advisable to use a judicious mixture of cereals and fats.

The moderately hard worker should take at least 475 gms of cereals, 80 gms of pulses and should use hand-pounded rice which also gives him extra vitamins. Besides this, leafy vegetables, some fruits and adequate amounts of milk should also be present in his diet.
In short, the industrial worker's diet should contain about 15 handfuls of cereals, 3 handfuls of pulses, 6 paisa worth of leafy vegetables, two other vegetables, a fruit and glassful of milk along with the requisite amounts of oil and jaggery; this would form a balanced diet for him.

Diet Surveys in India: Techniques & Results

Concepts and Techniques of Survey: Any diet survey includes three aspects:

1. Unit of Enquiry.
3. Facts regarding diet and nutritional status of the people.

As far as the unit of enquiry is concerned, there are three units, in which such a survey could be conducted, viz. an individual, a family and a residential institution. There are four methods of diet surveys: by weighing of raw foods, by the oral questionnaire method, by weighing of cooked foods, and by checking of stock by inventory.

The aims or objects of such surveys are to know the following:

i) The level of nutrition.
ii) Foods that people eat.
iii) How far existing diets are satisfactory.
iv) The basic cause of inadequacy, if any.
To improve the nutritional condition of a population, it is essential to know the amount and type of food consumed by different segments. This type of information will also be useful in correlating the dietary deficiencies with the observed symptoms of ill-health and disease in a given group of population.

The diet of the people differs from place to place, but broadly one can recognize three categories: 1. Urban diet, 2. Rural diet, 3. Industrial diet. How much of what elements of stuff is sufficient for the body is not yet a settled question. Nutritional experts have collected basic data on ethnic, climatic, socio-economic and other considerations and have fixed norms for each type of person and for each type of activity. A man living in the colder regions naturally requires more calories than his brother in the tropics. Similarly, rural people need more calories than urban dwellers mainly due to the nature of their work. Dietary habits of the study region vary from place to place, which is understandable in terms of the different communities who reside here, in terms of the nature of their work and also in terms of the variation of food-stuffs.

Difficulties are further created by the customs and prejudices which often preclude one or the other item of food from the dietary list. Different diets are directly controlled by the availability of food-stuffs, religious and customary inhibitions and even personal prejudices. On the other hand, the diet of the region is also determined by the crops produced locally.
Diet Surveys and Their Results

In our country many diet surveys have been conducted, to detect deficiencies in the diet of the people of different places. Most of them were conducted by workers of the Indian Council of Medical Research. The present scholar conducted such a survey by the oral-questionnaire method, due to the fact that this method took lesser time and at the same time enabled him to cover a larger area in comparison to other known methods of survey.

Diet surveys carried out by accepted techniques in different population groups enable one to assess how far the existing diet patterns are satisfactory and also help one to know the basic causes of inadequacy.

The National Institute of Nutrition, Hyderabad and the Nutrition sections of Public Health Departments of the states have regularly carried out diet surveys. During 1960-69, 535 such surveys were conducted, covering a population of over 1,52,028 persons. Only very small portions of Madhya Pradesh were covered by these workers, i.e. Raision and West Nimar districts only.

Regional Patterns of India

Caloric Intake: One of the important functions of food is to provide energy, which is measured in terms of the Calorie, while

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the caloric requirement depends on the type of occupation, body build, climate, sex, age and several other considerations. In our country the daily requirements of Calories have been placed at 2,400-3,000 per adult man and at 1,200-3,000 per adult woman. Taking into account the distribution of population according to age, sex, and activities, the average per caput requirement of calories would appear to be about 2,400. As against this, the all-India average consumption of calories-intake is found only in the State of Punjab, viz. 2,832, while the lowest is reported from Tamil Nadu, viz. 1,438 per day per head. The average caloric intake in Madhya Pradesh is found to be 1,965 per day per head, whereas experts recommend 2,400 calories.

On the basis of the above-mentioned surveys, protein-intake was analysed and found to be 56 gm per day. The highest intake of protein was reported in Madhya Pradesh while the lowest was reported from Tamil Nadu. The pattern of protein consumption corresponds to the pattern of caloric consumption. Any increase in calories intake is generally due to increased intake of the staple foods.

According to the National Institute of Nutrition, most subjects of low-income groups are perhaps vegetarian, as a result of economic necessity. As far as urban areas are concerned, non-vegetarian habits were noticed to be highest in

\[\text{ibid.}, \text{ pp. 46 and 47.}\]
Orissa, while they were lowest in Rajasthan. Non-vegetarian rural populations are found largely in Assam and West Bengal, while they are absent in Gujarat.

CURRENT DIETARY SITUATION: The results of various diet surveys have been compiled in a special publication of the I.C.M.R.1

In about 10 per cent of the surveys, the calorie intake was actually less than 1,600. The intake of protein was also less than 60 g/day, in nearly 50 per cent of the surveys, while animal protein was providing less than 10 per cent of the total protein intake in a great majority of the subjects. Calcium intake was less than 600 mg in 60 per cent of the surveys. These figures would indicate a highly unsatisfactory nature of the current diets among different segments of the population of the country.

In one study Shankar observed, in different parts of the country, the following dietary intake of nutrients amongst expectant and nursing mothers: Protein-40 gm (animal protein 6 gm), calcium-250 mg, iron-70 mg, for a total of 1,376 calories.2 Various other surveys were also conducted in different parts of the country and reports published.

1 I.C.M.R. Special Report Series No. 36, 1961

The above-mentioned diet analysis shows that the current dietary of the proper segments of the population in different parts of the country are highly unsatisfactory. While economic factors are no doubt the most important cause of such poor diets, customs and traditional prejudices arising from ignorance and superstition are also partly responsible for faulty food habits prevalent among various communities.

The complexity of the problem increases in societies with pronounced stratification and even at the level of relative uniformity the complexity is observed. Inequalities between classes in standards of living may introduce strong contrasts between the diets of the rich and of the poor.

**Diet and Nutrition**

It may not be generally appreciated that in respect of food availability and distribution, the quantitative factor alone is not important; the qualitative factor is equally and, perhaps often, more important. Some of the nutrients required by the human body cannot be synthesized by the human system and have to be provided by the diet.

**Plan for Balanced Diet: Food Groups**

On the basis of their nutrient-content and functions all food-stuffs can be broadly classified into five groups.¹

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Food taken from each of these groups may be expected to supply sufficient nutrients for the body.

<table>
<thead>
<tr>
<th>Group</th>
<th>Food-Stuffs</th>
<th>Main Nutrient Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Milk and its products</td>
<td>Protein, Calcium and Riboflavin.</td>
</tr>
<tr>
<td></td>
<td>Pulses all kinds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meat, fish, eggs</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Fruits: Mainly orange,</td>
<td>Carotene, Vitamin A</td>
</tr>
<tr>
<td></td>
<td>tomato, mango, 'papaya',</td>
<td>Vitamin C, Mineral salts, Iron (in leafy vegetables)</td>
</tr>
<tr>
<td></td>
<td>'sana', lemon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green leafy vegetables:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>'palak', cabbage etc.</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Other vegetables: Brinjals,</td>
<td>Vitamins and minerals</td>
</tr>
<tr>
<td></td>
<td>gourds, fresh beans,</td>
<td>(in small amounts)</td>
</tr>
<tr>
<td></td>
<td>pumpkin, ladies' finger,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>'tinda' etc.</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Cereals: Rice, wheat, maize,</td>
<td>Carbohydrates, B vitamins and protein only in cereals.</td>
</tr>
<tr>
<td></td>
<td>ragi etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Starchy vegetables: yams,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>colocasia, tephoca, potatoes.</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Fat and oil: Vegetable oil,</td>
<td>Fat, Vitamin A, Carbohydrates.</td>
</tr>
<tr>
<td></td>
<td>butter, 'ghee', sugar,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>jaggery etc.</td>
<td></td>
</tr>
</tbody>
</table>

The first group gives mostly proteins, some vitamins and minerals; foods from this group must be included in the daily diet. On the other hand, the second group is the main source of vitamins and minerals, which are essential for growth and disease resistance. The third group mainly includes
vegetables, which supply small amounts of vitamins and minerals for the body. Food-stuffs like rice, wheat, maize and vegetables like potatoes, yams etc. come in the fourth group which provides energy to do work; while the fifth group gives us energy; in addition, animal fats like butter or 'ghee' provide Vitamin A.

On the basis of these groups of food-stuffs, one can easily plan one's own balanced diet giving all the nutrients required in the proper quantity.

COOKING HABITS AND NUTRIENT LOSS: Food stuffs like cereals, pulses and flesh foods should not be boiled with salt water, this results in a loss in the amount of protein, vitamins as well as mineral salts. It is also desirable to use only minimum water, the water that remains after cooking should also be consumed as soups etc. The outer skin of tuber vegetables like potatoes is also generally not removed till the cooking is complete. It is also desirable that food be cooked for as short a period as possible and vegetables be cut into as big pieces as possible.

Sometimes loss of nutrients also occurs before cooking, for instance, rice is usually washed three or four times and in this process quite a significant loss occurs.

Vitamin A is not soluble in water so that no loss occurs when foods are boiled in water, but if foods are fried in oil,
there can be loss of vitamin A to the extent of nearly 75 per cent. Leafy vegetables contain large amounts of carotene, which will be converted into vitamin A, so it is desirable to boil leafy vegetables in water, and not fry them.

Distinct advantages have now come to light with the use of pressure cookers. This not only reduces the cooking period but also protects the nutrients. Cooked foods have a distinct taste and are always more appetizing than raw foods. Sometimes cooked foods also improve the nutritive value. Cooking always destroys pathogenic bacteria and cooked foods are digested more easily.

DIET AND COMMUNITY

As far as geographers are concerned, the diet of the different groups as a whole is important rather than the diet of the individual. In the study area every community forms a homogeneous group of mostly uniform dietary habits and it should be controlled by environment, ecological conditions, religious concepts and the personal choice of the respective community. It varies from one culture group to another, because each group has its own evolutionary set-up and these groups not only determine what foods are eaten, but they also determine the meal pattern, number of meals, method of eating and utensils used. What people are willing to eat is determined by a complex system of attitudes, ideas and assumptions that
form the local cultural patterns. Some social factors also influence the disease patterns found in an area, but this also varies from disease to disease, according to the etiology of illness.

In Hindu culture, meal patterns are based on religious concepts and the social structure which have no counterpart in any other culture. In some communities certain foods are prohibited by religion, such as beef amongst Hindus and pork amongst Muslims. Superstitious views about dietary patterns are in fact found in all communities, civilized as well as primitive.

As a whole the dietary patterns obtaining in the study unit may be grouped into (1) Vegetarian and (2) Non-vegetarian diets. Generally, vegetarian diets are directly controlled by the prevailing religious concepts. Availability of food-stuffs also determines the dietary habits of the place, due to the fact that more easily available food-stuffs automatically become a part of the diet of the region.

Both types of dietary habits have been reported in the area of study, but the vegetarian diet has been accepted by the majority of the people. The higher cost of the non-vegetarian food-stuff is also one of the reasons for its not being commonly accepted by the people of the region. Religious restrictions on food-stuffs also determine the variety of items. So that one could say, that religious concepts, economic status, and
availability of food etc. are the main factors for the adoption or rejection of non-vegetarian diets.

As far as rural dietary habits are concerned, they are purely vegetarian except amongst the scheduled caste and tribe communities. These communities occasionally take non-vegetarian foods but only when they obtain them cheaply or while going for hunting. The diet of the urban families is found mixed according to community concepts, status etc. In urban places availability of food often directly affects the dietary pattern of the family.

METHODS AND TECHNIQUES OF DATA COLLECTION

To determine the extent of nutritional deficiency, a community-wise diet survey was conducted. In the study of the nutritional deficiency diseases the detection of deficient nutrients in the diet is essential.

The diet survey was conducted in rural as well as in urban places, through the oral questionnaire method, in which the scholar himself interviewed the selected families. The villages were selected through systematic stratified sampling. Besides this, the families which were interviewed, were so selected that as far as possible they were equally distributed amongst the different communities of the village.
To collect the required information, a schedule of five pages was prepared, which contained various questions relating to the dietary patterns. A brief list of data and information which was collected is as follows:

1. Community and occupation of the family.
2. Number of members in the family, their sex, age, education etc.
3. Total monthly consumption of main food-stuffs by the entire family.
4. Consumption of vegetables and fruits in a day.
5. Average consumption of milk, ghee, sugar/gur in a day.
6. Frequency and quantity of consumption of non-vegetarian food-stuffs.
7. Eating habits, number of meals outside home and frequency of flesh foods eaten, if any.
8. Monthly expenditure on milk, fruit, medicine etc.
9. Food-stuffs which were being taken at different times in a day, i.e. during breakfast, at lunch, at dinner etc.
10. Food-stuffs which were specially liked by the members.
11. Methods of cooking.
12. Smoking habits, consumption of tobacco, betel-nuts.
13. Sleeping hours in a day or night.
14. Availability of food and special dishes which were prepared on festivals or on special occasions.
15. Other foods and dishes consumed by the family (Appendix 4 B).
Besides these items, the scholar also tried to note down the customs, traditions and social and economic factors by which the diet would be influenced. An entry was also made regarding any special diet given for certain groups in the family such as infants, pregnant women, sick people etc. The frequency of consumption of special food-stuffs, such as fruits, milk, leafy vegetables, eggs, meat, drinks etc., was also noted.

Besides the dietary information, the medical background of the family and general diseases of the family were also noted during the survey. In this way the scholar interviewed 557 families of different communities of rural as well as urban places.

VARIABLES ASSOCIATED WITH DIETARY HABITS

For the study of deficiency diseases, it is essential not only to obtain a clear picture of the quantity and quality of food, which people in various age, sex, economic, occupational and community groups in the different parts of the region ordinarily consume, but also to ascertain whether the quality or quantity of diet is changing for better or not. This objective can only be achieved if sample surveys of the diet of different communities of the region are carried out systematically.

Religion, customs, occupation, economic status etc. are important variables which influence the dietary habits of the
region. Beside this, broad differences have also been noticed between urban and rural groups as well as between industrial and non-industrial groups. Survey of one group of people or one community may not indicate the average level of consumption, therefore a stratified sample survey is the only method, by which the various groups could be included.

The village has been selected as the unit for conducting diet survey by a systematic stratified sampling method, while the actual survey has been done through the oral-questionnaire method to avoid all the irregularities.

SELECTION OF VILLAGES

To detect the deficiency in the diet of the people a diet survey was planned to cover 0.5 per cent of the total number of villages. These sample villages were selected as follows.

On the basis of the prevalent diseases in the region (according to data supplied by the Health Centres), the entire study region was divided into seven zones. The aim of representation of the dietary patterns of the study unit being zone-wise, it was necessary to select sample village for each zone separately.

First of all, the primary health centres of each zone were arranged alphabetically with their respective tahsils and
districts. The number of villages served by each primary
health centre and their population were also noted against
each centre. The villages of each zone were then serially
numbered.

The number '92' was initially selected at random from
a box containing serial numbers 1 to 200. As the aim was to
cover 0.6 per cent of the villages every 200th village has been
taken from the Census Hand books of the respective districts.
The starting number of village in each zone being '92', villages
bearing serial numbers 292, 492, 692 etc. were taken out for
conducting the diet survey. Names of villages where the survey
was conducted are given in Appendix 4 A.

In each village the following principles were kept in
mind, while actually conducting the survey:

1. The survey should not be concentrated in any particular part
   of the village, i.e. it should equally cover the whole village
   or town as the case may be.

2. The survey should also cover all the communities of the
   region in approximate proportion of their population.

Besides the dietary habits, general diseases of the
family, the surrounding environmental conditions, sources of
drinking water, living conditions, ventilation and other
factors which influence the diseases were also be noted. For
this purpose a 5-page proforma was prepared on which details
of each family interviewed were noted separately (Appendix 4 B).
Thirty-five villages were thus selected for conducting the diet survey. A survey was also conducted in ten different urban places which were selected on the basis of certain special characteristics of the town; for instance, Bairagarh was selected because of its predominant Sindhi community and also because it is an important business centre; Piplani (Bhopal), because of its being an industrial township; Khurai, because of its large wheat 'mandi' etc. The selection of families was also done on the basis of the above-mentioned criteria, so that most of the communities could be covered.

The total number of rural families of different communities whose diet survey has been conducted is 239, while the number of urban families is 318.

In such surveys care must always be taken to ensure that the sample is preferably of a homogeneous one. For this purpose, the scholar personally went round with a schedule of information in a selected area, interviewing the head of the household or/and the house-wife, enquiring about the nature and quantity of food eaten; he also made other necessary entries in the schedule.

Apart from this, a brief note on the surveyed village as a whole was also prepared; this included data on total cultivated area, production of different crops, main imported and exported articles and the general environmental condition;
other possible aspects, by which people may generally be
affected were also noted, on the basis of personal observation.

DIET CALCULATIONS

The analysis of the diet schedules has been done on the
basis of the data published by the Indian Council of Medical
Research (ICMR).¹

The average diet of each member was marked out and
resolved into various nutrients like calories, proteins, vitamins
etc. This was then checked against a table of desirable intakes
and the deficiency calculated. The entire analysis was done in
three parts:

1 On the basis of the given data and information the per diem
consumption of each food-stuff was calculated. Since consumption
was given variously for 30 days (i.e., for a month) or 7 days
(i.e., weekly), all the values were converted into a single time
unit, namely, one day.

2 The second step was to reduce the above-mentioned values in
terms of the total of population, so as to obtain consumption
of food-stuffs per diem per caput.

¹ W.R. Aykroyd, C. Gopalan et al.: The Nutritive Value of Indian
Foods and the Planning of Satisfactory Diets. ICMR
Special Report, Ser. No. 42, pp. 7 ff.

Swaran Paricha and L.M. Rebello: Some Common Indian Recipies
and Their Nutritive Value. Nutr. Res. Lab., Hyderabad,
1969, pp. 96-110.
3 The third step was to obtain the total intake of different nutrients in a day, so that the respective deficiencies could be calculated. On the basis of the nutritive value chart, one could easily convert the consumption of food-stuffs into nutritive values, so that the total amount of nutrients taken by the people through their diet could be calculated, including total calories, proteins, vitamin A, vitamin B-groups, calcium, iron etc.

In this way the quantity of different nutrients, which the people of the region get through their diet has been calculated. After the nutrients were calculated, the schedule forms were arranged community-wise. As a whole, the entire diet survey was divided into three main groups as follows:

a. Rural diet (community-wise).

b. Urban diet.

c. Industrial worker diet.