# C H A P T E R - V

## ASSESSMENT OF NUTRITIONAL LEVELS

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## 5.1 Introduction :

At present the problem of food and nutrition is being tackled with interdisciplinary approach such as department of public health, nutritional sciences, agricultural economists, agricultural geographer's, as well as a number of research institutes and government offices. Nutrition is defined as a process of assimilating food and the science of nutrition involves the study of all processes of growth, maintenance and repair of living body, which depend upon the intake of food.[2] To provide body with energy and material for growth and repair, food must contain certain basic ingredients.

Foodstuffs may be broadly classified as cereals, pulses, nuts and oilseeds, vegetables, fruits, milk and milk products and flesh foods. These foods contain substances known as nutrients. The nutrients include protein, fats, carbohydrates, vitamins and mineral salts.[3] These nutrients perform various functions in the body.

Speaking of nutrition one must remember that the possible status of deficiency could exist. One is malnutrition, i.e. deficiency of one or more essential nutrients in the diet. Those whose diets are inadequate in quality are malnourished. More generally, therefore malnutrition may be said to refer to a deficiency in the quality of diet which, if made good, enables a person to lead a healthy active life. The aspect of quantitative inadequacy of diet is known by the term undernutrition. People

who do not get enough quantity of food to eat are undernourished. An extreme degree of under nutrition is starvation. Undernutrition is measured in terms of caloric intake. The term 'hunger' covers both undernutrition and malnutrition.[4]

5.2 Persons below 2000 K.Cal. :

Good nutrition is the basic component of health. It is of prime importance in the attainment of normal growth and development and maintenance of health throughout life. Indian Council of Medical Research, after taking into consideration all groups of population, type of their work, age structure etc., has recommended an average requirement of 2400 calories a day.[5]

A diet survey was conducted for 24 villages, comprised 2564 population. Table 5.1, indicates disparilty in per man unit per day calorie intake. It was observed that most of the village population is facing the problem of undernutrition. Persons below 2000 calorie intake are found in all villages. The percentage of population below 2000 calorie intake to the total population of the villages, viz. Gundewadi 40 percent, Linghoor 34 percent and Patgaon 21 percent. These villages are in drought prone area of Miraj tahsil. Then the villages like Kundal 21 percent, Visapur 19 percent, Lodhe 24 percent of population are below the calorie intake of 2000 per man unit per day. These villages are also located in drought prone area of Tasgaon tahsil. The villages Walwa tahsil, viz. Pokharni 42 percent, Kurlap 39 percent, Surul 36 percent, Itakare 31 percent, Rethare Karnax

udy).

| Sr. No. | Name of | Percentage to the total population | Total persons |
|---|---|---|---|
| | Miraj Ta | | |
| 1. | Haripur | 9 | 167 |
| 2. | Patgaon | 8 | 136 |
| 3. | Narwad | - | 66 |
| 4. | Gundewad | - | 52 |
| 5. | Lingnoor | 7 | 77 |
| | Tasgaon | | |
| 6. | Ankalkho | 11 | 305 |
| 7. | Nagrale | 7 | 125 |
| 8. | Kundal | 4 | 140 |
| 9. | Visapur | 8 | 80 |
| 10. | Lodhe | - | 75 |
| 11. | Gourgaon | - | 57 |
| | Walwa Ta | | |
| 12. | Rethare | 8 | 101 |
| 13. | Shirgaon | 7 | 126 |
| 14. | Kurlap | - | 104 |
| 15. | Itakare | - | 91 |
| 16. | Surel | - | 94 |
| 17. | Pokharni | - | 104 |
| | Shirala | | |
| 18. | Charan | 6 | 123 |
| 19. | Fakirwadi | - | 46 |
| 20. | Padali | - | 110 |
| 21. | Dhamwade | - | 78 |
| 22. | Yelapur | - | 114 |
| 23. | Rile | - | 136 |
| 24. | Petlond | - | 57 |
| | | | 2564 |

27 percent of population, are below 2000 calorie intake per man unit per day. There are a number of factors responsible for low consumption of calories per man unit per day.

1. Most of the households have the landholding, less than one hectare or 2.5 acres. Small landholding causes small agricultural production.
2. The average size of holding is also very small. Not only agricultural holdings are small, but they are fragmented too. Small size holding leads to poor agricultural yield.
3. Most of the households are landless labourers. Most of them are agricultural labours and getting poor wages, which reflects in to the poor nutritional level.
4. It is found that most of the households of 'Harijan' class are in this category, in the number of villages. They are working on the others farm.
5. The lower income groups may even have lower food intake. This shows an increase in the extent of poverty in the community.
6. Particularly in the villages of Shirala tahsil most of the population is below 2000 calorie intake per man unit per day. The most striking point for this is that, migration of the population. Most of the population of Shirala tahsil has migrated to Bombay in search of employment.
7. Then the other causes are, inadequate irrigation facilities, lack of improved seeds, manures and plant protection. These could cause low agricultural production and ultimately it reflects in the undernutrition of the people.

8. No households in this group is self sufficient in the foodgrain production. They purchase foodgrains in the market. But prices are high in the market. This causes low nutritional level.

It is seen that the agriculturally flourished villages, viz. Ankalkhop, Haripur, Narwad, Nagrale, Fakirwadi etc. have less percentage of population under 2000 calorie intake per man unit, per day.

5.3 Persons between 2000 K.Cal. to 3000 K.Cal. :

Table 5.1 shows percentage of population per man unit per day consumption of 2000 to 3000 calorie intake. Most of the villages have large number of population in this group. The villages like Haripur, Patgaon, Narwad, Ankalkhop, Nagrale, Kundal, Visapur, Lodhe, Gourgaon, Shirgaon, Fakirwadi, Dhamwade, Petlond are having more than 75 percent of the total population of the villages are in between 2000 and 3000 K.cal. per man unit per day. The villages like Haripur, Gourgan and Narwad recorded more than 90 percent of population in this group. Whereas the villages like Gundewadi, Lingnoor, Pokharni, Yelapur recorded lowest number of population in this group.

Persons between 2000 and 3000 K.cal. per man unit per day form the normal group. The number of households of this category has the landholding of 1 to 3 hectares or 2.5 to 7.5 acres. Most of the households are selfsufficient in the foodgrain production. Some of the farmers have artificial irrigation facilities to

their farm. So they produce two or three crops on the same farm in a year. The economic level of these households is satisfactory. Most of the households of this category are farmers.

5.4 Persons above 3000 K.Cal. :

Very few villages fall in this group. Out of the 24 villages, only 10 villages are recorded in this group. The percentage of population is also very less. The village Ankalkhop has recorded highest percentage i.e. 11 percent to the total population of the village, followed by Haripur 9 percent, Patgaon, Visapur, Rethare Harnax 8 percent each, Kurlap, Nagrale 7 percent each, Charan 6 percent and Kundal 4 percent of the population. The households belonging to this group are the rich families in the respective villages. They have landholdings of more than 3 hectares and all are sufficient in the foodgrain production. Most of the farmers have their own artificial irrigation facilities to their farm. So they produce excess foodgrains. At the same time they utilize a piece of land for nonfoodgrains like sugarcane, grape, turmeric, chillies, tobbaco, cotton etc. These agricultural productions are sell in the market. So they get money. Naturally their purchasing power is also high. The standard of living is also high as compaired to the other households of the respective villages.

The other important aspect of this category is that, some of the households have side business to the agriculture. They are retail traders of the villages. Some run restaurants,

grinding mills, some are workers/employees. As they are earning money, their purchasing power is high, ultimately it reflects into better nutritional facilities. It clearly indicates the relieving pressure on the soil. This means that employment opportunities into the non agricultural sector also helps for higher nutritional level of the people.

Shirala tahsil is the far western part of Sangli district, located on the eastern slopping ground of the Sahyadri. Due to the undulating terrain, average size of landholding is very low, it causes low agricultural production. Charan village recorded its 6 percent of the total population in this group. It is one of the rural marketing centres of Shiral tahsil. So some of the households are benifited by non-agricultural services. The village is also located on the approachable road. So some population is registered in this group.

## 5.5 Calorie intake in different villages :

One of the important functions of food is to provide energy measured in terms of calories. The calorie requirement depends on the type of occupation, body built, climate, sex, age and several other considerations. In India the daily requirements of calories have been placed at 2400-3900 per adult man and at 1900-3000 per adult woman. Taking into account the distribution of persons in different age and sex groups and different activities in India, the average per capita requirement of calories would appear to be about 2400. As against this the all

day.

| Sr. No. | Villag | Riboflavin mg. | Niacin mg. | Vitamin C mg. |
|---|---|---|---|---|
| | Miraj | | | |
| 1. | Haripu | 1.4 | 23 | 18 |
| 2. | Patgao | 0.9 | 16 | 11 |
| 3. | Narwad | 0.9 | 19 | 13 |
| 4. | Gundew | 0.9 | 16 | 6 |
| 5. | Lingno | 0.8 | 18 | 9 |
| | Tasgao | | | |
| 6. | Ankalk | 1.0 | 23 | 14 |
| 7. | Nagral | 1.0 | 21 | 11 |
| 8. | Kundal | 1.0 | 19 | 8 |
| 9. | Visapu | 0.9 | 18 | 9 |
| 10. | Lodhe | 0.8 | 18 | 11 |
| 11. | Gourga | 1.0 | 20 | 11 |
| | Walwa | | | |
| 12. | Rethar | 1.0 | 21 | 15 |
| 13. | Shirga | 0.8 | 20 | 9 |
| 14. | Kurlap | 0.8 | 16 | 12 |
| 15. | Itakar | 0.8 | 17 | 8 |
| 16. | Surul | 0.8 | 17 | 8 |
| 17. | Pokhar | 0.7 | 17 | 10 |
| | Shiral | | | |
| 18. | Charan | 0.7 | 20 | 11 |
| 19. | Fakirw | 0.7 | 17 | 12 |
| 20. | Padali | 0.6 | 15 | 9 |
| 21. | Dhamwa | 0.6 | 14 | 9 |
| 22. | Rile | 0.7 | 13 | 9 |
| 23. | Yelapu | 0.6 | 15 | 8 |
| 24. | Petlon | 0.7 | 14 | 12 |

India average for consumption of calories is about 2000 per person per day.[6]

5.6 Villages above average (2400 K.Cal.) :

From the data on the consumption of different foodstuffs in the different villages of Western Sangli district, presented in Table 5.3. Here only the villages above the standard requirement are considered. This table shows highest calorie consumption is found in the Ankalkhop followed by Nagrale, Haripur, Kundal, Rethare Harnax and Shirgaon respectively. The coverage of demand in percentage is viz. Ankalkhop 110 percent, Nagrale 105 percent, Haripur 104 percent, Kundal 103 percent, Rethare Harnax 101 percent, and Shirgaon 100 percent equal to standard requirement. All these villages are located on the very fertile soil of the Krishna basin. Irrigation facilities are also quite satisfactory. So these villages are well flourished in agriculture. Ankalkhop is one of the biggest rural centres in the Krishna basin. Agriculture as well as dairy farming has flourished in this village. At the same time, it acts as a rural marketing centre. The employment opportunity in non-agricultural sector is also available locally. The economic condition of the village is satisfactory. So per man unit per day consumption of calories is good. The same condition is found in Nagrale village.

Haripur is located in the latter part of the upper Krishna basin. It has close proximity to Sangli and Miraj which are urban

Table 5.3 Calory demand and supply per man unit per day.

| Sr. No. | Villages | Demand | Supply | Coverage of demand in % |
|---|---|---|---|---|
| 1. | Ankalkhop | 2400 | 2632 | 110.0 |
| 2. | Nagrale | " | 2506 | 104.4 |
| 3. | Haripur | " | 2490 | 104.0 |
| 4. | Kundal | " | 2470 | 102.9 |
| 5. | Rethare Harnax | " | 2420 | 100.8 |
| 6. | Shirgaon | " | 2402 | 100.0 |
| 7. | Patgaon | 2400 | 2367 | 98.6 |
| 8. | Narwad | " | 2345 | 97.7 |
| 9. | Visapur | " | 2322 | 96.7 |
| 10. | Charan | " | 2302 | 95.0 |
| 11. | Gundewadi | " | 2273 | 94.7 |
| 12. | Lohe | " | 2260 | 94.1 |
| 13. | Gourgaon | " | 2257 | 94.0 |
| 14. | Fakirwadi | " | 2210 | 92.0 |
| 15. | Kurlap | " | 2202 | 91.7 |
| 16. | Itakare | " | 2194 | 91.4 |
| 17. | Lingnoor | " | 2174 | 90.5 |
| 18. | Surul | " | 2148 | 89.5 |
| 19. | Padali | " | 2132 | 88.8 |
| 20. | Dhamwade | " | 2072 | 86.2 |
| 21. | Pokharni | " | 2052 | 85.5 |
| 22. | Rile | " | 2014 | 83.9 |
| 23. | Yelapur | " | 2000 | 83.3 |
| 24. | Petlond | " | 1975 | 82.2 |

centres. So the village is influenced by the urban phenomena. Good alluvial soil and better developed irrigation facilities are available for the development of agriculture. As the village is influenced by the urban life, the educational background is also good. So farmers are aware of the modern amenities in agriculture. A number of households are self sufficient in the foodgrain production. As the village has close proximity to Sangli and Miraj, vegetables are also cultivated in the farms. Non farm services are also available in Sangli and Miraj. So in general, the economic levels of the households are relatively good.

Rethare Harnax and Shirgaon are also located in the Krishna basin in Walwa tahsil. Both the villages are developed in agriculture. The village Rethare Harnax has close proximity to Rethare Bk. Sahakari Sakhar Karkhana. Credit facilities and some of the agricultural inputs are supplied by the factory to the farmers. There are a number of tractors in the village. Some farmers use tractors for their farm practices. Food crops and non-foodcrops are produced in the village. A number of farmers are self sufficient in the foodgrain production.

No village in Shirala tahsil is found above the standard requirement in calorie intake. It clearly shows the backwardness in agriculture. A large number of households are not self sufficient in the foodgrain production and as such they facing the food problem. It also shows the extent of poverty in these villages.

5.7 Villages below the average (2400 K.Cal.) :

Out of the twenty four villages, only six villages are above the standard requirement in calorie intake. The remaining 18 villages are below the standard requirement of calorie intake. These villages are Patgaon, Narwad, Gundewadi, Lingnoor of Miraj tahsil; Visapur, Lodhe, Gourgaon of Tasgaon tahsil; Kurlap, Itakare, Surul, Pokharni of Walwa tahsil and Charan, Fakirwadi, Padali, Dhamwade, Yelapur, Rile, Petlond of Shirala tahsil.

The village Petlond recorded lowest (1975) calorie intake per man unit per day. It is located on yellowish red soil zone. The height of this region is above 600 metres from the mean sea level. Undulating and rugged topography adversely affects the agricultural development of the village. The village is not self sufficient in foodgrain production. The villages Charan, Yelapur, Rile, Dhamwade are located on yellowish brown soil. Their height from the mean sea level is 550 to 700 metres. Due to the encroachment of Sahyadri mountain ranges, the topography of the region is very undulating. Poor soil for the agriculture and agriculture is totally depends upon the rainfall. The average size of holdings is small. Combined effect of these factors affects low agricultural production. So all these villages are facing the problem of undernutrition.

The villages like Fakirwadi, Surul, Itakare, Kurlap, Pokharni, Visapur, Lodhe, Gourgaon, Patgaon, Gundewadi, Lingnoor,

Narwad are located on the dark brown soil. Dry farming is most dominant in these villages. Very few farmers have their own artificial irrigation facilities. The food availability depends upon one or two harvests. If the village has two harvests, food availability is more. Most of these villages produce Kharif crops. Where there are artificial irrigation facilities Rabi crops like wheat, bengal gram are cultivated. Seasonal shortage of food is the common phenomena in all these villages. As the foodgrains are not sufficient upto the next season. The only alternative is to buy food. But the prices are high in the market and the income of the farmers is low. This situation causes undernutrition. Cereals constitute the main source of calories. Nearly 70 percent of calories come from cereals and the remaining 30 percent from pulses, sugar and vegetables and animal foods.

5.8 Assessment of carbohydrates and proteins :

Carbohydrates, proteins and fats are also sometimes called, "Proximate principles". They are oxidised (i.e.burnt) in the body to provide energy required for the various activities of life.[7]

Carbohydrates are a class of substances which include glucose, canesugar, milk sugar, starch etc. Starches are found in abandance in cereals and millets roots and tubers and in plant stems, cereals and millets account for most of the dietary carbohydrates. They form the main source of energy to the body.

The standard requirements of carbohydrates are not given but about 70 percent of the calories in a diet can be from carbohydrates.[8] One gram of carbohydrate yields 4 calories.[9] So the standard requirement of carbohydrates per capita per day is of 420 grams.[10]

Table 5.4 indicates the villages viz. Ankalkhop, Nagrale, Haripur, Patgaon, Shirgaon reveals surplus consumption of carbohydrates per man unit per day. The remaining villages are deficient in the per man unit per day consumption of carbohydrates. The villages like Ankalkhop, Nagrale, Haripur, Patgaon, Shirgaon which are surplus in consumption of carbohydrates from the standard requirement. The coverage of demand of these villages is as follows. Ankalkhop 113 percent, Nagrale 104 percent, Haripur 103.3 percent, Patgaon 102.1 percent, Shirgaon 102 percent.

It is important to note that in these five villages nearly 70 to 75 percent of the total calories are obtained from carbohydrates and the remaining from other various nutrients in the diet. The remaining 19 villages deficient in the consumption of carbohydrates are viz. Narwad, Gundewadi, Lingnoor of Miraj tahsil; Kundal, Visapur, Lodhe, Gourgaon of Tasgaon tahsil; Kurlap, Itakare, Surul, Pokharni of Walwa tahsil and all the seven villages of Shirala tahsil. Among all these villages except Kundal, the remaining villages are facing the problem of undernutrition. The coverage of demand of carbohydrates of these

Table 5.4 Average intake of Carbohydrates.

| Sr. No. | Villages | Energy supply K.Cal. | Demand | Supply | Coverage of demand in % | % Energy derived from the carbohydrates |
|---|---|---|---|---|---|---|
| | Miraj T. | | | | | |
| 1. | Haripur | 2490 | 420 | 434 | 103.3 | 70.3 |
| 2. | Patgaon | 2367 | " | 429 | 102.1 | 72.4 |
| 3. | Narwad | 2345 | " | 410 | 97.6 | 70.0 |
| 4. | Lingnoor | 2172 | " | 390 | 92.8 | 71.8 |
| 5. | Gundewadi | 2273 | " | 410 | 97.6 | 72.1 |
| | Tasgaon T. | | | | | |
| 6. | Ankalkhop | 2632 | " | 475 | 113.0 | 72.1 |
| 7. | Nagrale | 2506 | " | 437 | 104.0 | 70.0 |
| 8. | Kundal | 2470 | " | 418 | 99.5 | 67.6 |
| 9. | Visapur | 2322 | " | 399 | 95.0 | 68.7 |
| 10. | Lodhe | 2260 | " | 365 | 87.0 | 64.6 |
| 11. | Gourgaon | 2257 | " | 408 | 97.1 | 72.3 |
| | Walwa T. | | | | | |
| 12. | Rethare H. | 2420 | " | 400 | 95.2 | 66.0 |
| 13. | Shirgaon | 2402 | " | 429 | 102.1 | 71.4 |
| 14. | Kurlap | 2202 | " | 375 | 89.2 | 68.1 |
| 15. | Itakare | 2194 | " | 393 | 93.5 | 71.6 |
| 16. | Surul | 2148 | " | 390 | 92.8 | 72.6 |
| 17. | Pokharni | 2052 | " | 352 | 83.8 | 68.6 |
| | Shirala T. | | | | | |
| 18. | Charan | 2302 | " | 408 | 97.1 | 70.8 |
| 19. | Fakirwadi | 2210 | " | 417 | 99.2 | 75.4 |
| 20. | Padali | 2132 | " | 368 | 87.6 | 69.0 |
| 21. | Dhamwade | 2072 | " | 370 | 88.0 | 71.4 |
| 22. | Yelapur | 2000 | " | 370 | 88.0 | 74.0 |
| 23. | Rile | 2014 | " | 372 | 88.5 | 73.8 |
| 24. | Petlond | 1975 | " | 369 | 87.8 | 74.7 |

villages is about 87 to 99 percent from the standard requirement. Nearly 67 to 74 percent of the calories are obtained from the carbohydrates. It is also important to note that cereals constitutes about 80 percent of the total carbohydrates.

Protein intake in different villages :

Protein is an important constituent of diet and is necessary for growth and replacement of tissue wear and tear. "Proteins supply the building material for the body, foods rich in protein are often called body building foods".[12] According to the report of the Nutrition Expert Group, which has been adopted by Indian Council of Medical Research (1968). The recommended allowances of protein for Indians are shown in table.[13]

| | |
|---|---|
| Man | - 55 grams |
| Woman | - 45 grams (55 grams during the later half of pregnancy and 65 during lactation) |
| Children | - 17 to 41 grams, depending on age and weight |
| Adolescent | - 50 to 60 grams |

Taking into account the age and sex composition of the population, the average per capita requirement of protein has been placed at about 44.0 gram per day. The all India average per capita consumption of protein has been estimated to be about 56 grams per day. Whereas per capita consumption of protein in Maharashtra is about 68 grams per day.[14] Whereas per capita

requirement of protein for Maharashtra is taken 70 grams per day.[15]

Table 5.5 shows that per man unit per day consumption of protein is sufficiently present in the diet. The villages viz. Ankalkhop, Nagrale, Kundal, Haripur, Visapur, Rethare H.,Patgaon, Narwad and Gundewadi reveal surplus consumption of protein in the diet. Highest protein consumption is found in Ankalkhop i.e. 84 grams per man unit per day. Followed by Nagrale 82 grams, Haripur and Kundal 79 grams, Visapur and Rethare H. 72 grams, Patgaon and Narwad 71 grams. Ankalkhop is one of the best dairy flourished villages in the upper Krishna basin. So milk is easily available in the diet. Proteins of animal foods such as milk, meat, fish, even eggs are called essential amino-acids, considered to contain good quality of protein, pulses and nuts are also the richest sources of protein. The village located in the Krishna basin like Ankalkhop, Nagrale, Rethare H.,Shirgaon, Kundal, Haripur have sufficient quantity of protein in the diet. This is due to developed agriculture and dairy farming is a substitute to agriculture. Pulses are also produced in Kharif and Rabi seasons. Milk supply is locally available in each of these villages. So the average consumption of protein is above the standard requirement. The coverage of demand of protein is ranging from 100 percent (Gourgaon) to 120 percent (Ankalkhop).

The villages viz. Gundewadi, Lingnoor of Miraj tahsil, Lodhe in Tasgaon tahsil, Shirgaon, Kurlap, Itakare, Surul and Pokharni of Walwa tahsil are defficient in the protein

Table 5.5 Protein demand and supply per man unit per day.

| Sr. No. | Villages | Demand | Supply | Coverage of demand in % |
|---|---|---|---|---|
| 1. | Ankalhop | 70 | 84 | 120.0 |
| 2. | Nagrale | " | 82 | 117.1 |
| 3. | Haripur | " | 79 | 112.8 |
| 4. | Kundal | " | 79 | 112.8 |
| 5. | Rethare Harnax | " | 72 | 102.8 |
| 6. | Visapur | " | 72 | 102.8 |
| 7. | Narwad | " | 71 | 101.4 |
| 8. | Patgaon | " | 71 | 101.4 |
| 9. | Gourgaon | " | 70 | 100.0 |
| 10. | Shirgaon | " | 69 | 98.5 |
| 11. | Lodhe | " | 69 | 98.5 |
| 12. | Gundewadi | " | 68 | 97.1 |
| 13. | Itakare | " | 67 | 95.7 |
| 14. | Charan | " | 66 | 94.2 |
| 15. | Kurlap | " | 65 | 92.8 |
| 16. | Lingnoor | " | 65 | 92.8 |
| 17. | Fakirwadi | " | 65 | 92.8 |
| 18. | Surul | " | 64 | 91.4 |
| 19. | Pokharni | " | 61 | 87.1 |
| 20. | Padali | " | 59 | 84.2 |
| 21. | Rile | " | 57 | 81.4 |
| 22. | Yelapur | " | 56 | 80.0 |
| 23. | Dhamwade | " | 55 | 78.5 |
| 24. | Petlond | " | 55 | 78.5 |

consumption from the standard requirement. The per man unit per day consumption of protein is ranging from 61 grams (Pokharni) to 69 grams (Lodhe). The coverage of demand for the same villages is 87.1 percent to 98.5 percent. These villages have dry farming, so most of the protein is from pulses and cereals. The consumption of animal proteins are very less. In these villages Shirgaon has adequate supply of calories and carbohydrates but is defficient in protein consumption. So this village is facing the problem of malnutrition. Whereas other villages are facing the problem of undernutrition.

The villages of Shirala tahsil viz. Charan, Fakirwadi, Padali, Dhamwade, Yelapur, Rile, Petlond are deficient in the protein consumption. The coverage of demand of protein of these villages ranging from 78.5 percent (Petlond) to 94.2 percent (Charan). A number of causes are responsible for this inadequately supply of protein. No village in this tahsil is self sufficient in the foodgrain production. Agriculture depends totally upon the monsoon. Most of the population has migrated to Bombay. Then most of the calories, carbohydrates and proteins are derieved from rice, maize, ragi and pulses. The rice, ragi and maize are relatively poor protein content. Combined effects of these factors affect the protein consumption, which is deficient from the standard requirement. Most of the proteins are obtained from cereals and pulses. The proteins of animal foods such as milk, meat, fish, eggs are very negligible in the diet.

## 5.9 Assessment of Calcium and Iron :

A large number of minerals are present in the human body. Bones and teeth are made of calcium, magnecium phosphorus and iron is an important constituent of blood.

### Calcium :

The bones and teeth are made principally of calcium salts, hence calcium is mainly required as a building material for strong bones and teeth. The recommendations for allowances for calcium considered only tentative. The available information on the retention of calcium by human body at different levels of intake has suggested the desirability of a daily intake of about 0.4 to 0.6 gm. of calcium by an adult.[16] The N.A.C. has not yet reviewed the international recommendations for calcium for application to India, but given as they are in the form of range they are presumably applicable. The per capita daily allowance for India based on these recommendations works out to 450 to 550 mg.[17] By considering these two allowances 500 mg is considered the standard requirement for this study.

Table 5.6 shows that calcium is adequatly available to the village people of Ankalkhop, Nagrale, Rethare Harnax, Kundal, Narwad, Lodhe and Petlond. The coverage of demand of calcium per man unit per day is ranging from 128 percent to Ankalkhop and Nagrale, 117.4 percent to Kundal 114.6 percent to Lodhe, 121.6 percent to Rethare H. 115.4 percent to Narwad, 101.2 percent to

Petlond. Calcium is found abundantly in milk, chees and green leafy vegetables. Most of the cereals contain some amounts of this element. Pulses also contain some amount of calcium. Among these villages Ankalkhop, Nagrale, Rethare Harnax are located on the Krishna basin, having black soil, which is most suitable for agriculture. Dairy has well flourished in these villages. So milk is easily available in the diet, moreover these villages are rich in calcium consumption.

Table 5.6 indicates that calcium is inadequatly available to the village people viz. Haripur, Patgaon, Gundewadi, and Lingnoor of Miraj tahsil. The consumption of calcium per man unit per day is about 449 mg, 483 mg, 318 mg and 496 mg to Haripur, Patgaon, Gundewadi and Lingnoor respectively. It will be seen that the village Gundewadi recorded highest (182 mg) deficiency from the standard requirement. The coverage of demand of calcium for this village is only 63.3 percent. These villages are located on the dark brown soil where dry farming is most dominent. The extent of poverty is also dominent. These factors adversaly affect the nutritional level of the people.

The villages viz. Visapur, Gourgaon of Tasgaon tahsil are deficient in the calcium consumption. The coverage of demand of calcium is 90.8 percent to Gourgaon and 95 percent to Visapur. Then the villages like Shirgaon, Kurlap, Itakare, Surul, Pokharni of Walwa tahsil are also deficient in calcium consumption. The village Pokharni recorded lowest consumption of calcium which is

Table 5.6 Average intake of Calcium and Iron per man unit per day.

| Sr. No. | Villages | CALCIUM | | | IRON | | |
|---|---|---|---|---|---|---|---|
| | | Demand | Supply | Coverage of demand in % | Demand | Supply | Coverage of demand in % |
| | **Miraj Tahsil** | | | | | | |
| 1. | Haripur | 500 | 449 | 89.8 | 30 | 34 | 113.3 |
| 2. | Patgaon | " | 483 | 96.6 | " | 35 | 116.6 |
| 3. | Narwad | " | 577 | 115.4 | " | 37 | 123.3 |
| 4. | Gundewadi | " | 318 | 63.6 | " | 34 | 113.3 |
| 5. | Lingnoor | " | 496 | 99.2 | " | 32 | 106.6 |
| | **Tasgaon Tahsil** | | | | | | |
| 6. | Ankalkhop | " | 640 | 128.0 | " | 43 | 143.3 |
| 7. | Nagrale | " | 640 | 128.0 | " | 34 | 113.3 |
| 8. | Kundal | " | 587 | 117.4 | " | 33 | 110.0 |
| 9. | Visapur | " | 475 | 95.0 | " | 32 | 106.6 |
| 10. | Lodhe | " | 573 | 114.6 | " | 29 | 96.6 |
| 11. | Gourgaon | " | 454 | 90.8 | " | 36 | 120.0 |
| | **Walwa Tahsil** | | | | | | |
| 12. | Rethare H. | " | 608 | 121.6 | " | 30 | 100.0 |
| 13. | Shirgaon | " | 439 | 87.8 | " | 33 | 110.0 |
| 14. | Kurlap | " | 451 | 90.2 | " | 30 | 100.0 |
| 15. | Itkare | " | 439 | 87.8 | " | 30 | 100.0 |
| 16. | Surul | " | 383 | 76.6 | " | 30 | 100.0 |
| 17. | Pokharni | " | 341 | 68.2 | " | 29 | 96.6 |
| | **Shirala Tahsil** | | | | | | |
| 18. | Charan | " | 456 | 91.2 | " | 28 | 93.3 |
| 19. | Fakirwadi | " | 374 | 75.4 | " | 29 | 96.6 |
| 20. | Padali | " | 473 | 94.6 | " | 27 | 90.0 |
| 21. | Dhamwade | " | 341 | 68.2 | " | 25 | 83.3 |
| 22. | Yelapur | " | 341 | 68.2 | " | 25 | 83.3 |
| 23. | Rile | " | 385 | 77.0 | " | 25 | 83.3 |
| 24. | Petlond | " | 506 | 101.2 | " | 23 | 76.6 |

341 mg per man unit per day, the deficiency is about 159 mg from the standard requirement. The same is the case with the village Surul, the deficiency is about 117 mg from the standard requirement. The coverage of demand of calcium for the both villages is about 68.2 percent and 76.6 percent respectively to Pokharni and Sarul.

The villages like Charan, Fakirwadi, Padali, Dhamwade, Yelapur, Rile of Shirala tahsil are poor in consumption of calcium. The deficiency is 126 mg to Fakirwadi, 159 mg to Dhamwade and Yelapur, 215 mg to Rile from the standard requirement. These villages are located on the yellow brown soil, undulaning topography causes low agricultural production. The most important reason for low consumption of calcium is the cropping pattern of these villages. Rice is the main produce of these villages, which is very deficient in the calcium. Dairy farming is not developed in Shirala tahsil. Therefore, insufficiency of calcium is one of the most important defects of the adequate supply of rice in the diet.

Iron :

The nutrition Expert Group of ICMR considered the various aspects relating to the availability an utilization of food iron and recommended an allowance of 20 to 30 mg of iron in a balanced diet for an adult. The average intake of iron for Maharashtra is 30 mg per head per day. So far the present study 30 mg is supposed to be the standard requirement.

A study of Table 5.6 shows that per man unit per day consumption of iron in number of villages are available to a satisfactory extent. All the villages of Miraj tahsil have sufficient quantities of iron in the diet. The coverage of demand of iron is 148 percent to Narwad, 140 percent to Padgaon, 136 percent to Haripur and Gundewadi and 128 percent to Lingnoor.

The villages of Tasgaon tahsil viz. Ankalkhop, Nagrale, Kundal, Visapur, Gourgaon are surplus consumption of iron. The village Ankalkhop recorded highest i.e.43 mg of iron consumption. The coverage of demand of iron is 143.3 percent. The village Lodhe recorded 1 mg of deficiency from the standard requirement. The foodstuffs that are rich in iron are green leafy vegetables, cereals and pulses are also good source of iron. Most of the iron is obtained from the cereals and pulses. Ankalkhop is a rural market centre. Vegetables are produced from the hinterland. So Ankalkhop recorded highest consumption of iron.

The villages of Walwa tahsil viz. Rethare H., Shirgaon, Kurlap, Itakare, Surul, Pokharni are getting average level of iron in the diet. Except the village Pokharni all other villages are self sufficient in the iron consumption. The coverage of demand of iron to Shirgaon is 132 percent. The village Pokharni is 1 mg deficient in iron consumption from the standard requirement. Totally dry farming village, less consumption of vegetables.

All the villages of Shirala tahsil viz. Charan, Fakirwadi, Padali, Dhamwade, Yelapur, Rile, Petlond have recorded inadequate supply of iron. The deficiency is about 7 mg to Petlond, 5 mg to Dhamwade, Yelapur and Rile 3 mg to Padali, 2 mg to Charan and 1 mg to Fakirwadi from the standard requirement. The coverage of demand of iron is recorded about 76.6 percent to Petlond and 96.6 percent to Fakirwadi. Less consumption of green vegetables is one of the causes of deficiency of iron consumption. Rice and maize constitute a major part in the diet which contains very low nutritive values of iron.

5.10 Average intake of various vitamins per man unit per day :

Vitamins are organic substances present in small amounts in various foodstuffs. They have important functions in many of the vital processes of life. They are therefore essential for health and well being.

Vitamin A is necessary to keep the several epithelial tissue in the body. It may be mentioned that the daily requirements of an adult are in the neighbourhood of 750 Ng (about 2500 International Unit).[19]

Vitamin $B_1$ or 'Thaimine' formally known as the 'Anti-beriberi' or 'Anti neuritic' vitamin. The requirement is usually expressed in terms of calorie intake and it is about 0.5 mg of the vitamin per 1000 calories, subject to a minimum of one milligram per day.[20] The thaimine requirement of an individual depends on the number of factors among which the composition of

diet is one. So here the standard requirement of an adult is taken 1.2 mg.

The standard requirement of Riboflavin has not been determined with any certanity but the figure usually reported is around 1.5 mg per day.[21]

The Nicotinic acid (also called Niacin) is the vitamin intimataly concerned in several metabolic reactions. The requirement of Niacin for an adult is about 16 mg.[22]

Vitamin C (Ascorbic acid) is the vitamin that prevents a condition called scurvy. A well balanced diet for school children and adult should contain some 30-50 mgs. of vitamin C per day.[23] So 50 mg is taken standard requirement.

Table 5.7 shows per man unit per day consumption of various vitamins. The table clearly shows that most of the villages are surplus in the consumption of thaimain and niacin, whereas deficient in vitamin A and vitamin C and riboflavin consumption. Vitamin A is present in specially in some animal foods like milk, butter, ghee and eggs etc. Some leafy vegetables as well as ripe fruits such as mangoes, papaya and tomatoes are rich in carotone; which is converted into vitamin A in the body. Good sources of riboflavin are milk and milk products, eggs, liver and green leafy vegetables. Vitamin C usually is found in fresh fruits and vegetables, particularly the green leafy varities. These nutrients are not easily available in the diet.

per day.

| Sr. No. | Villages | Niacin | | | Vitamin C | | |
|---|---|---|---|---|---|---|---|
| | | d Supply mg | Coverage of demand in % | Demand mg | Supply mg | Coverage of demand in % | |
| | **Miraj Tahsil** | | | | | | |
| 1. | Haripur | 23 | 143.7 | 50 | 18 | 36 | |
| 2. | Patgaon | 16 | 100.0 | " | 11 | 22 | |
| 3. | Narwad | 19 | 118.7 | " | 13 | 26 | |
| 4. | Gundewadi | 16 | 100.0 | " | 6 | 12 | |
| 5. | Lingnoor | 18 | 112.5 | " | 9 | 18 | |
| | **Tasgaon Tahsil** | | | | | | |
| 6. | Ankalkhop | 23 | 143.7 | " | 14 | 28 | |
| 7. | Nagrale | 21 | 131.2 | " | 11 | 22 | |
| 8. | Kundal | 19 | 118.7 | " | 8 | 16 | |
| 9. | Visapur | 18 | 112.5 | " | 9 | 18 | |
| 10. | Lodhe | 18 | 112.5 | " | 11 | 22 | |
| 11. | Gourgaon | 20 | 125.0 | " | 11 | 22 | |
| | **Walwa Tahsil** | | | | | | |
| 12. | Rethare H | 21 | 131.7 | " | 15 | 30 | |
| 13. | Shirgaon | 20 | 125.0 | " | 19 | 18 | |
| 14. | Kurlap | 16 | 100.0 | " | 12 | 24 | |
| 15. | Itakare | 17 | 106.2 | " | 8 | 16 | |
| 16. | Surul | 17 | 106.2 | " | 8 | 16 | |
| 17. | Pokharni | 17 | 106.2 | " | 10 | 20 | |
| | **Shirala Tahsil** | | | | | | |
| 18. | Charan | 20 | 125.0 | " | 11 | 22 | |
| 19. | Fakirwadi | 17 | 106.2 | " | 12 | 24 | |
| 20. | Padali | 15 | 93.7 | " | 9 | 18 | |
| 21. | Dhamwade | 14 | 87.5 | " | 9 | 18 | |
| 22. | Yelapur | 15 | 93.7 | " | 8 | 16 | |
| 23. | Rile | 13 | 81.2 | " | 9 | 18 | |
| 24. | Petlond | 14 | 87.5 | " | 12 | 24 | |

So most of the villages are facing the deficiencies of vitamin A, riboflavin and vitamin C.

Rice, wheat and other cereals, pulses and nuts particularly groundnut are a rich source of thaimain, which is easily available in most of the villagers diet. Then again whole cereals, pulses, nuts and meat are good sources of niacin. These foodstuffs are easily present in the diet. So most of the villages are rich in thaimain and niacin consumption. In village Haripur, thaimain and niacin are sufficiently present in the diet. But the deficiencies of 199 mg of vitamin A, 0.1 mg of riboflavin and 22 mg of vitamin C from the standard requirements are significant. The villages like Patgaon, Narwad, Gundewadi, Lingnoor have recorded surplus consumption of thaimain and niacin, whereas deficiencies could exist in vitamin A, riboflavin, vitamin C. The village Gundewadi recorded lowest consumption of vitamin A i.e. 397 mg, the coverage of demand of vitamin A is only 52.9 percent. Then the coverage demand of riboflavin is 60 percent and only 12 percent of vitamin C.

The villages viz. Ankalkhop, Nagrale, Kundal, Visapur, Lodhe, Gourgaon are recorded surplus consumption of thaimain and niacin, while vitamin A, riboflavin and vitamin C are lacking in varying degrees. The coverage of demand of vitamin A ranges from 73.4 percent to Gourgaon and 92 percent to Nagrale. For riboflavin 60 percent to Visapur and 66.6 percent to Kundal, for vitamin C 16 percent to Kundal and 28 percent to Ankalkhop.

It will be seen that Rethare Hernax, Shirgaon, Kurlap, Itakare, Sarul, Pakharni having adequate supply of thaimain and niacin. But there is deficiency of vitamin A, riboflavin and vitamin C. Pokharni is a very poor village of Walwa tahsil. In this village per man unit per day consumption of vitamin A is only 458 which 292 mg deficient from the standard requirement. The coverage of demand of riboflavin is 46.6 percent and 20 percent to vitamin C.

Charan and Fakirwadi are also rich in thaimain and niacin consumption but deficient in vitamin A, riboflavin and vitamin C. The remaining villages Padali, Dhamwade, Yelapur, Rile, Petlond are sufficient only in the thaimain consumption and deficient in vitamin A, riboflavin, niacin, vitamin C. The per man unit per day consumption of vitamin A, thaimain, riboflavin, niacin, vitamin C are very inadequate to all these villages of Shirala tahsil. This is due to the fact that rice contributes major diet, which is very poor in vitamin A, riboflavin, niacin.

5.11 Under nourishment & malnutrition :

The present study includes analysis of the following eleven nutrients. Calories, carbohydrates, protein, fat, calcium, iron, carotene, thaimine, riboflavin, niacin and vitamin C. Requirement of vitamin D is not considered in the analysis, because vitamin D is prepared inside the skin, when the body is exposed to sunlight. This is the cheapest source

of vitamin D and this vitamin D is abundantly found among the people of Western Sangli district.

It is not well equipped to undertake the measurement of different aspects nutritional gap. A 'balanced diet' is one which contains different types of foods in such quantities and proportions that the need for calories, minerals, vitamins and other nutrients is adequatly met.[24] There may be many nutrients required for a balanced diet. However our major concern will be the two important components, calories and proteins. The farmer provides energy and the latter the bulking blocks for the growth and substance of human body.

It is indeed a difficult exercise for an individual consumer to balance the level of all different nutrients. The three factors, knowledge, ability and willingness all together may ensure proper balancing of intake of the all nutrients.[25] A general awareness about the different nutrients has been noticed to be rare. It is clear that education had direct relation with awareness about nutrition.

Evidence of malnutrition :

Malnutrition reflects the inadequancy of the nutritional quality of diet. Excessive dependence on carbohydrate foods and inadequate consumption of protective foods such as animal products and fruit and vegetables are typical of diets of poor nutritional quality.

The present study deals with nutritional level of twenty four villages. Out of these 24 villages, not a single village has balanced diet. Qualitatively speaking the diets being predominantly cereals; the food is unbalanced and lacking in the essential requirements of protective foods, i.e. vitamins, minerals etc. The result is widespread mahutrition. Among these 24 villages six villages are facing the problem of malnutrition. These are, Ankalkhop, Nagrale, Haripur, Kundal, Rethare H. and Shirgaon. Table 5.8 indicates that in the villages Ankalkhop and Nagrale, per man unit per day consumption of calories, carbohydrates, protein, fat, calcium, iron, thaimine and niacin is in sufficient quantities, while there is deficiency of vitamin A, riboflavin and vitamin C. For the village Haripur calories, carbohydrates, protein, iron, thaimine and niacin are available to a satisfactory extent, while there is deficiency of fat, calcium, vitamin A, riboflavin and vitamin C. The villages viz. Kundal and Rethare H. per man unit per day consumption of calories, protein, fat, calcium iron, thaimine and niacin is in reasonable amount, while carbohydrates, vitamin A, riboflavin and vitamin C deviate from the standard requirement. The village Shirgaon, per man unit per day availabilities of calories carbohydrates, iron, thaimine and niacin are adequatly present in the diet while protein, fat, calcium, vitamin A, riboflavin and vitamin C are inadequatly present in the diet.

ifferent villages.

| e | Thaimine mg. | Riboflavin mg. | Niacin mg. | Vitamin C mg. |
|---|---|---|---|---|
| Mal-Nutritio | 2.3 | 1.0 | 23 | 14 |
| | 2.3 | 1.0 | 21 | 11 |
| | 2.9 | 1.4 | 23 | 18 |
| | 2.3 | 1.0 | 19 | 8 |
| | 2.0 | 1.0 | 21 | 15 |
| | 2.0 | 0.8 | 20 | 9 |
| Under Nutrition | 2.2 | 0.9 | 16 | 11 |
| | 2.3 | 0.9 | 19 | 13 |
| | 1.9 | 0.9 | 18 | 9 |
| | 1.5 | 0.7 | 20 | 11 |
| | 2.3 | 0.9 | 16 | 6 |
| | 2.0 | 0.8 | 18 | 11 |
| | 2.0 | 1.0 | 20 | 11 |
| | 1.7 | 0.7 | 17 | 12 |
| | 1.8 | 0.8 | 16 | 12 |
| | 1.9 | 0.8 | 17 | 8 |
| | 2.0 | 0.8 | 18 | 9 |
| | 1.8 | 0.8 | 17 | 8 |
| | 1.4 | 0.6 | 15 | 9 |
| | 1.2 | 0.6 | 14 | 9 |
| | 1.8 | 0.7 | 17 | 10 |
| | 1.3 | 0.7 | 13 | 9 |
| | 1.3 | 0.6 | 15 | 8 |
| | 1.2 | 0.7 | 14 | 12 |

Under nourishment :

Calories are a prime necessity for body maintenance. Calories deficiency leads directly to body weakness. It results in low energy level. Since the caloric level is directly related to the bulk or quantity of food consumed, the deficiency in calories is described as undernourishment. Out of the 24 villages 18 villages are facing the problem of undernutrition. These are Patgaon, Narwad, Visapur, Charan, Gundewadi, Lodhe, Gourgaon, Fakirwadi, Kurlap, Lingnoor, Sural, Padali, Dhamwade, Pokharni, Rile, Yelapur, Petlond. The village Patgaon, per man unit per day consumption of carbohydrates, protein, iron, thaimine and niacin is in sufficient quantities while the deficiency could exist among calories, fat, calcium, vitamin D, riboflavin and vitamin C. The per man unit per day availabilities of protein, calcium, thamine, niacin is in sufficient quantities to Narwad while there is deficiency of calories, carbohydrates, fat, vitamin A, riboflavin and vitamin C. The villages like Gundewadi and Lingnoor, per man unit per day consumption of iron thaimine, niacin is adequate while calories, carbohydrates, protein, fat, calcium, vitamin A, riboflavin and vitamin C are inadequate. The villages like Visapur and Gourgaon per man unit per day consumption of protein, iron, thaimine, niacin is the sufficient quantities while calories, carbohydrates, fat, calcium, vitamin A, riboflavin and vitamin C are having deficiency in the diet. The village Lodhe shows sufficient consumption of fat, calcium,

thaimine and niacin where as deficiency exists in calories carbohydrates, protein, iron, vitamin A, riboflavin & vitamin C. The villages like Kurlap, Itakare, Sarul per man unit per day availability of iron, thaimine and niacin is adequate while there is inadequacy of calories, carbohydrates, protein, fat, calcium, vitamin A, riboflavin and vitamin C. The villages like Pokharni, Charan and Fakirwadi, per man unit per day availability of thaimine and niacin is in sufficient quantities while deficiency exists in calories, carbohydrates, protein, fat, calcium, iron, vitamin A, riboflavin and vitamin C. The villages like Padali, Dhamwade, Yelapur, Rile per man unit per day availabilities of only thaimine is sufficient and all other nutrients are inadequate in the diet. The village Petlond per man unit per day consumption of calcium and thaimine is to bhe satisfactory level, while all other nutrients are not available according to the standard requirement.

Khanapur tahsil is the plateau region of northern part of Sangli district. The western part of Khanapur tahsil is close to Sahyadrian strap and having similar physiographical conditions to Shirala tahsil. But eastern part is located in drought prone area of Sangli district. That means western part of Khanapur tahsil is similar to Shirala tahsil and eastern part is similar to eastern part of Miraj and Tasgaon tahsil. So the nutritional level of Shirala tahsil and eastern villages of Miraj and Tasgaon will be applicable to Khanapur tahsil. As most of the villages of study region are facing the problem of under-nutrition the villages of Khanapur tahsil faces similar problem of undernutrition.

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