

Diet and Nutritional Status of Tribal Population in ITDA Project Areas of Khammam District, Andhra Pradesh

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ABSTRACT Tribal populations are socio-economically disadvantaged compared to other population groups. They have different health problems owing to the variability in their geographical, socio-economic development and cultural characteristics. At the request of the project officer, a cross sectional survey was carried out to assess the diet and nutritional status of tribal population in ITDA, Bhadrachalam in Khammam district of Andhra Pradesh. A total of eight hundred households in twenty villages from five *Mandals*, were covered for survey. The study revealed that a majority of the households were living in *kutch* houses. The major occupation of the head of the HH in a majority of the HHs was either agricultural labour or other labour. About 72% of the men and 88% of their women counterparts were illiterate. In general at household level, the average consumption of all the foods except cereals and millets were below the recommended level. The average intake of all the nutrients was lower than the RDA as well as the figures reported in NNMB tribal survey. The extent of deficit was highest with respect to vitamin A (83%), followed by riboflavin (64%), iron (59%), and total fat (47%). Protein calorie adequacy status revealed that about half of the HHs (52%) were consuming adequate amounts of both protein and energy, while about 21% were consuming inadequate amounts of both the nutrients. The prevalence of undernutrition ($<$ Median -2 SD of weight for age) among 1-5 years children were lower (65.4%) than that reported for the Tribes in the State of Andhra Pradesh (68.8%). Among the adolescents (12-17 years), about 45% of boys and 21% of girls were undernourished. The prevalence of Chronic Energy Deficiency (CED) among adults was about 51%. Breast-feeding practices revealed that majority of the mothers initiated breast-feeding with in 24hrs of delivery. About 76% of the children started receiving the complementary feeding from the age of 4-6 months. About 93% of children (12-24 months) were fully immunized and 90% received at least one dose of massive dose vitamin A during previous one year. However the study indicates the need to control the micro nutrient deficiencies through dietary diversification by promoting home gardening. Since the prevalence of morbidity was higher in this population, effort should be made to improve the environmental sanitation and personal hygiene.

INTRODUCTION

Tribal communities are isolated from general population and are socially and economically disadvantaged. In view of their habitat and dietary habits, they often distinguish themselves from other population groups. Their food consumption pattern is influenced by vagaries of nature and varies from extreme deprivation in lean season to high levels of intakes of several foods during post harvest period. Geographical isolation, primitive agricultural practices sociocultural taboos, lack of formal education, poor infrastructure facilities, improper health seeking behavior, poverty etc. leads to the development of various morbidities and undernutrition. To mitigate this, the Government of India has been implementing several programs

under Tribal sub-plan (TSP) approach for upliftment of the tribal populations. Areas having more than 50% Tribal population are covered under ITDA, while those with lesser concentrations are covered under modified area development approach (MADA).

Nutritional status of the population largely depends on the consumption of food in relation to their needs, which in turn is influenced by the availability of food and purchasing power. The socio-economic conditions like agricultural pattern and occupation profile are different among different tribes and are determined by the eco-system they live in (Hanumantha Rao, D., 1996). Several studies have shown a close relationship between the tribal eco-system and their nutritional status. The tribal populations are 'at risk' of undernutrition because of household food and nutrition insecurity.

Andhra Pradesh is the homeland of nearly 33 Tribal groups, accounting for 6.6% of the total population of the State (<http://www.Khammam.com>). However, most of the tribes are found inhabiting in higher concentrations in the districts

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of the north and northeastern parts of the State as well as States of Orissa, Maharashtra and Chattisgarh. The Khammam district has the largest tribal population among all the district of Andhra Pradesh, constituting 22% (5.59 lacks) of total population (25.6 lacks). The major tribes inhabit in the ITDA project area, Bhadrachalam include mostly Koyas, Lambadas and Konda Reddies.

Survey carried out earlier by the National Nutrition Monitoring Bureau (NNMB) among the Tribal population in the State of Andhra Pradesh (NNMB-2000) had revealed, that the overall prevalence of underweight (weight for age < Median-2SD) among preschool children was relatively higher (69%) compared to their rural counterparts (62%) (NNMB-1999). The repeat surveys showed that the prevalence of moderate to severe undernutrition (<75% of NCHS, weight for age) among preschool children in Andhra Pradesh decreased from 19.8% in 19985-87 to 9.6% in 1998-99 despite the fact that were no significant changes in the intake of food over period of time. This was attributed to probable improvement in their living conditions in general and health status, in particular.

At the request of the project officer, ITDA, Bhadrachalam, the National Institute of Nutrition (NIN) undertook a survey to assess health and nutritional status of the tribal population in the project area in that district during April- May 2005.

MATERIALS AND METHODS

Study Design: It was a cross sectional and community based study, carried out by adopting three stage stratified random sampling procedure. *Mandal* formed the first stage unit, village was second stage unit and households were third stage unit.

Sample Size: Assuming an overall prevalence of 69% of undernutrition (< median -2SD of weight for age) among 1-5 year children, with 95% confidence interval and 5% relative precision, a sample size of 335 children was arrived at. Generally, 1-5 year children constitute about 12% of the total population and therefore it was proposed to cover a total population of about 4000. Considering the average family size as 4, it was decided to cover a total of 1000 households, to get the required number of pre-school children.

From the 29 *mandals*, which were inhabited by tribes, five were randomly chosen. From each

of the selected *mandal*, four villages were selected randomly for the survey. Thus a total of 20 villages were selected in the district. From each of the selected village, a total of 40 contiguous households (HHs) were covered, starting from northeast corner of the village. Informed oral consent was obtained from the village leaders and heads of the concerned households, before carrying out the survey.

Investigations: Information on demographic and socio-economic particulars was collected from all the households selected for the survey. Height, weight and clinical examination for nutritional deficiency signs, and history of morbidity were collected on all the available individuals. One-day recall method of diet survey was carried out on every fourth household covered for household information. In addition, coverage of target beneficiaries under national programs and breast-feeding and child feeding practices among women was also collected in the households covered for diet survey

Analysis of Data: The average daily consumption of various foods and nutrients were computed per consumption unit (CU) at the household level using Food Composition Tables (Gopalan, C.1996) The average daily intake of foods were compared with Recommended Dietary Intakes for Indians (ICMR, 1981), while that of nutrients were compared with the Recommended Dietary Allowances for Indians (ICMR, 1988).

The percent distribution of children according to weight for age, height for age and weight for height according to Standard Deviation (SD) classification by using National Center for Health Statistics (NCHS) standards (WHO, 1983) was carried out. The 12-17 year children were categorized into various nutritional grades according to the age and sex specific BMI centile (NHANES) (WHO, 1995). Body Mass Index (Weight in kg/ height in metres²) was computed to assess the nutritional status of adult men and women using James et al classification (James, 1988).

The results of the present study were compared with the results of Andhra Pradesh Tribal survey (NNMB, 2000).

RESULTS

Coverage

A total of 802 households (HHs) from 20

villages were covered in the present study. A subsample of 203 HHs was covered for family diet survey. In addition, data on knowledge and practices of breast-feeding and complementary feeding was collected from 71 mothers of 0-3yr children. Nutritional anthropometry and clinical examination was carried out on 390 children of 1-5 years, 461 school age children, 257 adolescents (12-17 year) and 1559 adults. History of morbidity for the previous 15 days was also collected on all the individuals covered for anthropometry.

Household Demographic and Socio-economic Particulars: A majority (85%) of the households were living in *kutchha* houses, while only small proportion living in semi *pucca* (8%) and *pucca* (7%) houses. The proportion of households living in *kutchha* houses in the area surveyed were much higher (85%) compared to that reported by NNMB for the tribes (50%) in the State of Andhra Pradesh (NNMB, 2000) indicating relative backwardness of the tribes. About 72% were nuclear families, 17% were extended nuclear and 11% were joint families. About 56% of the families had < 5 members, 41% had 5-7 members and 3 percent had >8 members with overall family size of 4.6 per household (Table 1).

The major occupation of head of the household in a majority of the HHs was either agriculture labour or other labour (48%), followed by cultivation (44%). One fourth of the households had no land, about 41% were marginal farmers (<2.5 acres) and 20% were small farmers (2.5 - 5.0 acres) and 14% large farmers (≥5 acres). About 72 % of adult men and 88% of adult women were illiterate. The average per capita annual income was about Rs. 4,590/.

Household Food and Nutrient Intake: The average consumption levels for various foods (g/CU/day) by the households as per cent of RDI (ICMR 1981) for both the surveys are presented in Figure 1. The average intake of all the foods except cereals and millets (480g) was lower than the RDI. The extent of deficit was relatively more with respect to protective foods such as green leafy vegetables (90%) and milk and milk products (80%) and income elastic foods such as sugar and jaggery (83%) and fats and oils (70%). The average intake of cereals and millets, GLV, and sugar and jaggery, in the current survey were observed to be less than that reported for the tribes in Andhra Pradesh. The average daily

Table 1: Distribution (%) of households by Socio-economic Characteristics

Socio Economic Variable (n=802)	Per cent
<i>Type of House</i>	
Kutchha	85.1
Semi-pucca	7.9
Pucca	7.0
<i>Type of Family</i>	
Nuclear	72.3
Extended Nuclear	16.7
Joint	11.0
<i>Family Size</i>	
1-4	56.2
5-7	40.5
>=8	3.3
Average Family Size (n):	4.6
<i>Literacy Status of Adult Male</i>	
Illiterate	71.8
Read and Write	0.3
Primary	7.2
Upper Primary	12.4
Higher Secondary	7.6
College	0.7
<i>Literacy Status of Adult Female</i>	
Illiterate	87.5
Read and Write	0.0
Primary	3.8
Upper Primary	6.3
Higher Secondary	2.1
College	0.3
<i>Size of Land holdings (Acres)</i>	
Landless	25.2
Marginal Farmers (< 2.5)	40.5
Small Farmers (2.5 - 5.0)	19.8
Large Farmers (≥ 5.0)	14.5
<i>Occupation of the Head of the Household</i>	
Agriculture Labour	28.4
Non- agriculture Labour	19.6
Cultivators	43.7
Artisans	0.9
Service	3.0
Business	1.2
Others	3.2

consumption of alcoholic beverages was about 88 ml per CU / day. Locally brewed alcoholic beverages such as toddy, mohua liquor, and rice beer were consumed frequently.

Nutrient Intake: The median intake of various nutrients (per CU/day) by the households expressed as per cent RDA is presented in Figure 2. The intake of all the nutrients was lower than the RDA as well as the figures reported in NNMB tribal survey. The extent of deficit was highest with respect to vitamin A (87%) followed by riboflavin (64%), iron (66%), total fat (55%), and thiamin (50%). Except for vitamin C, the intake of all the other nutrients was much lower compared to their tribal counterparts of the State. The proportion of households consuming various

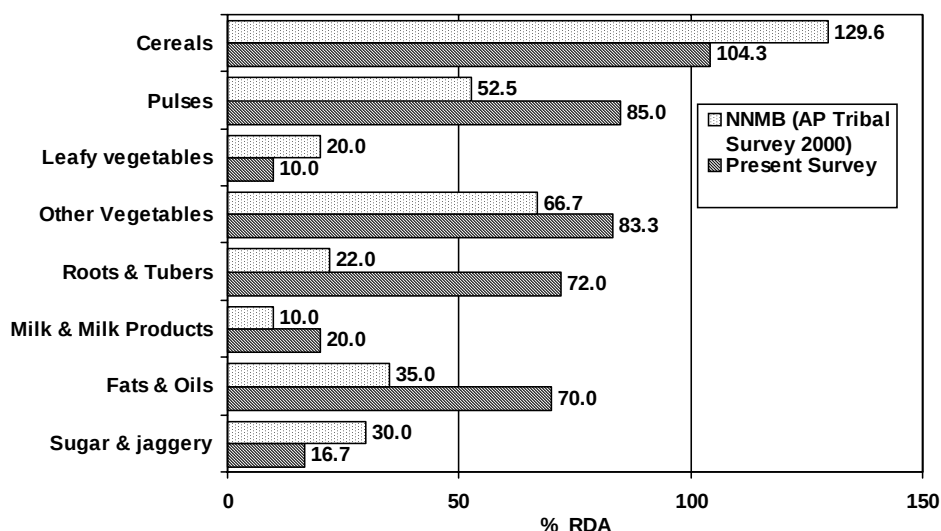


Fig. 1. Average food intake (g/CU/day) of households as % RDA

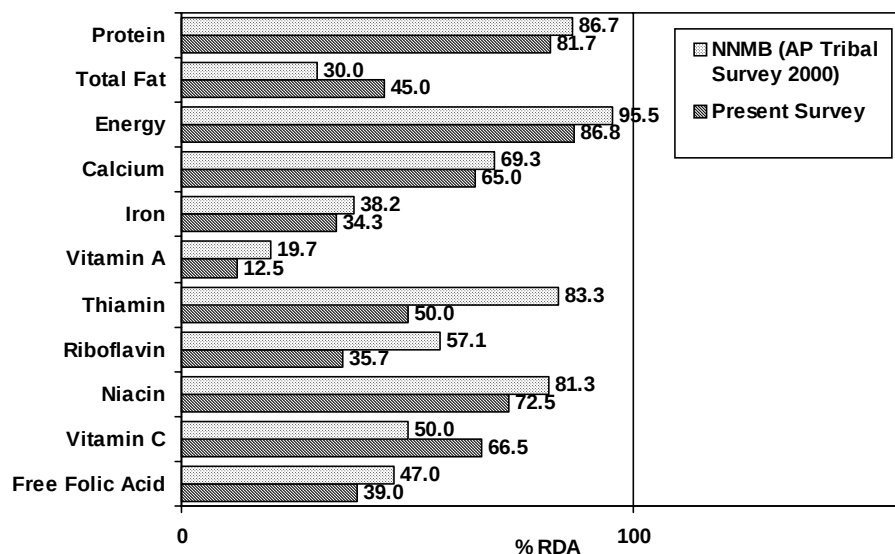


Fig. 2. Median nutrient intake of households (CU/day) as % RDA

nutrients in levels of < 50% of RDA was highest for vitamin A (95.6%), followed by Iron (76.8%), riboflavin (73.9%) and free folic acid (71.4%).

Protein - Calorie Adequacy Status of the Households: To determine whether a particular household was consuming adequate amount of protein or energy, Mean-2SE was used as cut-off, taking the total number of CU in the household as the sample size to calculate the

SE. If in a given household, the average daily intake of protein or energy (per CU) was found to be equal to or above this cutoff level, the household was considered as consuming adequate amount of that nutrient. About half of the households (52%) were consuming adequate amounts of both protein and energy (P+C+), while about 21% were consuming inadequate amounts of both the nutrients. The corresponding figures reported for

the tribes of Andhra Pradesh were, 71% and 12% respectively.

Nutritional Status

Prevalence of Clinical Signs Nutritional Deficiency: None of the infants examined exhibited signs of nutritional deficiency. The prevalence of severe forms of protein energy malnutrition such as kwashiorkor or marasmus among 1-5 year children was conspicuous by their absence. About 0.5% each of the preschool children had conjunctival xerosis and Bitot Spots, indicating vitamin A deficiency. Angular stomatitis, a sign of riboflavin deficiency was also observed among (1.5%) preschool children (Table 2).

Among school age children, the prevalence of conjunctival xerosis and Bitot Spots was 6.7% and 2.4% respectively. About 3% of the children had angular stomatitis, while 2% each had goitre and dental fluorosis. About 3% of the adolescents had conjunctiva xerosis and 0.8% had Bitot Spots. The prevalence of total goiter was about

3%, and that of dental fluorosis was 5.4%. Among adults the prevalence of goitre was 2.3%, while that of other signs was negligible.

Particulars of Morbidity: About 17% of the preschool children were reportedly sick during the previous fortnight. The common forms of morbidities were fever (12.6%), upper respiratory tract infections (6.7%), diarrhoea (1.7%) and measles (0.4%). Only about 5% of the adults reported sick during the preceding fortnight (Table 3).

Anthropometry

Preschool Children: The distribution of preschool children according to weight for age, height for age and weight for height by Standard Deviation (SD) classification are presented in Table 4. The prevalence of undernutrition among 1-5 year children is compared with the figures reported for the tribes in Andhra Pradesh (NNMB 2000).

About 65% of 1-5 year children, in general, had underweight (<Median -2SD weight for age). About 18% of children had severe underweight (<Median -3SD of weight for age), the proportion of which were lower than that reported for the tribes in Andhra Pradesh (28%). The overall prevalence of stunting (< Median -2 SD of Height for age) an indicator of long duration undernutrition was 46%, while that of severe stunting was (< Median -3 SD) 20%, as against 57% and 28% respectively reported for their counterparts of the State.

The overall prevalence of wasting, an indicator of acute undernutrition was 21.3%, which was lower than that reported for tribes of the State (26.7%). Only about 4% of the children had severe wasting.

Adolescents: Among the adolescents (12-17Yrs), about 45% of boys and 21% of girls were undernourished (< 5th BMI centile) indicating that a significantly ($p < 0.001$) higher proportion of boys were undernourished compared to girls (Table 5). Negligible proportion (<1%) of boys and girls had of obesity (³ 95th centile of BMI).

Adults: The overall prevalence of chronic energy deficiency (CED) among adult men and women was about 51%, which was significantly ($p < 0.01$) lower than that reported for the State (58%) (Table 6). The prevalence was significantly higher among women (58%) compared to men (41%). Only about 1% each of adult men and

Table 2: Prevalence (%) of Nutritional Deficiency signs *

Clinical signs	Age group (Yrs)			
	1-5	5-11	12-17	≥ 18
Number Examined	390	461	258	1558
Conjunctival Xerosis	0.5	6.7	3.1	0.0
Bitot spots	0.5	2.4	0.8	0.0
Angular stomatitis	1.5	2.8	0.8	0.6
Glossitis	0.0	0.2	0.0	0.4
Dental caries	0.0	2.6	0.8	1.5
Dental fluorosis	0.0	2.2	5.4	0.9
Goitre Gr I	0.0	2.0	2.3	1.8
Goitre Gr II	0.0	0.0	0.4	0.5
Total goitre	0.0	2.0	2.7	2.3

* Multiple responses

Table 3: Prevalence of morbidity in the population by age during previous fortnight

Morbidity	Age group (Yrs)				
	0-1	1-5	5-11	12-17	≥ 18
N	83	391	461	257	1559
None	85.5	83.4	93.7	97.6	96.9
Fever	9.7	8.2	4.8	1.2	2.1
Diarrhoea	2.4	2.3	0.2	0.4	0.5
Dysentery	0.0	1.0	0.0	0.0	0.1
ARI	2.4	5.1	1.1	0.8	0.4
Measles	0.0	0.0	0.2	0.0	0.0

Table 4: Distribution (%) of Preschool children according to Standard Deviation (SD) Classification

Indicator/Sex	N	< Median -3SD	Median -3SD to Median -2SD	Median -2SD and above
<i>Weight for Age:</i>				
Boys	199	18.6	47.2	34.1
Girls	191	16.8	48.2	35.0
Pooled	390	17.7	47.7	34.6
NNMB	1312	27.9	40.9	31.2
(AP Tribal survey 2000)				
<i>Height for Age:</i>				
Boys	199	20.6	27.6	51.7
Girls	191	19.4	25.1	55.5
Pooled	390	20.0	26.4	53.6
NNMB	1312	28.4	28.4	43.3
(AP Tribal survey 2000)				
<i>Weight for Height:</i>				
Boys	199	4.5	17.1	78.4
Girls	191	2.6	18.3	79.1
Pooled	390	3.6	17.7	78.7
NNMB	1312	4.6	22.1	73.2
(AP Tribal survey 2000)				

* NCHS standards

Table 5: Distribution (%) of Adolescents according to Body Mass Index (BMI) *

Sex	N	BMI Centiles		
		< 5 th Centile	5 th – 85 th Centile	≥ 85 th Centile
Boys	121	44.6	54.6	0.8
Girls	136	21.3	78.0	0.7
Pooled	257	32.3	66.9	0.8

*NHANES BMI Centiles
gender difference in BMI centiles (p< 0.01)

women had overweight/obesity.

Breast Feeding and Complementary Feeding Practices

Majority of the mothers (90%) interviewed reported that they initiated breast-feeding within 24 hours after delivery. About 20% of mothers reportedly gave liquids to the new born such as plain water (2.8%), sugar water (5.6%), honey (5.6%) and milk (4.2%) before initiating breast-feeding. Only about 14% of the mothers stated that they discarded colostrum, mostly on the elder's advice. About 76% of the children started

Table 6: Distribution (%) of Adults according to Body Mass Index (BMI)*

BMI class	Nutritional grade	Males	Females	Gender pooled	
				Current Survey	AP Tribal Survey (2000)
<16.0	CED III	4.3	13.9	9.9	12.8
16.0-17.0	CED II	8.7	15.1	12.4	15.0
17.0-18.5	CED I	28.0	29.5	28.9	30.4
18.5-20.0	Low Normal	30.0	19.5	23.9	24.8
20.0-25.0	Normal	28.3	20.5	23.7	16.5
≥25.0	Overweight/Obesity	0.8	1.4	1.2	0.5

Gender difference in BMI centiles (p< 0.01)

CED: Chronic Energy Deficiency*

in receiving the complementary feeding at the age of 4 - 6 months, while the remaining started getting the same during 7-12 months of age. The type of complementary foods commonly used was Rice/roti (85%), bread and biscuits (8%) and milk (7%). None of the mothers reportedly gave commercial baby foods to their children.

Coverage under Health and Nutrition Programs

Immunization: Children of 12-24 months covered for various immunizations during the first year of life, such as B.C.G., 3 doses of D.P.T/ Oral polio and Measles vaccination was assessed based on immunization cards/ statement of the mother. It was observed that about 93% of the children reportedly received all the immunizations/doses indicating complete immunization. About 7% reportedly did not receive measles vaccine, while 1.5% did not receive the third dose of D.P.T/Oral Polio. About 93 of women interviewed reportedly received tetanus vaccination during previous pregnancy.

Massive Dose of Vitamin A Administration: About 90% of children reportedly received at least one dose of Vitamin A during the previous 1-year. Only about 52% received stipulated two doses. About 93% of the women interviewed reportedly received tetanus vaccination during the previous pregnancy.

Iron and Folic Acid Tablets Distribution: Ninety percent of the women reportedly received iron and folic acid (IFA) tablets during pregnancy. However, only about 69% received more than 90 tablets. Of those who received the tablets, 65% consumed more than 90 tablets while 8%

consumed 60-90 tablets. The common reasons given by the women for non-consumption of IFA tablets during pregnancy included fear of side effects, belief that it may be harmful during pregnancy etc. Only about 31% of lactating women reportedly received IFA tablets.

Majority of (92-97%) the women received supplementary feeding provided by ICDS during pregnancy and lactation.

DISCUSSION

Tribal communities are relatively more vulnerable to food and nutrition insecurity compared to their rural counterparts. Studies carried out earlier by the National Institute of Nutrition among primitive tribal groups in different States of the country revealed that their socio-economic conditions and nutritional status are largely influenced by the eco-system (Hanumantha Rao et al., 1993, 1994).

Over the period, rapid changes are taking place in their lives in all its spheres. They are gradually understanding the concept of good health care practices and preventive and curative aspects of diseases. It has been observed that the tendency to use their knowledge of traditional practices to cure ailments is giving away, seeking modern medicare (Bhowmik, 2003). However, in some tribal societies, lack of treatment and poor health seeking behaviour still exists.

Studies carried out by National Nutrition Monitoring Bureau (NNMB) in different States revealed that, even though there has been marked decrease in prevalence of severe undernutrition over a period of three decades, the prevalence of overall undernutrition continues to be still high. The prevalence of undernutrition in the tribal communities was relatively higher compared to the urban as well as rural counterparts. The present study revealed that though the intake of staple foods such as cereals and millets was satisfactory, the intake of protective foods such as green leafy vegetables, and milk and milk products and income elastic foods such as sugar and jaggery and fats and oils was very low compared to recommended levels. This was reflected by the gross inadequacy in the intakes of micronutrients like vitamin A, iron, calcium, riboflavin, niacin etc. A relatively higher proportion of the HHs surveyed was meeting both protein and energy, compared to their rural counterparts.

A higher prevalence of conjunctival xerosis, Bitot Spots and B-complex deficiencies reflect the poor micronutrient status of the community. The prevalence of morbidity such as fever and diarrhoea was relatively higher among tribal population compared to the rural, indicating the problem of poor environmental sanitation and personal hygiene.

Relatively lower prevalence of undernutrition among children and adults compared to their State counterparts, indicate better nutritional status of the community studied. Higher prevalence of undernutrition (<75% of weight for age) among 1-3 year children compared to 3-5 year group, a commonly observed feature, reflects poor child feeding practices in the community.

Majority of the households were participating in supplementary feeding programmes such as ICDS and MDM. These, to certain extent could have averted more severe forms of undernutrition. Nevertheless, the observations highlight the need for further strengthening of health and nutrition programmes, especially RCH programme in this area. In addition, health and nutrition education activities needs to be strengthened in order to 'bring-in' behavioural change among the women to ensure better infant and child feeding practices, environmental sanitation and personal hygiene to achieve better health and nutritional status.

Though the coverage of preschool children and pregnant women for immunizations was near total which is commendable efforts should be on for 100% coverage. Though the overall coverage of children for distribution of massive dose vitamin A during the previous year was good, the proportion of the children covered for the two doses was low. Similarly, the proportion of women that reportedly received stipulated minimum of 90 IFA tablets during pregnancy/lactation was also low.

Several studies have shown that iron deficiency anaemia (IDA) still continuous to be wide spread in all communities (NNMB, 2003) and therefore there is a need to strengthen the programme of distribution of iron and folic acid tablets to the target beneficiaries to ensure better coverage both in terms of number of beneficiaries as well as doses. There is need to improve the household consumption of protective foods such as Green leafy vegetables, fruits etc., through dietary diversification by promoting home

gardening. IEC activities need to be strengthened to impart health and nutrition education to ensure better infant feeding and child rearing practices, personal hygiene and environmental sanitation. High rate of adult illiteracy warrants strengthening of the adult literacy programme.

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