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Food, Nutrition and Morbidity: Some Observations Among Four Tribal Groups of South India

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ABSTRACT It is an established fact that the socio-economic condition of a community determines the quality a diet and consequently the morbidity pattern of the community. This article is based on a socio-economic and diet survey among four tribal groups namely Jatapu, Savara, Gadaba and Kondadora inhabiting in two agency blocks of Vizianagaram district, Andhra Pradesh of South India. These tribals are mainly agriculturists and labourers and they follow the traditional method of cultivation which results in poor production. The diet intake also show a deficiency in nutrition among pre-school children, and the women are deficient in B- carotene vitamin C and riboflavin. The morbidity data indicates that scabies, dermatitis, infection and infestation are the major health problems the area.

INTRODUCTION

One of the major factors determining nutritional status of any community is the food consumption which is influenced by a wide range of factors like agro-climatic differences, foods grown and the socio-economic condition of the community. The dietary pattern of aboriginal tribes of India living under various agro-climatic conditions in different isolated regions may vary widely. Studies on various tribal population of India reveals that the diet of majority of the tribal population are nutritionally deficient (Sengupta, 1980; Sharma, 1971; Rao and Satyanarayana, 1974). In light of this, the present study was undertaken to analyse the socio-economic condition, dietary situation, and morbidity pattern of tribals of Vizianagaram district, Andhra Pradesh, India. For the analysis of dietary pattern only women and preschool children were considered.

AREA AND METHODOLOGY

Vizianagaram district in Andhra Pradesh, India having 1.53 lakh tribal population was selected for the present study. The study was conducted in the two agency blocks of the district namely Bhadragiri and Pachipenta where the tribal population of the district is concentrated (Fig.1). Several tribes live in these two blocks. Four major tribes namely Jatapu, Savara (from Bhadragiri block), Kondadora and Gadaba tribes (from Pachipenta block) were selected on the basis of the concentration of the various tribes (obtained from 1981 records of the *Panchayat Samithis*).

For information on actual dietary intake of tribal women of child bearing age (15-45 years) and preschool children (1-6 years), fifty five women from each of Jatapu and Savara tribes and thirty women from each of Kondadora and Gadaba tribes and fifteen children from each of the four tribes were selected at random. Age of the children was assessed with the help of local event calender.

Collection of Dietary Information

The dietary survey was conducted in 1984 during the months September-October when the availability of foods was at maximum. Informa-

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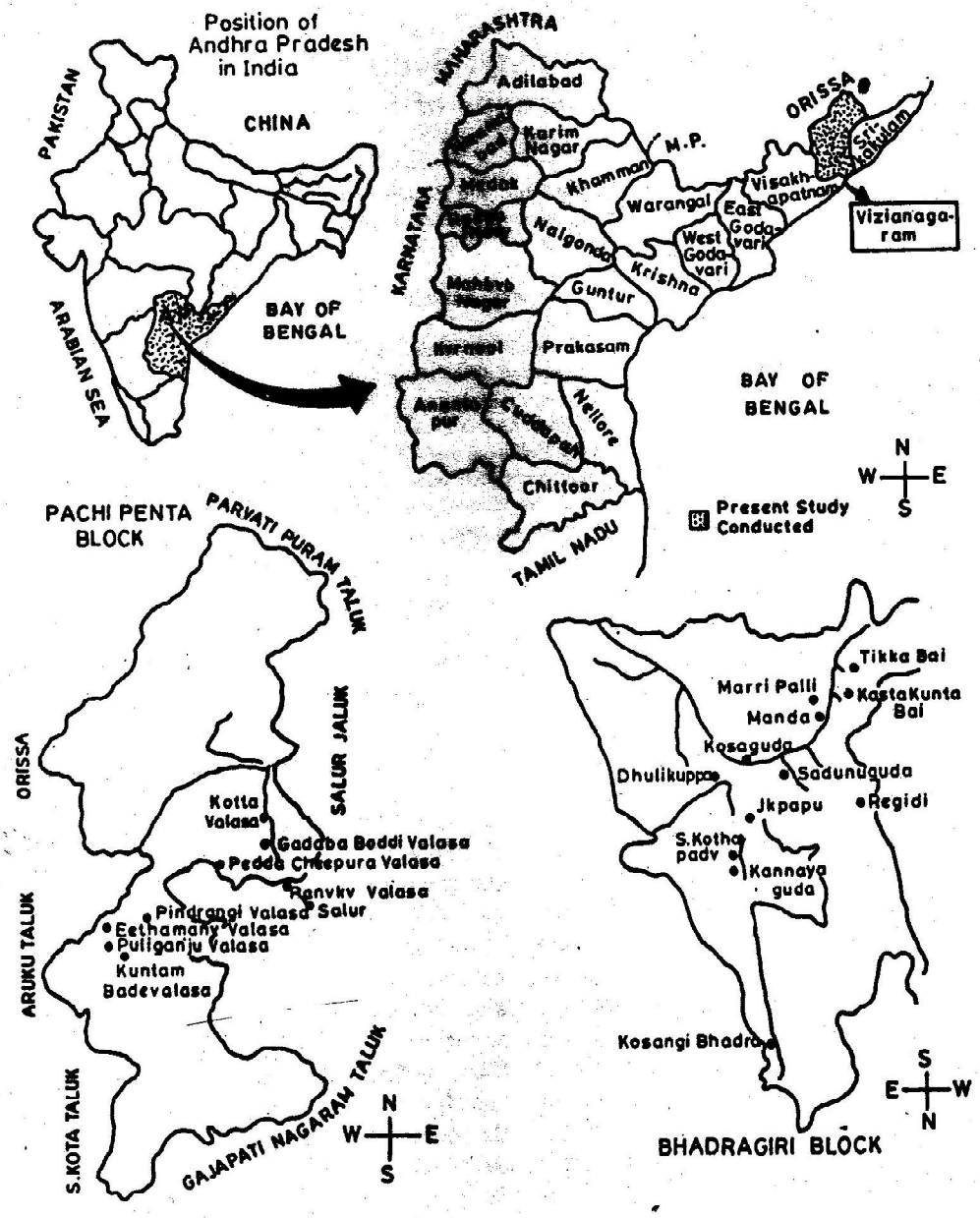
Position of Andhra Pradesh in India
PAKISTAN
CHINA
ARABIAN SEA
BAY OF BENGAL
MAHARASHTRA
KARNATAKA
M.P.
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Adilabad
Karim Nagar
Khammam
Warangal
Nalgonda
Krishna
Guntur
Prakasam
Nellore
Chittoor
TAMIL NADU
Visakh-apatnam
Sri-kakulam
Vizianaga-ram
East Godavari
West Godavari
BAY OF BENGAL
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Present Study Conducted
PACHI PENTA BLOCK
PARVATI PURAM TALUK
SALUR TALUK
ORISSA
ARUKU TALUK
S.KOTA TALUK
GAJAPATI NAGARAM TALUK
Kotta Valasa
Gaddaba Beddi Valasa
Pedda Chepura Valasa
Ranvkv Valasa
Pindrangi Valasa
Salur
Eethamany Valasa
Puliganju Valasa
Kuntam Badevalasa
Tikka Bai
Marri Palli
KastaKunta Bai
Manda
Kosaguda
Dhulikuppa
Sadunuguda
Jkpapu
Regidi
S.Kotha padv
Kannaya guda
Kosangi Bhadra
BHADRAGIRI BLOCK

Fig. 1

tion on the total quantity of the foods both raw and cooked for the whole family was noted using a set of standardized vessels. The individual intake of cooked portion by the women and pre-school children was recorded using the standardized vessels. The food intake data was collected on three consecutive days. From the above data, the raw amount of foods taken by an individual was calculated using the formula:

$$\text{Amount of raw foods consumed by the individual} = \frac{\text{Total raw quantity of food used for preparation for the family}}{\text{Total cooked quantity of the food}} \times \text{Individual intake of the cooked portion}$$

Having thus known the amount of raw foods consumed by the individual, the intake of nutrients from the diets was calculated using food composition tables obtained from actual nutrient analysis of the foods consumed by the tribals (Rajyalakshmi, 1986). However, in calculating nutrients for perishables-vegetables and flesh foods which were not analysed, the values of Indian foods published by Gopalan et al. (1981) were used.

Morbidity data for one year period from January, 1983 to January, 1984 was obtained from the records of primary health centres in the two blocks.

SOCIO-ECONOMIC CONDITION

The four major tribes Jatapu, Savara, Kondadora and Gadaba have their own dialect while also they speak Telugu with a local accent. The tribes lead a simple life. Both young and old irrespective of sex enjoy smoking and drinking home made liquors. The Jatapus in Bhadragiri block are considered superior to the Savaras. Jatapus usually live in plain areas whereas Savaras mostly inhabit hilly areas and are hard working. Marriages between the two tribes are uncommon. Kondadora tribe in Pachipenta block live on hilly areas and Gadabas mostly inhabit plain areas and are mostly non-agriculturists unlike the other tribes. The dietary habits of the tribals irrespective of their tribal affiliation were observed to be similar.

Occupation

Agriculture is found to be the primary occupation of majority of the tribal families and agricultural labour to be the secondary occupation (Table 1) indicating that the tribal economy is mainly based on agriculture and the allied labour. Gadaba tribe, however is an exception in that, majority of them are found to be non agriculturists. They earn their living by stone cutting or agricultural labour, depending on the season. It is learnt that their ancestors were basically agriculturists but the lands were taken away by money lenders when they failed to repay the debt.

Table 1: Occupational distribution of the tribal families

Occupation	*Jatapu*	*Savara*	*Gadaba*	*Konda-dora*	*Total*
agriculture as primary and agricultural labour as Secondary	62	71	30	71	234(78)
Non-agricultural labour as primary and agricultural labour as secondary	6	4	45	4	59(20)
Government employment as primary and Agricultural as secondary	7	-	-	-	7(2)
Total	75	75	75	75	300(100)

Values in parenthesis represent percentages

Another striking feature observed from the table is that tribals engaged in government jobs form only a small per cent. The nature of the jobs they were employed in are as cooks and watchmen in *ashram* schools or in government offices. This reflects the low educational levels of the tribals. The per cent literates in tribals of Vizianagaram district is reported to be only 7.98 per cent

(Bureau of Economics and Statistics, Government of Andhra Pradesh, India 1981-82). The forest produce available include *Adda* leaf and seeds *(Bauhinia vahilli)*, tamarind *(Tamarindus indica)*, mahuva flowers *(Bassia latifolia)* and marking nut *(Semecarpus anacardium)* and some are of the medicinal importance like Nux vomica *(Strychnos Nux-vomica)*, Patpal garidi *(Rawulfia serpentina)*, Karakkai *(Myrobalan)* etc. No particular information is available on the economic contribution of the forest produce collected by these tribals and it is difficult to get correct information on income from forest produce.

Land Holding

As is seen from table 2, tribals of Vizianagaram district practice both *podu* and settled cultivation. Wherever small streams are passing through, they build bunds with stones and divert water to their fieds and cultivate paddy. This is known as terrace cultivation. However, tribals prefer *podu* cultivation as it means less work and no use of cattle. Moreover, cultivation of more number of crops is possibe with *podu* as compared to plain cultivation. Therefore, the recent concern of the government to wean them from *podu* cultivation may be successful only through providing them proper incentives and practical approach to the problem.

Table 2: Type of land holding of the tribal families

Tribes	*Hill (Shifting Cultivation)*	*Dryland (Settled) Cultivation*		*No land Cultivation*
		Own	*Leased*	
Jatapu	53	48	1	6
Savara	69	53	-	4
Gadaba	10	20	10	45
Kondadora	58	53	-	4
Total No. of families	190(63)	174(58)	11(3)	59(20)

Values in parentheais represent percentages

Cropping Pattern

Mixed cropping pattern is practiced in *podu* cultivation. The seeds are broadcast on the cleared land and attended to only at the time of harvest. Relay cropping pattern is followed in dry and agriculture, paddy is grown both on hill and in plains where irrigation facilities are available. The major crops grown are paddy, sorghum, *bajra, ragi* and minor millets *viz.*, Ooda *(Echnichloa frumentacea)*, Korra *(Setaria italica)*, Arika *(Paspalam scrobiculatum)*, Sama *(Panicum miliare)* and pulses redgram, horse gram and cowpea. Apart from the common crops, the tribals also produce less common cereal-like grain namely rajkeera seeds *(Amaranthus paniculates)* and less known legume crops *dukka chikkudu (Mucuna pruriens)* and Judumulu *(Vigna sp.)*. Cash crops tobacco, turmeric, castor, niger, sesame and groundnut are grown by the tribals. They also gorwn by the tribals. They also grow vegetables like brinjal, beans, gourds, pumpkin both in fields and in the backyards of their houses.

Although diverse food crops are grown by the tribals, the crop yields in *podu* cultivation ranged from 2 to 15 quintals and 3 to 100 quintals per hectare in dryland cultivation. While encouraging cultivation of cash crops to improve their economy, care is needed in that it should not be allowed to be taken up at the expense of staple food crops as it affects food consumption.

FOOD STORAGE PRACTICES

Period of Storage

It is evident from table 3 that majority of the tribals (78%) stored food grains for one to six months and a small number (15%) stored for an year and 7 per cent did not store any grain which indicates that the grain yields are poor.

Method of Storage

Tribals store the food grains both for consumption and seed purposes. Earthenware pots are used mainly for storage of food grains by 76 per

Table 3: Period of storage of food grains by the tribal families

Tribe	Period stored		No storage
	1 year	1-6 months	
Jatapu	7	68	-
Savara	15	60	-
Gadaba	-	55	20
Mondadora	22	53	-
Total	44(15)	236(78)	20(7)

Values in parenthesis represent percentages

Table 4: Methods of Storage of grains by the tribal families

Tribe	Earthen-ware pots	Baskets	Gunny bags
Jatapu	72	3	-
Savara	75	-	-
Gadaba	19	55	1
Kondadora	63	10	2
Total	229(76)	68(23)	3(1)

Values in parenthesis represent percentages

cent of the tribals and 23 per cent stored in baskets (Table 4). Sundrying is the usual pretreatment adopted before storing of food grains.

Consumption of Staples

It is seen from table 5 that millet is the staple food for 55 per cent of the tribal families and only 14 per cent consumed rice as staple food. Rice in combination with millets is consumed by 31 per cent of the tribal families. Cereal grains are consumed mostly in gruel form and the bulk density of their diets was found to be low.

Food and Nutrient Intake of Women

The food and nutrient intake of the tribal women are presented in tables 6 and 7.

It is seen from table 6 that the intake of staple grains by the tribal women as nearly adequate but the consumption of pluses/oilseeds met about half that of RDA. The cereal to pulse ratio was 17:1 as against the ideal ratio of 7:1 recommended by ICMR (1981). Inspite of production of pulses by the tribals, consumption is low because the tribals sell away the pulses in purchase of staple food item or to meet any incidental expenses. In addition, tribals being ignorant are exploited by middlemen who try to procure pulses from the tribals for a low cost. Therefore, it seems that it is not awareness or availability that limits pulse consumption but their poor economic condition.

In cereal pulse based diet the first limiting amino acid is not lysine but the sulphur containing amino acids (Srikantia, 1984). Since the tribals are habituated to consume cereal with gingelly seed cake product the consumption of it will complement the deficiency of methionine, a sulphur containing amino acid in their cereal based diets. However, the health implications in terms of the inadequate and improper oil extraction procedure with country ghani should not be overlooked as the high oil content of the gingelly cake product affect shelf life of the product. Steps should be taken to improve the quality of the product and its shelf life with improved oil extraction techniques.

Cultivation of vegetables is the common practice with almost all the tribals. Vegetables commonly grown by them are yellow pumpkin, legume vegetables, gourds and beans. In addition, tender bamboo shoots and mushrooms available from August through October are also consumed in plenty. Though tribals cultivate roots like yam, colocasia its consumption is limited and consumption of wild tubers available in the forests is also seem to be on the decline probably due

Table 5: Staple grain consumption by the tribal families

Staple grains	Jatapu	Savara	Gadaba	Konda-dora	Total
Millet alone	31	59	38	37	165(55)
Rice and millets	22	8	31	32	93(31)
Rice alone	22	8	6	6	42(14)
No. of families	75	75	75	75	300(100)

Values in parenthesis represent percentages

able 6: Food intake of the tribal women

oods (g)		Jatapu N = 55	Savara N = 55	Gadaba N = 30	Kondadora N = 30	Mean	% RDA[1]
ereals/Millets		42.7	430	430	429	429.7	97.7
	SD	49.7	60.9	49.7	35.4		
ulses/Oilseed cake		32	-	33	35	25.7	55.5
	SD	17	-	20	20		
reen leafy vegetables		100	60	-	-	47.5	47.5
	SD	50	20	-	-		
egetables		98	116	120	117	112.7	281.6
	SD	18.5	28	40	24.6		
oots		29	-	30	32	22.7	45.5
	SD	15.3	-	20	21		
lesh foods		25.6	10	25	26.2	19.2	64.0
	SD	8.14	2	7.5	8.7		

. ICMR (1981): Recommended Dietary intakes for Indians, New Delhi

Table 7: Nutrient intake of the tribal women as compared to the recommended deitary allowances

Nutrients		Jatapu N = 55	Savara N = 55	Gadaba N = 30	Kondadora N = 30	Mean	% RDA met[1]
Energy (Kcal)		1722	1736	1724	1735	1729	78.7
	SD	160	150	168	170		
Protein (g)		47.4	40.4	48.8	48.0	46.2	102.6
	SD	8.1	7.8	12.5	10.8		
Calcium (mg)		1159	1199	56	66	620	137.7
	SD	52.8	54.5	10.0	11.0		
Iron (mg)		56.6	42.4	39.6	39.4	44.6	139.4
	SD	5.2	8.2	.2	5.2		
B-carotene (µg)		1159	1199	55.9	66.1	620	20.6
	SD	270	280	10.0	12.0		
Vitamin C (mg)		20.5	30.9	20.1	19.9	20.3	50.8
	SD	8.20	8.40	5.20	5.20		
Thiamine (mg)		1.02	1.45	1.51	1.41	1.35	122.4
	SD	0.160	0.220	0.250	0.340		
Riboflavin (mg)		0.791	0.767	0.853	0.919	0.832	64.0
	SD	0.13	0.22	0.05	0.10		
Nicacin (mg)		11.63	11.07	16.42	16.3	15.15	92.4
	SD	2.80	3.20	4.80	4.50		

1. ICMR (1981): Recommended dietary intakes for Indians, New Delhi

to the strenuous and elaborate process of searching, digging and processing involved prior to their consumption.

Though rearing of domestic animals like cattle, poultry, pig etc. is common with the tribals, they do not sacrifice them for meat purpose except on special occasions like marriages, festivals etc. Though poultry rearing is a common practice, consumption of eggs is almost nil as they are used mainly to rear chickens which are sold for money. It is evident from table 6 that the consumption of milk and milk products, sugar, jaggery, fats

and oils, spices and condiments are almost nil in their daily diets, which may reflect their tradition and/or poor socio-economic condition.

Nutrient intake by the Tribal Women

From the nutrient intake data (Table 7) it can be seen that the intake of calories met seventy nine per cent RDA and the calorie gap is due to low calorie density of their diets (as they are habituated to consume cereals/millets in gruel form) and also due to inclusion of negligible amount of energy rich foods like fats, oils, sugar, roots etc. in their diets. However, if the consumption of millet beer (2 or 3 litres a day) by the tribals is considered in calculating the daily calorie intake, the calorie deficit of 600-700 Kcal is made good by the beer. However, it's adverse effects on health has more damaging effect than making up calorie gap. Though protein requirement seemed to be adequate, the major contribution of it was from cereals and in terms of complementary nutrition value adequate inclusion of pulses in their diets is necessary.

Table 8: Age of weaning the infants in the four tribes

Tribe		Percentage of the women who suggested	
		1 year	*1-2 years*
Jatapu	n = 75	96	4
Savara	n = 75	-	100
Gadaba	n = 75	33	67
Kondadora	n = 75	11	95
Total	n = 300	11	89

The requirement of B-carotene and vitamin C were met 20 to 50 per cent RDA respectively which is mainly attributable to low consumption of leafy vegetables and citrus fruits. Calcium and iron content in their diets found to be satisfactory. However, major contribution of the minerals was derived from whole gingelly seed cake product and since it contains also high amounts of oxalates, the availability of the minerals to the body is questionable.

Infant Feeding Practices

As it quite evident from table 8 infants are weaned late at 1-2 years and are directly weaned to an adult diet.

The diets of tribal preschool children are almost similar to that of adults in their diets (Table 9).

Food and Nutrient intake of Tribal Pre-school Children

It is found (Table 10) that not a single nutrient is adequately met and the nutrients-calcium, B-carotene, vitamin C were grossly deficient in their diets. Since the diets of the children can only be improved by overall improvement in the diet of the entire family, nutrition education to the mothers with emphasis on synergistic relation between sanitation and nutrition is essential.

Considering the quality of milk in terms of nutrients, tribals may be persuaded to consume milk and the techniques of milking the cow may be taught to them. Establishment of supplementary feeding programmes for the preschool children along with education to the mothers on proper child rearing practices and preparation of weaning foods with local foods will help to improve the dietary situation of tribal preschool children.

Morbidity

It is evident from the morbidity records (Table 11) that scabies and dermatitis are the major health problems in the tribal area followed by infection and infestation. The high incidence of skin diseases in the area reflect their poor personal and environmental hygiene. Since the effects of malnutrition and infection personnel are essential in the area. Apart from providing mobile health facilities, prevention aspect also needs spe-

Table 9: Food intake of the tribal pre-school children

Foods (g)		*Jatapu n = 15*	*Savara n = 15*	*Gadaba n = 15*	*Kondadora n = 15*	*Mean*	*% RDA*[1]
Cereals/Millets		230	240	235	232	234	105
	SD	33.1	12.4	17.3	14.9		
Pulses/Oilseed cake		10.6	-	10.7	12.3	8.4	24
	SD	5.8	-	7.5	7.6		
Green leafy vegetables		-	19.5	-	-	4.9	11
	SD	-	5.04	-	-		
Other vegetables		40	38	44.1	43.1	41.3	165
	SD	25.5	11.5	28.0	26.4		

1. ICMR (1981): Recommended dietary intakes for Indians, New Delhi

Table 10: Nutrient intake of the tribal pre-school children as compared to the recommended dietary allowance

Nutrients		*Jatapu n = 15*	*Savara n = 15*	*Gadaba n = 15*	*Kondadora n = 15*	*Mean*	*% RDA met* [1]
Energy (Kcal)		822	826	823	820	823	56.0
	SD	50	60	72	73		
Protein (g)		19.1	18.2	19.7	19.3	19.1	74.3
	SD	4.1	2.5	4.2	3.8		
Calcium (mg)		76.4	42.6	83.6	81.2	71.0	15.7
	SD	20	10	30	25		
Iron (mg)		16.2	17.3	13.1	13.0	14.9	66.2
	SD	2.1	2.9	4.0	3.8		
B-carotene (µg)		193	214	16.4	8.33	108	9.82
	SD	50	30	4.1	2.4		
Vitamin C (mg)		8.13	5.86	9.20	2.56	6.43	16.0
	SD	2.0	0.9	2.1	10		
Thiamine (mg)		0.253	0.393	0.626	0.606	0.469	62.5
	SD	0.09	0.02	0.08	0.10		
Riboflavin (mg)		0.235	0.198	0.280	0.258	0.242	28.4
	SD	0.03	0.04	0.09	0.08		
Niacin (mg)		3.666	3.6	6.6	0.25	4.89	51.4
	SD	0.7	0.5	0.2	0.25		

1. ICMR (1981): Recommended dietary intakes for Indians, New Delhi

cial attention. However, to get a clear picture of their health problems, a systematic epidemeological survey may prove to be quite useful.

SUMMARY

Majority of the tribals subsist on agriculture, though diverse food crops are grown by the tribals, the yields are poor. Efforts should be made to introduce latest agricultural technology with proper supply of incentives at appropriate time. Literacy rate of the tribals is very low. Non-formal education needs special attention in the tribal areas as it will help in exposisng them to outer world and thus make them more receptive. Millets are the major staple food of the tribals and their diet is monotonous lacking variety and bulk density. Scabies and dermatitis are their

major health problems. Preventive measures need special attention in the area. Intensive health education on importance of personal and environmental hygiene should be given to them and mobile health care centres will be of great help in facilitating the tribals living in remote areas to avail the health facilities.

Table 11: Incidence of morbidity during the year 1983 to 84

Ailments	*Number of cases registered*	*Per cent to the total registered cases in PHC*	*Per cent to the total population in the two Blocks*
Scabies/ Dermatitis	3311	37	3.578
Fever	1294	14	1.376
Gastric disorders	823	9	0.900
Bronchitis	670	8	0.700
B-complex deficiency	657	7	0.710
Anaemia	529	6	0.570
Diseases related to eye	527	6	0.570
Arthritis	507	6	0.550
Otitis	198	2	0.213
Malaria	145	2	0.154
Others	279	3	0.300
Total cases registered	8918	100	9.651

The poor dietary situation calls for nutrition consideration in agriculture production and nutrition education to mothers on proper selection of foods, child rearing practices along with efforts to improve their socio-economic conditions through appropriate income generating activities.

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