CHAPTER VIII

DISEASES: III

NUTRITIONAL DEFICIENCY DISEASES
Deficiency diseases are defined as a pathological state with characteristic clinical signs, which are due to deficiency of nutrients in the diet and which can be prevented by supplying the missing nutrients. The main components of our diet are protein, vitamins, minerals and water. Besides these, calories are also very essential for the body, which can be derived from different foods.

Partial or complete absence of one or more nutrients in the diet leads to nutritional deficiency diseases. Although a particular disease is caused by lack of various nutrients, generally certain diseases occur due to a deficiency of particular nutrients. The more important deficiency diseases or other effects on the body (nutrient-wise) which are reported in the study region are as under:

<table>
<thead>
<tr>
<th>Due to lack of:</th>
<th>Diseases/Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Protein</td>
<td>Retarded growth, under-weight, swelling, mental retardation.</td>
</tr>
<tr>
<td>2 Calcium</td>
<td>Rickets, bone deformities.</td>
</tr>
<tr>
<td>3 Iron</td>
<td>Anaemia.</td>
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<tr>
<td>4 Iodine</td>
<td>Goitre.</td>
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</tbody>
</table>
DISTRIBUTION AND DISCUSSION

Nutritional deficiency diseases are the most frequently occurring diseases in the entire region, both urban and rural. These diseases are very commonly reported in the private hospitals also, but due to lack of reliable data their actual intensities cannot be marked out. Different signs of deficiency diseases were also noticed during the author's diet survey. Private hospitals do not maintain any records while government hospitals give combined figures for all the deficiency states put together. For study of distribution, government data have been taken and analysed, while the description of each deficiency disease and a discussion on its probable causes are being done separately on the basis of the author's own disease and diet survey.

As a whole the intensity of deficiency diseases has been grouped into 5 categories and shown in Plate No. 11 (Table 8.1).
### Table 8.1
**INCIDENCE OF DEFICIENCY DISEASES (P.H.Cs.-WISE)**

1969-71 (in percentage)

<table>
<thead>
<tr>
<th>I</th>
<th>High (More than 20 per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lateri 30.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II</th>
<th>Moderately High (Between 15-20 per cent)</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>Badarwas 19.8</td>
</tr>
<tr>
<td>2</td>
<td>Vidisha-Pipakdel 17.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III</th>
<th>Moderate (Between 10-15 per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Berasia 14.9</td>
</tr>
<tr>
<td>2</td>
<td>Bamori 14.3</td>
</tr>
<tr>
<td>3</td>
<td>Amon 14.1</td>
</tr>
<tr>
<td>4</td>
<td>Ghairatganj 13.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV</th>
<th>Moderately Low (Between 5-10 per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bina 8.7</td>
</tr>
<tr>
<td>2</td>
<td>Guna-Bhada 8.5</td>
</tr>
<tr>
<td>3</td>
<td>Ichhawar 8.3</td>
</tr>
<tr>
<td>4</td>
<td>Ashta 7.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V</th>
<th>Low (Less than 5 per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bhopal-Balrakarpur 4.9</td>
</tr>
<tr>
<td>2</td>
<td>Binaganj 4.5</td>
</tr>
<tr>
<td>3</td>
<td>Mungaoli 4.4</td>
</tr>
<tr>
<td>4</td>
<td>Shamshabad 4.3</td>
</tr>
<tr>
<td>5</td>
<td>Mampura-Pichhore 3.8</td>
</tr>
<tr>
<td>6</td>
<td>Sehore-Shampur 3.6</td>
</tr>
</tbody>
</table>
Vidisha and Quraraspur are the centres where deficiency diseases are leading among other diseases, being most frequent (first rank) among all the registered cases in the respective centres. On the other hand, Badarwas, Begamganj, Bamori, Basoda, Lateri, Malthome primary health centres are next to the above-mentioned ones, the diseases being second most frequent (second rank) among all the registered cases. Deficiency diseases are third most frequent (third rank) in Sagar, Bina, Aron, Goharganj, Ghairatganj and Ichhawar centres. In other centres these diseases were also reported in quite high numbers; their respective ranks have been given in Table 6.2.

As far as the number of registered cases is concerned, the maximum number of deficiency diseases has been reported in Lateri, i.e. 30.9 per cent of the total reported cases, while in Quraraspur, Badarwas, Vidisha and Begamganj the percentages are 21.8, 19.8, 17.9 and 15.7 respectively. The percentages for the other centres are given in Table 8.1, they vary from 1.5 to 14.9.

As far as deficiency diseases are concerned, they are directly related to the prevalent dietary habits and actual intake of different nutrients by the people. Different aspects of our diet and intake have been discussed in Chapter 5 and 6, where it was found that the current dietary habits of most of the people were highly unsatisfactory in some aspects. Poverty, ignorance, customs and traditional prejudices which
are due to ignorance and superstition, faulty cooking methods etc. are the main factors responsible for the deficient diet of the people of the region. Nutrient-wise deficiency has already been discussed in Chapter V and shown in Tables 5.1, 5.7.

The prevalent deficient diet is directly reflected in the health status of the population and is responsible for many disorders related to under/malnutrition.

The main nutritional deficiency diseases which are of such magnitude as to constitute major public health hazards of the study region are as follows.

DISEASES DUE TO PROTEIN-CALORIE MALNUTRITION (P.C.M.)

Protein-calorie malnutrition (P.C.M.) is regarded as a spectrum of disease arising from an inadequate diet, especially among children. On the basis of experimental studies and on a few epidemiological observations, it is generally claimed that deficiency of protein with adequate or more than adequate calories leads to kwashiorkor, whereas deficiency of calories leads to marasmus. These two are the main consequences of protein-calorie malnutrition.

Kwashiorkor and marasmus are reported throughout the region in private hospitals and were also observed during field work. These are the diseases due to protein-calorie malnutrition and our diet was also reported deficient in the respective nutrients.

FIELD DATA

For example, mental retardation and retarded growth have been reported widely in the private hospitals of Ghairatganj and their diet has also been found quite deficient in most of the nutrients (Table 6.1).

Rather similar condition has also been found in the village Padariya of Sagar-Shahpur centre as far as diet is concerned; here retarded growth has been clearly noticed among some of the interviewed families mainly due to P.C.M. Various diseases due to P.C.M. have also been reported by the many private clinics in the region, particularly in Bhopal city, Kasturba Hospital of H.B. Township, Bhopal and in Bina.

DISEASES DUE TO VITAMIN A DEFICIENCY

The diseases due to vitamin A deficiency are nearly as important as those due to P.C.M in the region. Poor growth, weak resistance to infection leading to the following disorders are usually reported in the region:
1 Night-blindness.
2 Xerophthalmia.
3 Xerosis.
4 Keratomalacia.

The average intake of vitamin A of the rural peoples is 2023 I. U. and of urban peoples 2158 I. U. (Table 5.11), while the recommended allowance of this vitamin is 4000 I. U. per day per head. It is clear then that the diet of the region is quite deficient in vitamin A intake.

Keratomalacia is believed to be the common cause of blindness and is mainly due to the lack of foods containing vitamin A in the daily diet. Yet another causes of vitamin A deficiency disorders in the region is the poor nutritional status of the mother with respect to vitamin A, during pregnancy and lactation. It has been clearly observed during diet survey that no special attention was being given to women during these periods. It has also been noticed that infants of the region usually entirely depend on breast milk, which is low in vitamin A.

Xerosis, dry skin, nightblindness etc. are also reported widely throughout the region.

In nightblindness the adaption takes a longer time than normal. It is an early manifestation of vitamin A deficiency. In the cornea and conjunctiva, deficiency may
lead to a variety of characteristic lesions. The term 'keratomalacia of the cornea' is applied when cornea is destroyed, while 'xerophthalmia' means the dryness of the eye.

Among the children of the region, the deficiency of vitamin A is a serious problem and is responsible for the deterioration of their eye-sight, especially in the lower income group. It has been observed that this condition results from the poor health of the mother. Besides this, lack of vitamin A is also responsible for many other disorders which are frequently reported in the region.

FIELD DATA

For example, besides government data, it has been noticed during diet and disease survey, that disorders due to vitamin A deficiency are reported in all the private clinics of the region which were visited by the author particularly in Bina, Bhopal city, Kasturba Hospital of H.B. Township Bhopal, Ashoknagar, Ghairatganj, Begamganj and Sagar, the disorders due to deficiency of this vitamins are quite common. During diet survey also, the signs of vitamin A deficiency, were noticed among the families by the author himself and also frequently reported by the interviewed families, such as poor sight, nightblindness and rough and dry skin. The diet of the people in such cases was also found quite deficient in vitamin A (Tables 5.1 and 5.7). The
consumption of milk, fruits and vegetables was also noticed to be low in the diet of the people concerned.

**DISEASES DUE TO DEFICIENCY OF VITAMIN B_{1} (THIAMINE)**

According to the diet survey (Table 5.11) conducted in the region, the average intake of Thiamine in most of the families was found to be satisfactory. The disease due to deficiency of this vitamin have been reported in private hospitals and also observed during the survey. This vitamin is essential for maintaining appetite, normal growth, good digestion and health nerves. Deficiency of this important vitamin could arise either naturally or by low intake or from disproportionate carbohydrate ingestion. During pregnancy increased tissue utilization may cause deficiency.

**BERI-BERI** : In India as a whole the incidence of beri-beri is on the decline.\(^1\) In the study region also up to a certain extent the intake of thiamine is satisfactory, incidence of beri-beri is therefore not high; it is, however, reported in the region in some families. Among communities eating milled rice, the disease is reported usually. It is of three kinds: 1. Wet Beri-Beri, 2. Dry Beri-Beri, 3. Infantile Beri-Beri. The actual effect of this disease is a degeneration of the nerves, muscular weakness and swelling on feet, and the patient becomes weak.

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The incidence of beri-beri may be prevented through the use of under-milled, home-polished rice or by the increased use of pulses and other foods containing vitamin B₁.

DISEASES DUE TO DEFICIENCY OF VITAMIN B₂ (RIBOFLAVIN)

Riboflavin (B₂)-intake in the study region has been found to be quite deficient (Table 5.11). The average intakes of urban and rural peoples are 1.4 and 1.5 mg per day per head while the recommended allowance is 2.5 mg per day per head.

This vitamin is essential for the health of the eyes, good sight and for avoiding cracks at the corner of the lips. Angular stomatitis, erosion of tongue and ocular manifestations are usually reported in private hospitals of the region and also in government dispensaries. Soreness and burning of lips, mouth, and tongue are common trouble, accompanied by discomfort in eating and swallowing. Angular stomatitis occurs frequently among malnourished children. Due to riboflavin deficiency, the inflammation of the skin starts most often in the nasolabial fold and is scaly and oily in character. Similar lesions also appear around the eyes and on the ears.

FIELD DATA

For example, the diet of the people of this region was found deficient in respect of vitamin B₂ (Table 5.11). When author visited the different towns and villages, many
interviewed families reported quite frequently various troubles due to lack of vitamin B₂ such as angular stomatitis, tongue erosion etc. Private doctors of the region also mentioned disorder due to this deficiency in their reports.

DISEASES DUE TO VITAMIN C DEFICIENCY

It has been noticed during diet survey that the food-stuffs which are usually taken by the people of the region are quite deficient in vitamin C content. Citrus fruits, tomatoes, cauliflower, cabbage etc. are the main sources of vitamin C and lack of this vitamin results in scurvy.

Scurvy: Due to absence of reliable data the actual distribution and intensity of this disease cannot be detected, but it is commonly reported in the entire region as noticed in the disease survey. Scurvy is characterized by multiple haemorrhage, weakness, fatigue and aching in the muscles and joints and loss of weight and is all due to vitamin C deficiency.

Bleeding from gums and loosening teeth are the earliest symptoms, which are followed by minute haemorrhage under the skin. In a severe condition, haemorrhage in the conjunctiva, retina or bleeding from nose, gastro-intestinal or genito-urinary tract may also be seen. Under such conditions, haemorrhages may start from any part of the body. Other common disorders due to vitamin C deficiency, viz.:
(i) Anaemia and haemorrhagic disorders.

(ii) Infectious diseases.

(iii) Gastro-intestinal disturbances.

(iv) Dental troubles are also sometimes reported in the study area.

FIELD DATA

For example, bleeding gums and loosening teeth troubles were noticed during diet survey and also reported frequently by the families interviewed. It has also been noticed frequently during disease survey that these troubles usually reported in various private clinics, which were visited by the author.

DISEASES DUE TO VITAMIN D DEFICIENCY

Vitamin D is mainly needed for the development of bones and is also essential for children. Disorders due to vitamin D deficiency are commonly reported in the area and had been noticed during the author's disease survey and diet survey.

Deficiency of vitamin D in childhood leads to the development of rickets and in adults its deficiency cause osteomalacia. These are the diseases of calcium and phosphorus metabolism which occurs when infants do not get sufficient amounts of vitamin D. Osteomalacia is usually common in women during and after the child-bearing period.
Separate government data are not available, but on the basis of disease and diet survey, it could be said that these are the common diseases throughout the region. The general D vitamin deficiency found in the study region is due to the fact that most of the population is vegetarian, while the important sources of this vitamin are of animal origin. Although milk is a source, but it is not consumed by the general public because of their poor economic condition. Another source of vitamin D is ultra-violet rays from the sun, but in the generally ill-built houses this source is not easily available to all members of the family; particularly in the case of ladies, the prevailing social customs are another inhibiting factor.

The main diseases are as follows:

**RICKETS**

The incidence of rickets is quite common among infants and children in the region and is mainly due to deficiency of vitamin D. The vitamin can be obtained from food as well as by the action of ultra-violet rays on the skin.

It was noticed during field work, particularly in Bhopal, Begamganj, Ghairatganj and Naisen centres that the disease was more common among Muslim girls, due to the 'purdah' system and living conditions. Besides this, rapid urbanization under bad living conditions increases the incidence of rickets.
OSTEMALACIA

D vitamin deficiency in adults leads to osteomalacia. The reactions of the skeleton are fundamentally similar to those in rickets.

The disease has been usually reported amongst the women of the region who live on a poor cereal diet lacking calcium and vitamin D and who mostly remain indoor.

OTHER DEFICIENCY DISEASES OF THE REGION

PELLAGRA

Pellagra has been associated with the consumption of diets based predominantly on jowar, and in the region it is frequently reported and observed amongst poor agricultural labourers. The main symptoms are loss of weight, increasing debility, mental changes, gastro-intestinal disturbance and the tongue having a particular swollen and 'beefy-red' appearance. Besides nicotinic acid, deficiency of the other members of vitamin B complex is also involved in the incidence of pellagra. It has been believed that the tongue condition in pellagra is due to riboflavin deficiency.

The disease occurs due to poverty and ignorance and can be prevented by increased use of milk, meat, and other foods of animal origin.
ANAEMIA

Anaemia is prevalent in the entire region, being reported in government hospitals as well as in private clinics and has become one of the public health hazards. During the diet survey also, some information was collected, regarding the prevalence of anaemia. It was also noticed during the survey that the proportion of iron-containing food-stuffs is low in the diet of most of the people. The average intake of iron in rural peoples is found to be 15 and 20 mg per day per head (Table 6.7), while the recommended allowance is 20-30 mg.

Anaemia is reported mainly due to iron deficiency, resulting directly in deficiency of haemoglobin, which reduces the ability of the blood to carry oxygen from the lungs to the rest of the body.

Loss of appetite, indigestion, a burning sensation in the mouth and the tongue becoming red are the common indications of anaemia. Such conditions mainly arise due to an unbalanced diet and lack of elements required for haemoglobin formation, such as iron, calcium, vitamin C, as well as protein. It would be clear from Tables 6.1 and 6.7 that the diet here is deficient in most of the nutrients which are required for haemoglobin formation.

Anaemia is mostly reported by the womenfolk, owing to added stress and demand of reproductive function, multiple deliveries and unhygienic conditions of living. The high
incidence of anaemia is responsible for the prevailing state of ill-health and consequently a great loss of working capacity and low economic efficiency in the region.

FIELD DATA

It has been analysed from the disease survey data that anaemia has been reported in all the private clinics which were visited by the author himself. During diet survey also the author observed signs of this conditions on the women of the interviewed families, particularly in Beganganj, Chiratganj, Bina, Asoknagar, Badkua, Notha, Gondarmau Barkhooa, Bilrai and in Kalara villages.

DIABETES MELLITUS: Diabetes mellitus is a chronic disease due to deficiency or diminished effectiveness of insulin. This condition affects the metabolism of carbohydrates, protein, fats, water and electrolytes, sometimes with grave consequences. It is commonly reported in private clinics and government hospitals also, but is mostly confined to wealthy persons.

GOITRE

Goitre is usually reported but the actual numbers are not known. The patient is nervous, loses weight and often has

pulmonations. The disease occurs mainly due to the use of iodine-deficient water.

Besides the above-discussed disorders, there are several minor visible signs which were noted by the author during field work and which could be attributed to under and/or malnutrition. These were:

- **Hair**: Dry, straight
- **Eye**: Dryness of eye. The wrinkled surface may be associated with bitol's spots.
- **Mouth**: Lips dry and patchy with cracking.
- **Teeth**: Various forms of decay, loosened teeth.
- **Skin**: Dry.

Loss of weight among adults and retarded growth in children were also noticed at several places in the region.

The author would here like to make one point clear, viz. that the resistance power of the body plays an important role in the incidence of any disease; where resistance is weak, the probability of any disease incidence is greater and this is directly connected with the diet of the people. It must be obvious then that nutritional deficiencies have a direct or indirect relation with any prevalent disorder. The following diseases are also indirectly related to nutritional deficiency:

1. Various diseases of the digestive system
2. Various diseases of the liver
3. Various diseases of the cardio-vascular system
4. Various diseases of the kidney and urinary tract
5. Various diseases of the respiratory system

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