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Deficiency of Food and Nutrition in Tribal Regions of Madhya Pradesh

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Abstract

Food and nutritional intake among tribal population of Madhya Pradesh has been analysed in this paper. The study is based on the diet survey conducted in the sample villages of some tribal parts of the State. The survey results show that the daily diet of the tribals is deficient in all the nutrients. The nutritional deficiency is relatively high among children, females and aged people of tribal population in the rural areas of Madhya Pradesh.

Introduction

India is now self sufficient in food production, but some regions and some sections of the society are not getting sufficient food, tribals are one of them. The production of food is not equal in the society, and poor people are unable to purchase daily required food because of low purchasing power. In our country the food problem is because of high growth rate of population and lower rate of food production, while among tribals this problem is because of lower availability of foodstuffs and low purchasing power. Most of the tribals of our country are living in the remote areas and depend upon millets and forest food products for their daily food requirement. The main nutrients are calories, proteins, mineral elements and the vitamins. These nutrients are present in the foodstuffs in different amount. The deficiency of food nutrients causes a wide range of deficiency diseases and retards the working capacity of individuals (Sherman and Lanford, 1957). Therefore, the daily diet should contain all the essential nutrients in proper proportion. Majority of the tribal population of our country suffers from both under nutrition and malnutrition. Diet survey carried out in different parts of Madhya Pradesh shows that an average diet of tribals is highly deficient in all the nutrients necessary for a healthy life. The low intake of protein and fats is common in the tribal parts of the State.

Methodology

FAO (1957), Shafi (1960), Sukhatme (1962), Mishra (1984), WHO, and ICMR have suggested two methods of estimating food availability and nutritional intake in a region: (i) the food balance sheet method, and (ii) the household food consumption survey method.

(i) The food balance sheet shows the estimated per capita per day availability and consumption of foodstuffs in an area. It is measured by the total food production adjusted for in and out movements of food in trade, for changes in stocks, and for any

quantities used for animal feeding, seed, industrial production, and wastage. When such commodity balances are available for all main foodstuffs, the nutritive values can be calculated. This method is suitable for the assessment of food and nutritional structure in a small unit of a region.

(ii) The household food consumption survey method is based on a representative sample of households in an area. World Health Organization and Indian Council of Medical Research have accepted the four ways for household food consumption survey (a) weighing of raw foodstuffs, (b) checking of foodstuffs, (c) checking of stocks by inventory, and (d) interviewing the households.

The present study is based on both the methods. The diet surveys were conducted in the eighteen sample villages located in the tribal parts of Madhya Pradesh. The data obtained from diet surveys are tabulated and then converted into different nutrients on the basis of table supplied by the National Institute of Nutrition and Indian council of Medical Research (Gopalan, and others 1980). The quantitative and qualitative aspects of nutritional intake among tribals have been analysed in this paper. The quantitative food (energy content) has been measured in terms of caloric value of foodstuffs. The qualitative food measures the value of different nutrients in foodstuffs available in the diet.

The results of the analysis are presented in Table 1 and 2. The requirement of nutrients are given in col. no. 3, 4 and 5 of both the tables. The level of intakes of these nutrients are given in terms of intakes as % of requirement. Table 1 records the requirement of intake of average individual, male and female, it also records the intake levels as observed in rural or urban areas. Table 1.2 record the intake status of children in rural or urban areas. The intake status differentials based on the income levels are given in 8 & 9 of table 1.2.

Results and Discussion

Food Consumptions Pattern

Among the tribal population the consumption of food is based on cereals, roots, forest products and flesh food. Cereals consist more than half (55.6%) of the total food intake. Roots and vegetables are two other important sources of food, which consist more than one-third (38.4%), of the daily diet. While pulses, milk and green vegetables have small share in the daily diet of the tribals. The diet of the tribals is very much deficient in fats & oil and sugar. This suggests that the food intake is mainly based on the staple food available in the tribal area.

Leafy vegetables are available in the rainy season only and during rest of the year they are almost absent from the daily diet of the tribals. The production of milk, sugar, fats and oil is very low in the tribal parts, therefore its intake is also very low. Tribals are unable to purchase these food items from market because of low purchasing power. It is therefore concluded that tribal's diet is almost based on those foodstuffs, which are produced in their surroundings.

Nutritional Intake (Table 1.1; col. 6)

Energy (Calories): The diet of the tribals of the study area is deficient in quantity. It is evident from the fact that the average intake of calories among tribals is 31.6 percent lower than the recommended requirement of 2400 calories per capita per day (Table 1). They are taking only 68.4

Table 1: **Nutritional Intake among Tribal Gender Differentials as Rural Urban Differentiats**

1	2	3	4	5	6	7	8	9	10
Nutrients		**Requirement**			**Intake Status %**				
						Gender Differentials		**Rural/Urban Differentials**	
	Units	**Person**	**Male**	**Female**	**Person**	**Male**	**Female**	**Rural**	**Urban**
Energy	Cal	2400	2400	1900	-31.6	-16.9	-18.4	-32.5	-24.6
Proteins	grams	60	65	55	-41.7	-41.2	-45.3	-41.7	-44.8
Fat	grams	60	60	60	-73.3	-69.7	-86.7	-71.7	-71.7
Carbohydrates	milligrams	600	600	605	-26.7	-22	-37.2	-35.1	-28.9
Iron	milligrams	24	24	24	-29.2	-23.3	-31.7	-23.8	-25
Calcium	milligrams	900	900	900	-36.6	-20.5	-32	-31.6	-30.6
Vitamin-A (Carotene)	milligrams	1.5	1.5	1.5	-46.7	-40	-40	-40	-46.7
Vitamin-B1 (Thiamine)	milligrams	1.3	1.3	1.3	-23	-23.1	-23.1	-23.1	-30.9
Vitamin-B2 (Riboflavin)	milligrams	1.4	1.4	1.4	-37.7	-35.7	-35.7	-42.9	-35.7
Vitamin C	milligrams	49	49	49	-4.3	-21.8	-20.8	-16.3	-23.3

Source: Based on diet survey.

per cent of the minimum required calories. It is an indication of undernutrition and malnutrition in the tribal belts of Madhya Pradesh. The lower intake of calories is the result of lower production of foodstuffs from agriculture in the tribal parts. Main source of caloric intake is foodgrains, meat, fish, eggs, roots, local fruits, and some other local traditional foodstuffs.

Proteins: The average intake of proteins among tribals is 25 per cent lower than the recommended requirement (60 grams). The main sources of proteins are both vegetable and animal sources in the study area. But major source of proteins in tribal parts of Madhya Pradesh is animal food like meat, fish, eggs, etc. Tribals of this region are mainly dependent on animals and forest products for their food, therefore, they are taking sufficient quantity of animal proteins in their daily diet. While the proportion of vegetable proteins is low in the diet of the tribals such as pulses, groundnuts, soybeans, etc. The lower intake of vegetable proteins is due to lower production of these foodstuffs in the area. The share of flesh food in the diet is high in the rural parts and it is low in the urban centres. The lower purchasing power of tribals dose not allow them to purchase the costly animal protein in urban centres.

Fats: The average daily intake of fats and oils among tribals is 73.3 per cent lower than the recommended requirement of 60 grams. In other words, the tribals are taking only 26.7 per cent of the required fats per day. The proportion of vegetable oils is lower than animal fats. The lower intake of fats is the result of lower availability of fats and oils. The production of oilseeds

is negligible in the tribal parts; therefore, the supply of vegetable oil is also very low. Tribals are not able to purchase fats from market because of their poor economic condition.

Carbohydrates: The principal function of carbohydrates is to provide energy (calories) to the human body (Leveilli, 1975). The average intake of carbohydrates among tribals is 26.7 per cent lower than the recommended requirement. Majority of carbohydrates comes from sugar, jaggery, fruits, roots, etc. The intake of these foodstuffs is not sufficient in the daily diet of the tribals. The lower intake of carbohydrates is an indication of under nutrition in the study area.

Minerals: The deficiency of two minerals i.e. iron and calcium is relatively low, while the intake of iodine salt is very low among tribals in the study area. A large number of mineral elements are present in the human body (Mc Henry, 1957).

(i) Iron: Iron is a necessary part of the red pigment hemoglobin of blood, since this pigment carries oxygen around the body (Mottram, 1968). The iron intake should be greater than minimum needs to ensure that iron storage is maintained at a generous level to provide for emergencies. In a normal adult about 28 mg. of iron is set free each day by hemoglobin degeneration. The Nutrition Expert Group of ICMR considered the various aspects relating to the availability and utilization of food iron and recommended an allowance of 20 to 30 mg. of iron in a balanced diet for an adult. The intake of iron is 29.2 per cent lower than the recommended requirement (24 mg) in the daily diet of tribals of Madhya Pradesh. Iron deficiency has also been recorded among females in the study area. The lower intake of green leafy vegetables is the main reason of lower iron intake in the daily diet.

(ii) Calcium: Calcium is the most important inorganic element of the body for a number of reasons: (i) the body contains more of it than of any other mineral element. (ii) It is essential for the structure of bone and teeth, (iii) It catalyses reactions which result in contraction of muscles and conduction of nervous impulses (Irving, 1957). Calcium is found abundantly in milk, cheese, and green leafy vegetables. Children need relatively more calcium for the growth and development of their body. Expectant and nursing mothers also require higher amount of calcium. The daily intake of calcium is 36.6 per cent lower than the recommended daily requirement (900 mg) among the tribals of the State. Milk, cheese and some other animal foods are the main sources of calcium. The tribals are unable to take some of these foodstuffs in sufficient quantity in their daily diet

Vitamins: Many of the vitamins are needed only in very small amount, yet vitamins play a vital role in the body. Vitamins work in various ways and are often closely related to each other in their reaction within the body (Anderson, 1967). The daily intake of vitamin A and B-complex is highly deficient, while the intake of vitamin C is less deficient among the tribals of the study area. The less deficiency of vitamin C may be because of the consumption of *amla* and other citrous fruits in the diet. On the other hand, the deficiency of vitamin A and

B-complex may be due to lower intake of green vegetables and other foodstuffs.

(i) Vitamin A (Carotene): Vitamins A helps in the normal growth of bones and teeth particularly in children and young people. In the absence of adequate intake of vitamin A, the outer lining of the eyeball loses its usual moist, white appearance and becomes dry and wrinkled. The redness and inflammation of the eye and gradual loss of vision may follow. Vitamins A are present in some animal foods like butter, ghee, milk, curd, egg-yolk and liver. The other sources are leafy vegetables and fruits such as mangoes, papaya and tomato. Generally the greener the leafy vegetables, the higher would be the vitamins A content. About 50 grams of the common leafy vegetables in a diet will furnish adequate amount of this vitamin. The daily intake of this vitamin is 46.7 per cent lower than the recommended requirement (1.5 mg). The deficiency of this vitamin is due to poor intake of butter, ghee, milk, curd, papaya, etc. among the tribals. The absence of green leafy vegetables is also a factor of vitamin A deficiency in this region. The problem is more serious in the rural parts and far off villages.

(ii) Vitamin B_1 (Thiamine): Vitamins B complex includes thiamine, riboflavin, niacin, vitamin B_6, etc. Most of these B-complex vitamins work together for the benefit of the body. Without Vitamin B_1 (thiamine), the cells cannot utilize oxygen or fuel for energy and nervous system cannot function properly. Prolonged deficiency of thiamine leads to a disease in the form of neuritis and general weakness called *beriberi*. This deficiency causes sub-normal growth and poor appetite in children. In adults vitamin B_1 deficiency is responsible for the constipation. With this condition frequently go headache, lack of stamina, and chronic fatigue (Borsook, 1941, p. 62). Main source of thiamine is outer layers of rice, wheat and other cereals. The average per capita per day intake of thiamine among the tribals is 23 per cent lower than the recommended requirement (1.3 mg). The deficiency of this vitamin is the result of lower intake of groundnut, vegetables, milk, etc.

(iii) Vitamin B_2 (Riboflavin): Riboflavin is the next member of the vitamin B-complex. The deficiency of riboflavin in the daily diets my cause loss of hair, soreness of lips and tongue. The main source of this vitamin is green leafy vegetables, fish, milk, and egg. Wheat, millets and pulses are also good source of riboflavin, but rice is particularly poor source of this vitamin. Almost as important as milk and egg as source of riboflavin are the green leafy vegetables. Soyabeans are also a very rich source of this vitamin. The average daily intake of this vitamin is 37.7 per cent lower than recommended requirement (1.4 mg). The lower availability of green vegetable is the main cause of lower intake of this vitamin in the daily diet of tribals. The very low intake of soyabeans in the daily diet is also a factor of riboflavin deficiency in this region.

(iv) Vitamin C (Ascorbic acid): This is the great healing vitamin of the body. This vitamin cannot be stored in the body therefore it must be taken daily. Vitamin C is usually found in fresh fruits and vegetables. *Amla* is very rich source of vitamin C and it is a very cheap and common fruit in the study

area. The average intake of this vitamin is 4.3 per cent lower than the recommended requirement (49 gm). The deficiency of this vitamin is negligible in the tribal parts of Madhya Pradesh.

Gender Differentials

(Table 1.1; col 7 & 8)

The diet of tribal females in rural areas as wells as urban centres is recorded inferior in comparison to the diet of tribal males. As a family tradition the children take their food first, followed by males and then females. Therefore, many times the females have to take the remaining insufficient food. Even during their pregnancy period tribal females get insufficient food both in terms of quantity and quality. The deficiency of all the nutrients has been recorded both among males and females in the tribal parts of the State, but the deficiency is higher among tribal females than males.

The caloric deficiency is 1.5 per cent higher among females (18.4%) than males, (16.9%). The deficiency of proteins, fats, iron, and calcium are higher among females in comparison to males. It is evident from the facts that protein deficiency is 4.1 per cent higher among females (45.3%) than males (41.2%). The fat deficiency is 17 per cent higher, iron deficiency is 8.4 per cent higher and calcium deficiency is 11.5 per cent higher among females than males. The deficiency of vitamin A (40%) and vitamin B-complex (thiamine and riboflavin) is similar among males and females, while, vitamin C deficiency is higher among males than females in the study area.

Rural-Urban Differentials and Intake Status

The deficiency of all the nutrients among tribals has been recorded both in rural and urban centres of the tribal regions. But, average intake of calories, proteins, fats, carbohydrates, calcium, vitamins A and vitamin B-complex is relatively higher in urban centres; therefore, the deficiency of these nutrients is lower in urban centres in comparison to rural areas (Table 1; col 9 & 10).

Moreover, the caloric deficiency is 7.9 per cent higher in rural areas, than that of the urban centres. In rural areas very high deficiency is recorded in proteins (41.7%), fats (71.7%), carbohydrates (35.1%), vitamin A (40%) and vitamin B_1 (23.1%). While in urban centres a very high deficiency is recorded in terms of proteins (44.8%), fats (71.7%), iron (25%), and vitamin B_1 (46.7%). The very high nutritional deficiency among tribals of rural areas is because of lower development of food resources, while in urban centres lower nutritional deficiency is the result of lower purchasing power of an average family.

Nutritional Intake among Tribal Children

The food requirements of children are lower in terms of quantity, but must be rich in vegetables, fruits, milk for the growth and development of their body. The average diets of the tribal children are deficient in many foodstuffs. It is deficient in milk, vegetables, fats, sugar and flesh foods. The children get a very little amount of green& leafy vegetables, which are the main source of vitamins and minerals. The nutritional intake among tribal children both in rural and urban areas is inadequate in respect of

Table 2: **Nutritional Status: Children (R/U) and Income Differentials**

Nutrients		Requirement			Intake Status %			
					Children R/U Differentials		Income Differentials	
Groups	Units	Person	Male	Female	Rural	Urban	High	Low
1	2	3	4	5	6	7	8	9
Energy	Cal	2400	2400	1900	-34.2	-31.3	-13.8	-35.8
Proteins	grams	60	65	55	-39.3	-38.1	-38.5	-49.5
Fat	grams	60	60	60	-84.8	-80.7	-49.5	-82.8
Carbohydrates	milligrams	600	600	605	-31.9	-16.3	-18.3	-38.9
Iron	milligrams	24	24	24	-32.5	-40.4	-29.6	-41.7
Calcium	milligrams	900	900	900	-20.4	-19.5	-20.4	-31.4
Vitamin-A (Carotene)	milligrams	1.5	1.5	1.5	-40	-33.3	-33.3	-46.7
Vitamin-B1 (Thiamine)	milligrams	1.3	1.3	1.3	-38.5	-30.9	-23.1	-38.5
Vitamin-B2 (Riboflavin)	milligrams	1.4	1.4	1.4	-35.7	-35.7	-35.7	-42.9
Vitamin C	milligrams	49	49	49	-17.3	-23.7	-17.8	-23.7

all the nutrients. The deficiency of energy, proteins, fats, carbohydrates, and vitamins is higher in rural areas than in urban centres. The deficiency of iron, calcium and vitamin-C is higher in urban centres.

Nutritional Intake among Tribal Children, Madhya Pradesh, 2001

(Table 1.2; col. 6 & 7)

In rural areas, the deficiency of fats (84.8%), Iron (32.5%), Vitamin-A (40%), is very high. The deficiency of energy (34.2%), proteins (39.3%), carbohydrates (31.9%), thiamine (38.5%), and riboflavin (35.7%) is moderate to high. While the deficiency, of calcium (20.4 %) and vitamin-C (17.3%) is relatively low in these areas. The very high deficiency of fats and vitamin-A is the result of lower availability of milk products, oilseeds and green leafy vegetables. The similar pattern has also recorded in urban centres. The deficiency of fats (80.7%) and vitamin C (23.7%) is very high. The deficiency of energy (31.3%), proteins (38.1%), iron (40.4 %), vitamin-A (33.3 %), thiamine (30.9%) and vitamin B-complex is moderate to high. While the deficiency of carbohydrates (16.3%) and calcium (19.5%) is relatively lower among the tribals children of urban centres. The relatively inferior diet among the children of rural areas is the result of lower development of food resources, while in urban centres the purchasing power of tribals is relatively high and therefore the level of deficiency is lower in urban centres.

Economic Status and Nutritional Intake

(Table 1.2; col. 8 & 9)

There is direct correlation between the economic status of a family and the diet of the

family members. It is the purchasing power, which influences the food habits, food consumption system and general health conditions of people. Food consumption is higher among the people of high-income group than that of the low-income group. Generally families of the high-income group consume less quantity of cereals and higher quantity of vegetables, milk, fruits and flesh foods, while the families of the lower economic status consume more quantity of cereals and less quantity of other foodstuffs.

Though, the diet is deficient in both the income groups, the diet of low income group is very much deficient in all the nutrients. The daily diet of high-income group is better than that of the low-income group of tribals in the State. It is evident from the facts that the deficiency is very high in terms of fats (82.8 %), iron (41.7%), proteins (49.5%), vitamin A (46.7%), and riboflavin (42.9%) among the tribals of low-income group. A moderate deficiency is recorded in terms of calcium and vitamin C among the tribals of low-income group. On the other hand, tribals of high-income group have recorded little deficiency in terms of calories (13.8%), carbohydrates (18.3%), and vitamin C (17.8%). A moderate deficiency is recorded in terms of iron (29.6%),and calcium (20.4%). While higher deficiency is recorded in terms of fats (49.5%), proteins (38.5%), carotene (33.3%), thiamine (23.1%) and riboflavin (35.7%).

Conclusions

1. The diet of the tribals of the study area is deficient in quantity. The average intake of calories among tribals (1642 calories) is 31.6 per cent lower than the recommended requirement of 2400 calories per capita per day. They are taking only 68.4 per cent of the minimum required calories.
2. The average intake of proteins among tribals (35 g.) is 25 per cent lower than the requirement. The average daily intake of fats and oils is only 16 grams, which is 73.3 per cent lower than the requirement. The intake of iron (17 mg) is 29.2 per cent lower than the requirement. Iron deficiency has also been recorded among females in the study area. The lower intake of green leafy vegetables is the main reason of lower iron intake in the daily diet. The daily intake of calcium (571 mg) is 36.6 per cent lower than the daily requirement.
3. The daily intake of vitamin A and B-complex is highly deficient, while the intake of vitamin C is less deficient among the tribals.
4. The nutritional intake among tribal children both in rural and urban areas is inadequate in respect of all the nutrients.
5. The deficiency of all the nutrients has been recorded both among males and females, but the deficiency is higher among tribal females than males. This deficiency has been recorded both in rural and urban centres of the tribal regions. Moreover, the diet is deficient in both the income groups in terms of all the nutrients, the diet of low income group is very much deficient.

References

Anderson, C.R. (1967): *Your Guide to Health*. Poona: Oriental Watchman Pub. House.

Borsook, H. (1941): *Vitamins: What They Are and How They Can Benefit You*. New York: The Viking Press.

Dube, R.S. and Mishra, R.P. (1984): Evaluation of Foodgrain Availability in India: An Alternate Approach, *The Asian Geographer*, Vol. 3.1, pp.51-67.

FAO (1957): Factors Influencing the trend of food consumption, *The State of food and Agriculture*, Rome, pp. 72 –73.

FAO (1957): *Caloric Requirement*, Nutritional Studies No. 15. Rome: Food and Agriculture Organization of the United Nations.

FAO and WHO (1957): *Energy and Protein Requirements*. Rome: Food and Agricultural Organizations of the United Nations, Vol. 1& 2.

Gopalan, C., Ramasastri, B.V. Balasubramaniam, S.C. (1980): *Nutritive Value of Indian Foods*, Hyderabad: National Institute of Nutrition (ICMR).

Irving, J.T. (1957): *Calcium Metabolism*. London: Methuen& Co.

Leveilli, G.A. (1975): Tissues in Human Nutrition and their probable impact on Foods of Animal Origin. *Journal of Animal Science*, Vol. 41, p. 733.

McHenry, E.W. (1957): *Basic Nutrition*. Philadelphia: J.B. Lippincott company.

Mishra, R.P. (1984): Nutritional Availability Patterns in Madhya Pradesh, *Transactions, Institute of Indian Geographers, Vol.*6:2, pp.79-89.

Mishra, R.P. (1985): Nutritional level in a Rural Settlement of Madhya Pradesh, *Geographical Review of India*, Vol. 47.1, pp. 48-51.

Mishra, R.P. (1988): Regional Disparities in Caloric Availability in Madhya Pradesh, *National Geographer*, Vol. 23:2, pp. 27-33.

Mishra, R.P. (1989): *Population and Food Supply in Madhya Pradesh*. New Delhi: Northern Book Centre.

Mishra, R.P. (1990): Spatial variations in the Vitamins Availability in Madhya Pradesh, *Indian Journal of Landscape System and Economic Development*, Vol. 13: 1.

Mishra, R.P. (2002): Increasing Pressure of Population on Food Resources in Madhya Pradesh, *The Deccan Geographer, Vol.40: 1, pp.65-74.*

Mottram, V.H. (1968): *Human Nutrition, London*: Edward Arnold.

Patwardhan, V.N. (1960): *Dietary Allowance for Indians : Calories and Proteins*. Special Report No. 35. New Delhi : Indian Council of Medical Research.

Shafi, M. (1960): *Land utilization in Eastern Uttar Pradesh*. Aligarh.

Shafi,M. (1960): Food Production Efficiency and Nutrition in India, *The Geographer*, Vol. 14, pp. 23-27.

Sherman, H.P. (1945): *The science of Nutrition*. New York: Columbia press.

Sherman, H.C. and Lanford, C.S. (1957): *Essentials of Nutrition*. New York: The Macmillan Company.

Sukhatme, P.V. (1962): The food and Nutrition Situation in India, part –I. *Journal of Indian Society of Agricultural Statistics*, Vol. 19, No. 1&2, pp. 49-87.

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