

Nutritional Status of Munda Women in an Urban Setting of Sambalpur, Orissa

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ABSTRACT The present paper reports on the dietary and nutrient intake of a group of tribal women (Munda) living in an urban setting of Sambalpur, Orissa. In general the intake of different food stuffs like pulses, green leafy vegetables, milk, oils and fats, sugar and jaggery and fleshy foods was found to be less than the Recommended Dietary Allowance (RDA) of ICMR (1990) whereas intake of cereal and other vegetables was found to be 20 per cent and 11 per cent more than the RDA respectively. Although differences could be observed numerically in relation to socio-economic variables like income, education, occupation, type of family, marital status, etc. the differences were not statistically significant. The differences in the intake of protein, calories and vitamin A were not significant whereas the intake of iron and riboflavin were found to be significant at 1 per cent level. Significantly higher consumption of thiamine, niacin, Vitamin C and folic acid were observed among Munda women in the present study. Though the intake of nutrients was also influenced by some socio-economic variables yet the differences between married and unmarried, employed and unemployed and women belonging to nuclear and extended families were not found to be significant.

Women occupy an important position in the society. The wheel of development and fortune of the society depends upon the progress and development of women. She contributes a lot for the welfare of the society but unfortunately she is the most discriminated one. The discrimination against women starts right from her birth and continues till her last breath. Differences frequently emerge in consideration of health and nutritional status between the sex. Throughout their life cycles females receive less food and also "inferior quality" of foods than do males (Khan et al., 1983; Ghosh, 1985; Karkal and Pandey, 1989). The socio-economic and socio cultural dimensions of the subject "Women and Nutrition" have two-fold significance. Firstly, the cultural norms and practices and socio-economic situation determine the extent to

which women are able to contribute to the nutritional levels of their families and secondly those also determine their own nutritional status.

Tribals constitute an important segment of the population of India representing 7.6 per cent of the total population of the country. In recent time decade a fundamental change seems to have occurred in the orientation of tribal research studies. Not only are such studies now taken seriously by the welfare officials but also every state has now a flourishing Tribal Research Institute. Baseline information like demographic, geographic, cultural, agricultural and socio-economic characteristics are some of the important features in tribal studies which help to shed some light on the constraints to the development of tribal communities.

One of the major factors in determining nutritional status of a community is the food intake which is influenced by a wide range of factors like agro climatic differences, foods grown and the availability of foods, beliefs, customs and traditions associated with food, urbanization and modernization. The dietary pattern of the tribes of India living under various agro climatic conditions in different isolated regions may vary widely. Studies on various tribal communities in India revealed that the diets of a majority of the tribal population are nutritionally deficient (Sen Gupta, 1960; Roy and Rao, 1962; Pingale, 1973; Pratap et al., 1973; Rao and Satyanarayan, 1974; Gore et al., 1977; Sen Gupta, 1980; Pushpamma et al., 1983; Gopaldas et al., 1983; Rajyalakshmi, 1991; Mohanty and Sahu, 1991; Hanumanth Rao et al., 1992, 1993 and Sabat et al., 1997).

Orissa is a small state of India having a total population of about 31.6 million of which 22.2 per cent are scheduled tribe (1991 Census). A review of literature reveals that no systematic study has been made on nutritional status of

tribal women of Orissa, excepting the recent work of Sabat et al. (1997). A humble attempt has been made in this paper to study nutritional status of Munda women within Sambalpur municipality taking dietary and nutrient intake into consideration. The results of the study have been compared with Recommended Dietary Allowance (hereafter RDA) of ICMR (1990). Munda is one of the sixty three tribal communities in Orissa.

STUDY AREA AND METHODOLOGY

The survey was conducted during last quarter of 1996 in Sambalpur town. The town has a population of 131 thousand of which more than 11 thousand are scheduled tribe. Munda women of above 18 years of age were selected as the subject of the study. Data were collected from 120 Munda women selected on the basis of simple random sampling method.

A personal interview schedule was designed pretested and refined for the collection of general information by interviewing the women personally. Oral questionnaire method (Park and Park, 1991: 358) was followed to estimate the mean intake of food consumed by the tribal women during last 24 hours. The nutrient contents of the diet were estimated following the tables of nutritive value of Indian foods given by ICMR (Gopalan et al., 1994: 47-91). Various statistical methods were applied for the presentation and interpretation of field data.

DIETARY INTAKE

Dietary Intake and Age

Table 1 presents the food intake among the Munda women of Sambalpur in relation to different age-groups. The mean intake of cereal among the Munda women of different age groups varied from 444.9 to 549.8 g/day with a maximum 25 per cent increase over the RDA of ICMR (1990). Although no definite relationship could be observed between the age of women and cereal consumption but in general the aged women (≥ 50 years) consumed relatively less cereal (445-467 g/day) than the women of lower age groups, i.e. < 50 years (481-550

g/day). The average intake of cereal taking all the age groups together was found to be 524.9 g/day which is approximately 20 per cent more than the RDA of moderate work group (ICMR, 1990). Average intake of pulses varied from 33.8 to 47.0 g/day which was found to be low in the younger age group (< 25 years). Normal and over consumption of pulses were observed in the relatively older age group (≥ 25) and remarkably less intake was observed in the age group of ≤ 19 years. The mean intake of pulses taking all the age groups of women together was found to be 41.1 g/day which is 9 per cent less than the RDA of ICMR (1990).

Green leafy vegetables (hereafter GLV) intake among the women of different age group varied from 44.4 to 59.4 g/day with a grand mean intake of 55.3 g which is about 55 per cent of the RDA for GLV (ICMR, 1990). Mean intake of other vegetables among the Munda women varied from 31.3 to 63.3 g/day with a grand mean of 44.6 g. and is 11 per cent more than the RDA. No distinct association was observed between the age of women and green leafy or other vegetable intake. Roots and tubers intake ranged from 30.6 to 70.0 g/day with a grand mean of 50.7 g. The intake was highest in the middle age group (35-39) and lowest in the age group of 50-54. The average intake of roots and tubers for all (120) the women was at par with the RDA (ICMR, 1990).

The mean intake of milk and milk products among the women of different age groups are significantly less than the RDA. The milk intake was observed only among very few women of the age group 45-49 and 25-29. Thus it would not be wrong to say that the milk intake among the Munda women is almost absent. The intake of fruits varied from 13.0 to 43.5 g/day. As almost all women were found to take ripe tomato, (the survey was carried on during winter season) the average intake of fruits taking all the age group of women together was found to be 29.6 g which is almost equal to the RDA (ICMR, 1990). However, there was no significant association between age of women and fruit intake.

The average intake of oils and fats varied from 6.4 to 9.4 g/day which was much less than the RDA. The oil consumption pattern was also

Table 1: Average Daily Food Intake (g) of the Tribal Women according to Age (Mean $\pm$ S.D.)

Age group of women	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
≤ 19	541.3 (± 123.7)	33.8 (± 41.6)	54.2 (± 70.6)	61.8 (± 58.7)	60.6 (84.9)	-	41.3 (± 67.9)	8.3 (± 3.4)	2.8 (± 2.8)	12.49 (± 29.9)	24
20-24	481.4 (± 125.3)	38.6 (± 42.5)	44.4 (± 68.5)	40.8 (± 39.4)	39.4 (± 57.7)	-	24.7 (± 31.9)	6.4 (± 3.7)	2.1 (± 4.5)	13.8 (± 46.6)	18
25-29	549.8 (± 222.1)	45.6 (± 66.6)	59.4 (± 78.3)	32.5 (± 49.0)	55.0 (± 82.9)	13.37 (± 48.3)	23.1 (± 37.7)	8.1 (± 2.9)	2.2 (± 3.3)	-	16
30-34	522.9 (± 144.81)	46.4 (± 41.6)	45.3 (± 47.8)	60.5 (± 48.8)	64.7 (± 74.3)	-	43.5 (± 55.7)	8.8 (± 3.2)	2.8 (± 3.2)	11.8 (± 47.1)	17
35-39	535.0 (± 145.6)	42.0 (± 52.8)	45.0 (± 72.3)	42.5 (± 47.5)	70.0 (± 78.1)	-	13.0 (± 29.6)	11.5 (± 4.5)	3.1 (± 3.3)	22.5 (± 27.5)	10
40-44	526.2 (± 107.5)	47.0 (± 55.9)	52.5 (± 69.6)	35.5 (± 35.6)	50.0 (± 70.7)	-	25.5 (± 35.4)	8.8 (± 3.3)	2.2 (± 3.8)	12.5 (± 33.7)	18
45-49	526.6 (± 145.8)	41.6 (± 44.9)	57.7 (± 78.5)	63.3 (± 96.9)	35.5 (± 40.81)	11.1 (± 31.4)	16.5 (± 30.9)	9.4 (± 2.9)	2.4 (± 3.4)	-	9
50-54	466.8 (± 169.8)	37.5 (± 35.7)	58.5 (± 78.6)	31.3 (± 64.4)	30.6 (± 32.9)	-	33.7 (± 33.1)	8.3 (± 2.5)	6.6 (± 7.3)	25.0 (± 66.1)	8
55 and above	444.9 (± 120.55)	36.5 (± 56.4)	49.9 (± 70.7)	54.6 (± 33.9)	43.3 (± 47.1)	-	20.3 (± 17.8)	7.6 (± 1.9)	4.5 (± 3.5)	16.6 (± 84.3)	10
Total for 120 women	524.9 (± 181.6)	41.1 (± 52.6)	55.3 (± 70.6)	44.6 (± 56.7)	50.7 (± 72.8)	2.7 (± 27.6)	29.6 (± 46.9)	8.5 (± 3.5)	4.5 (± 7.3)	13.7 (± 65.1)	120
RDA	440	45	100	40	50	150	30	25	20	-	

not influenced by the age of women. The mean intake of oil and fats taking all the age groups of women together was 8.5 g/day which met only 34 per cent of the RDA. It was also observed that the daily consumption of sugar and jaggery was less among the Munda women which varied from 2.1 to 6.6 g/day and taking all the age groups together it was 4.5 g *i.e.*, only 22.5 per cent of RDA. The consumption of meat, fish and egg was found to be quite meagre among the Munda women. Of the 120 sample women, only 12 reported the consumption of fleshy food during the last 24 hours. It varied from 11.8 to 25g with a grand mean of 13.7 g.

Income Level and Dietary Intake

The average daily intake of foods among the tribal women in relation to per capita income is presented in table 2. On the basis of per capita income per month, the Munda families have been classified into upper (>Rs. 500/-), middle (>Rs.200/- $\leq$ Rs.500/-) and lower ($\leq$ Rs. 200/-) income groups. The cereal intake was maximum (554.3 g) in lower income group and min-

imum (524.5 g) in higher income group. The mean intake of pulses were 32.4, 42.6 and 56.6 in the lower, middle and higher income groups respectively. The intake of GLV in the three income groups varied from 40.6 to 71.3g and was maximum in lower income group. The consumption of GLVs like amarnath and drumstick leaves along with rice by the women of lower income group contribute to this high values. The intake of other vegetables, roots and tubers was also influence by per capita income which were more in the higher income group. The average fruits intake among the three income groups varied from 20.0 to 32.5 g/day. Interestingly higher intake of fruits was observed in the lower income group. This might be due to adequate intake of ripe tomatoes. The mean intake of oil and fats varied from 8.2 to 9.3 g/day, with a slightly higher (9.3 gm) intake in higher income group. The intake of sugar (2.8g) and flesh food (20.3 g) were also found to be higher in the higher income category.

Marital Status and Dietary Intake

Dietary intake of Munda women in relation

to their marital status is presented in table 3. Average cereal and pulses intake were more in case of unmarried women than married women. The pulses intake was approximately 94 per cent and 87 per cent of RDA in married and unmarried women respectively. The mean intake of GLV was 53.9 g among married and 56.9 g among unmarried women. The average intake of other vegetables was also more in case of unmarried women (47.2g) in comparison to married women (42 g). Roots and tubers intake among both married and unmarried women met the RDAs and the intake was more in case of married women. The average milk intake of married women was 6.1 g, as very few respondents reported milk intake during the last 24 hours. The average fruits intake was more among unmarried women than the married women.

No significant difference was observed between married and unmarried women, when the mean intake of sugar and jaggery, oils and fats and fleshy foods were compared through Z-test. In general all the food stuffs were taken in excess quantity by the unmarried women.

Type of Family and Dietary Intake

The type of family also influenced the food

stuff intake of the women (Table 4). The mean intake of pulses, GLVs, other vegetables, oils and fats, sugar and jaggery and fleshy food was found to be higher in case of women belonging to nuclear families whereas, the intake of cereal and roots and tubers was found to be higher in women of extended families. Remarkable difference was observed when the intake of pulses and GLVs was compared. The women belonging to nuclear family took 15 per cent more pulses and 59 per cent more GLV in comparison to the women belonging to the extended families.

Educational Level and Dietary Intake

Among illiterate and low educated women, the intake of cereals, GLVs, roots and tuber, fleshy foods was relatively more than their educated counterparts whereas the average intake of pulses, other vegetables and fruits was found to be more among educated women (Table 5).

Occupational Level and Dietary Intake

The average daily food stuff intake of the Munda tribal women was also influenced by their occupation (Table 6). Majority of the Munda women performed similar type of work and they were mostly engaged in bidi making

Table 2: Average Daily Food Intake (g) of the Tribal Women in relation to Per capita Income (Mean $\pm$ S.D.)

Per capita income	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
≤ 200	554.3 (± 172.0)	32.9 (± 52.8)	71.3 (± 76.9)	41.45 (± 54.7)	54.0 (± 71.7)	2.6 (± 12.5)	32.5 (± 54.8)	8.6 (± 3.7)	1.6 (± 12.6)	8.9 (± 33.02)	62
200- ≤ 500	520.3 (± 127.05)	40.6 (± 59.7)	45.17 (± 66.5)	55.3 (± 56.7)	42.05 (± 68.7)	-	28.23 (± 37.9)	8.2 (± 3.4)	1.8 (± 2.7)	15.7 (± 53.8)	51
>500- ≤ 800	524.5 (± 346.5)	56.6 (± 41.55)	40.6 (± 42.2)	60.3 (± 52.2)	62.8 (± 86.3)	-	20.0 (± 35.5)	9.3 (± 1.7)	2.8 (± 4.5)	20.3 (± 34.9)	7

Table 3 : Average Daily Food Intake (g) of the Tribal Women in relation to Marital Status (Mean $\pm$ S.D.)

Marital Status	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
Married	517.8 (± 138.2)	39.5 (± 63.2)	53.9 (± 71.3)	42.24 (± 60.6)	56.8 (± 75.3)	6.07 (± 27.6)	25.8 (± 39.5)	8.8 (± 3.7)	1.9 (± 12.07)	12.93 (± 35.37)	69
Unmarried	532.8 (± 180.7)	42.07 (± 42.1)	56.9 (± 70.09)	47.15 (± 52.9)	52.7 (± 70.3)	-	33.52 (± 54.5)	8.03 (± 3.3)	1.6 (± 2.4)	13.76 (± 38.8)	51

(moderate type of work). The average intake of pulses (54.6 g), other vegetables (49.5g), roots and tubers (62.4 g), milk (3.2g), oil and fats (8.7g), fleshy foods (18.2g), and sugar and jaggery (1.7 g) was found to be higher in case of the employed women than the housewives. This might be due to more purchasing power of employed women. The intake of cereals, GLVs and fruits was found to be higher in case of unemployed (housewives) women as in most of the instances they took rice with mashed tomato (*chutney*) and GLVs.

It is said that if the requirements of vulnerable segments in a community are met, the requirements of others will also be met. The average food intake of the Munda women of the

present study was compared with the RDA for Indians and with others (Table 7) who have done similar type of surveys (Sen Gupta, 1980; Pushpamma et al., 1983; Rajyalakshmi, 1991; Hanumantha Rao et al., 1992, 1993; and Sabat et al., 1997). The intake of cereal by the tribal women was found to be higher than the RDA in majority of the studies including the present observation. The intake of cereals to pulses ratio was found to be 13:1 as against the ideal ratio of 7:1 recommended by the ICMR 1981. Sabat et al. (1997) observed a pulses intake of 23.58g among the Kondh of Orissa whereas it was 41.1g in the present study. The consumption of other vegetables by the Munda women was found to be 10 per cent higher than the RDA.

Table 4: Average Daily Food Intake (g) of the Tribal Women in relation to Type of Family (Mean $\pm$ S.D.)

Type of family	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
Extended	543.9 (± 200.2)	40.7 (± 49.7)	41.3 (± 50.3)	42.2 (± 50.35)	63.5 (± 79.8)	-	26.9 (± 58.9)	8.4 (± 3.5)	1.9 (± 2.9)	14.5 (± 42.5)	31
Nuclear	518.08 (± 135.7)	46.7 (± 57.5)	65.7 (± 77.02)	50.5 (± 58.5)	50.54 (± 24.5)	4.5 (± 24.5)	25.8 (± 39.7)	11.5 (± 17.6)	2.5 (± 13.5)	18.78 (± 41.8)	89

Table 5: Average Daily Food Intake (g) of the Tribal Women in relation to their Education (Mean $\pm$ S.D.)

Educational status	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
Illiterate	535.4 (± 157.4)	48.4 (± 60.2)	64.4 (± 69.9)	36.8 (± 59.7)	55.8 (± 73.1)	2.32 (± 15.07)	21.62 (± 31.9)	8.48 (± 3.7)	3.4 (± 15.4)	20.27 (± 35.7)	43
Upto Primary	514.3 (± 110.3)	45.6 (± 41.0)	57.5 (± 80.3)	40.8 (± 54.2)	52.5 (± 70.3)	5.0 (± 31.2)	29.0 (± 48.8)	8.25 (± 4.3)	1.2 (± 3.9)	12.5 (± 45.7)	40
Upto Middle	580.5 (± 257.2)	50.1 (± 58.5)	43.3 (± 47.1)	47.5 (± 56.8)	50.0 (± 74.8)	-	26.5 (± 32.7)	9.16 (± 1.86)	2.2 (± 2.5)	4.1 (± 13.8)	12
Upto High School	442.2 (± 105.2)	70.5 (± 21.7)	52.2 (± 73.2)	55.4 (± 48.3)	48.28 (± 66.23)	-	29.76 (± 38.5)	9.04 (± 1.4)	1.5 (± 3.5)	5.2 (± 21.3)	25

Table 6: Average Daily Food Intake (g) of the Tribal Women in relation to their Occupation (Mean $\pm$ S.D.)

Occupational status	Cereals	Pulses	Green leafy vegetables	Other vegetables	Roots and tubers	Milk	Fruits	Oils and fats	Sugar and jaggery	Meat, fish and egg	No. of women in each class
Unemployed	528.8 (± 108.2)	28.9 (± 64.0)	70.3 (± 92.2)	42.2 (± 50.4)	35.9 (± 58.3)	-	34.2 (± 31.8)	7.6 (± 2.5)	1.3 (± 1.8)	12.9 (± 42.14)	27
Employed*	522.9 (± 164.8)	54.6 (± 50.1)	47.5 (± 61.4)	49.5 (± 58.5)	62.4 (± 75.4)	3.2 (± 22.9)	27.6 (± 49.9)	8.7 (± 3.8)	1.7 (± 10.5)	18.1 (± 30.78)	93

* As most of the employed women were in one occupation, i.e. "bidi making", they have not been classified further

Table 7: Comparison of Food Intake (in g) of sample Tribal Women with RDA and the Food Intake Patterns of other Tribal Women of the Country

Types of foods	Tribes of NEFA ¹	Eastern India (1980) ²	Central India (1980) ³	Southern India (1980) ⁴	Tribals of East Godavari district (1983) ⁵	Four Tribals Groups of A.P. (1991) ⁶	Maria Gonds of Maharastra (1992) ⁷	Jenu Kuruba of Karnataka (1993) ⁸	Kandh of Orissa (1997) ⁹	Munda Women of (1990) ¹⁰	ICMR RDA (1990) ¹¹	Per cent of RDA met
Cereal	622	660	584	278	572	429.7	671	429	523.59	524.9 (±181.6)	440	119.3
Pulses	-	30	34	8	-	25.7	9	16	23.58	41.1 (±52.6)	45	91.3
Green leafy vegetables	-	-	-	-	-	47.5	55	62	37.28	55.3 (±70.6)	100	55.3
Other Veg.	51*	85*	120*	103*	51	112.7	69	3	38.52	44.6 (±56.7)	40	111.5
Roots and tubers	53	31	-	492	19	22.7	15	14	38.04	50.7 (±72.8)	50	101.4
Milk	-	14	23	108	279	-	2	17	4.6	2.7 (±27.6)	150	1.8
Fruits	-	-	-	-	-	-	11	10	12.51	29.6 (±46.9)	30	98.7
Oils and fats	-	-	-	9	-	-	4	-	2.9	8.5 (±3.5)	25	34.0
Sugar	-	-	-	-	-	-	4	20	6.65	4.5 (±7.3)	20	22.5
Meat	11	Neg	Neg	Neg	13	19.2	11	-	8.22	13.7 (±65.1)	-	-

Neg - Negligible

1 to 4 : Sen Gupta (1980); 5: Pushpamma et al. (1983); 6: Rajyalakshmi (1991); 7: Hanumantha Rao et al. (1992); 8: Hanumantha Rao et al. (1993); 9: Sabat et al. (1997); 10: Present Study (1997); 11: ICMR, RDA (1990)

* The value includes GLVs and fruits

Pushpamma et al. (1983) and Sabat et al. (1997) have reported 27 per cent higher and 2 per cent lower intake of other vegetables than RDA among tribal women of East Godavari and Orissa respectively.

The consumption of GLVs among Kondh of Orissa (Sabat et al., 1987) and the tribals of Andhra Pradesh (Rajyalakshmi, 1991) was less than the intake by Munda women. The consumption of root and tubers in the present study was almost equal to the RDA whereas the reported intake by Kondh of Orissa (Sabat et al., 1977), Jenu Kurubas of Karnataka and Maria Gonds of Maharastra (Hanumantha Rao et al., 1992 and 1993), tribals of Andhra Pradesh (Rajyalakshmi, 1991) and East Godavari district (Pushpamma et al., 1983) was lower than RDA (19g to 38g). The lower intake of milk (2.7g) among the Munda women was found to be al-

most similar to that of the reports made by Hanumantha Rao et al. (1992 and 1993) and Sabat et al. (1997). The consumption of sugar and jaggery, fats and oils, spices and condiments were negligible in the daily diets of the Munda women of the present study and were only used in special occasions. The average intake of fruits by the Munda women was 29.6 g against 12.5g among the Kondh of Orissa (Sabat et al., 1997). The lower intake of fruit was also observed in case of the Jenu Kurubas of Karnataka and Maria Gonds of Maharastra (Hanumantha Rao et al., 1992 and 1993).

The test of hypothesis using standard error reveals that there exists no significant difference between the RDA (ICMR, 1990) and mean dietary intake with regards to pulses, other vegetables, roots and tubers and fruits among Munda women of the present study. However, the

differences between the RDA and the mean cereal intake as well as GLVs of the present study were significant at 1 per cent level indicating a significantly higher consumption of cereals and lower consumption of GLVs among Munda women. The differences in the average intake of milk, fats and oil and sugar and jaggery with their respective RDA were also significant at 1 per cent level indicating a significantly less intake of milk, fats and oils and sugar and jaggery in case of the tribal Munda women.

NUTRIENT INTAKE

Nutrient Intake and Age

The mean energy intake of Munda women through different food stuffs at different age groups along with the recommended allowance have been presented in table 8. The mean energy intake under the age group of ≤ 19 to ≥ 55 varied from 1850.3 to 2252.1 kJ. The grand average intake of calories (2160.4) met 97 per cent of the RDA. No definite pattern was observed in the relationship between the mean

calorie intake and the age of the women. The mean intake of protein varied from 40 to 48.6g. The mean protein intake taking all the age groups together was found to be 44.4 which met 88 per cent of RDA. The intake of milk and fleshy food was quite less among the Munda women. Their protein requirement is usually met from cereals and pulses. Consumption of pulses among the Munda women was less leading to less protein intake.

The average intake of iron varied from 14.9 to 19.4 mg with a grand mean intake of 16.9 mg. It was pertinent to note that the iron intake levels were less than 55 per cent of RDA when all the age groups were pulled together. Intake in the age group of 55 and above (1820.0 μ g) and maximum in 25-29 age group (2888.2 μ g) with a grand mean intake of 2321.4 μ g which met 96 per cent of RDA. The intake of vitamin A was found approaching RDA because of higher intake of green leaves.

Intake of thiamine and niacin were higher than riboflavin. The average intake of thiamine varied from 1.3 to 1.7 mg (mean 1.5) per day and the grand mean intake was 36 per cent more

Table 8: Average Daily Nutrient Intake of the Tribal Women according to Age (Mean $\pm$ S.D.)

Age group	Calories (KCAL)	Protein (g)	Iron (mg)	Vit-A (μ g)	Thiamine (mg)	Ribo- flavin (mg)	Niacin (mg)	Vit-C (mg)	Folic Acid (μ g)	No. of persons in each group
≤ 19	2201.4 (± 537.3)	48.8 (± 77.1)	16.8 (± 3.6)	2210.3 (± 3855.2)	1.6 (± 0.4)	0.8 (± 0.1)	23.8 (± 5.3)	106.3 (± 60.3)	128.8 (± 110.2)	24
20-24	1850.3 (± 481.3)	40.3 (± 19.9)	14.9 (± 3.6)	2011.18 (± 3790.6)	1.4 (± 0.4)	0.7 (± 0.2)	20.6 (± 5.4)	70.7 (± 48.7)	100.8 (± 106.1)	18
25-29	2228.5 (± 545.8)	48.6 (± 18.1)	19.4 (± 6.8)	2888.2 (± 4144.3)	1.7 (± 0.5)	0.8 (± 0.2)	25.0 (± 6.1)	85.1 (± 64.6)	136.8 (± 96.4)	16
30-34	1989.5 (± 520.6)	46.9 (± 19.2)	18.9 (± 16.8)	2173.6 (± 2576.1)	1.5 (± 0.4)	0.7 (± 0.1)	22.7 (± 5.8)	90.4 (± 69.6)	121.2 (± 91.9)	17
35-39	2244.3 (± 473.5)	48.0 (± 18.8)	17.8 (± 3.0)	2696.9 (± 4424.0)	1.6 (± 0.5)	0.8 (± 0.3)	25.3 (± 9.3)	70.2 (± 67.9)	117.4 (± 123.3)	10
40-44	2218.8 (± 515.2)	44.7 (± 15.0)	15.3 (± 2.5)	2700.6 (± 3793.8)	1.5 (± 0.3)	0.8 (± 0.2)	22.4 (± 5.6)	74.6 (± 67.5)	166.9 (± 102.3)	8
45-49	2228.2 (± 629.9)	41.1 (± 25.1)	16.9 (± 4.2)	2363.7 (± 3671.6)	1.5 (± 0.5)	0.8 (± 0.2)	23.0 (± 6.4)	94.6 (± 82.6)	174.6 (± 139.3)	9
50-54	2230.5 (± 381.5)	41.5 (± 16.6)	16.4 (± 9.4)	2029.6 (± 4245.8)	1.3 (± 0.3)	0.7 (± 0.1)	21.7 (± 4.0)	97.6 (± 55.7)	174.8 (± 123.5)	8
55 and above	2252.1 (± 612.2)	40.0 (± 38.3)	15.8 (± 9.5)	1820.08 (± 3066.7)	1.4 (± 0.7)	0.6 (± 0.3)	24.1 (± 7.8)	95.2 (± 25.6)	127.1 (± 124.6)	10
Total for 120 women	2160.4 (± 616.4)	44.4 (± 56.6)	16.9 (± 6.2)	2321.4 (± 4882.8)	1.5 (± 0.8)	0.7 (± 0.4)	23.88 (± 6.8)	86.7 (± 59.3)	138.1 (± 99.3)	120
ICMR RDA, 1990	2225	50	30	2400	1.1	1.3	1.4	40	100	

than RDA. The intake of riboflavin varied from 0.6 to 0.8 mg (mean 0.7) per day which met only 54 per cent of RDA and no appreciable difference was observed between the age groups. The niacin intake was found to be much higher (70 per cent) than the RDA of 14.0mg which varied from 20.6 to 25.0 mg with a mean niacin intake of 23.88mg. The frequent intake of par-boiled and puffed rice might be an important contributor for higher niacin intake by Munda women.

Vitamin C intake among the Munda women varied from 70.2 to 106.3 mg. The intake of vitamin C was almost more than twice of RDA in majority of age groups with a significantly higher intake in the age group of ≤ 19 . The mean intake of vitamin C (86.7 mg) per day was 115 per cent more than RDA. This excess intake of vitamin C might be due to higher intake of lemon, ripe tomato and GLVs like amarnath leaves, drumstick leaves and others. As vitamin C is a water soluble, excess intake of this vitamin does not help in anyway rather they are excreted in the urine. The average intake of folic acid among the Munda women varied from 100.8 to 174.8 μg as against the RDA of 100 μg per day, with a grand mean 138.1 μg which is 38 per cent higher than the RDA (ICMR, 1990).

SOCIO-ECONOMIC VARIABLES AND NUTRIENT INTAKE

Income Level and Nutrient Intake

The nutrient intake of tribal women in relation to income level, has been presented in table 9. The calorie intake was maximum in upper income group (2301.4kcal), and minimum in lower income group (1860.1 kcal). Protein intake varied from 41.9 to 47.7 g with minimum (41.9g) intake in lower income group and maximum (47.7g) in higher income group. However, the protein intake in all the income groups were lower than the RDA. The average intake of iron in the three income group varied from 17.2 to 21.8 mg with maximum in lower income group. Vitamin A intake ranged from 2027.3 to 2443.9 μg with a relatively higher intake in two low income groups because of larger consumption of GLVs by them. Thiamine intake showed a distinct trend of increase

with increase in income level and it ranged from 1.5 to 1.7 mg. There was no significant variation in riboflavin intake among lower and upper income groups where as niacin, vitamin C and folic acid intake was highest among the low income group women. Relatively higher niacin intake among lower economic group women (23.2 mg) might be due to higher intake of par-boiled rice and puffed rice. The intake of vitamin C in all the age groups was more than RDA, because of the intake of ripe tomatoes and other greens.

Marital Status and Nutrient Intake

Average daily nutrient intake of tribal women in relation to their marital status is presented in table 10. The intake of calories, iron, vitamin A, thiamine, niacin and folic acid were found to be more among married women than unmarried women whereas reverse was true for protein, riboflavin and vitamin C.

Type of Family and Nutrient Intake

Among women belonging to nuclear families the intake of protein, iron, vitamin A, thiamine, niacin, vitamin C and folic acid was more than women of extended families. However, calories and thiamine intake were more in extended families (Table 11).

Educational Level and Nutrient Intake

A reverse trend was observed between the calorie intake and the education of the women. (Table 12). The average calorie intake was highest in case of the illiterate women (2248.6kcal) and lowest among women educated upto high school (2058.9kcal). The average daily protein intake increased with the increase in educational level, lowest being 41.6 g among illiterate and highest of 49.2g among educated upto high school. No specific trend was observed in average daily nutrient intake of iron, vitamin A, thiamine, riboflavin, vitamin C, folic acid in relation to educational level of women. The highest average intake of iron (18.7mg) was recorded among illiterate women. Whereas vitamin A intake was more in women having education upto high school. The average niacin intake was highest (23.6mg) among illiterate women and lowest (20mg) among educated

Table 9 : Average Daily Nutrient Intake of the Tribal Women in relation to Per-capita Income (Mean $\pm$ S.D.)

<i>Per capita income</i>	<i>Calories (KCAL)</i>	<i>Protein (g)</i>	<i>Iron (mg)</i>	<i>Vit-A (μg)</i>	<i>Thiamine (mg)</i>	<i>Ribo-flavin (mg)</i>	<i>Niacin (mg)</i>	<i>Vit-C (mg)</i>	<i>Folic Acid (μg)</i>	<i>No. of persons in each group</i>
≤ 200	1860.1 (± 526.0)	41.9 (± 11.6)	17.2 (± 8.9)	2306.6 (± 3718.3)	1.5 (± 0.4)	0.8 (± 0.2)	23.2 (± 6.5)	97.63 (± 65.8)	135.0 (± 103.7)	62
> 200-500	2164 (± 569.2)	44.4 (± 18.6)	21.2 (± 9.4)	2443.98 (± 3414.9)	1.6 (± 0.5)	0.7 (± 0.3)	22.3 (± 6.1)	99.0 (± 65.3)	131.6 (± 134.0)	51
>500-800	2301.4 (± 547.4)	47.7 (± 7.3)	21.8 (± 9.3)	2027.3 (± 1927.4)	1.7 (± 0.5)	0.8 (± 0.2)	22.4 (± 6.3)	85.2 (± 72.7)	101.1 (± 66.3)	7

Table 10 : Average Daily Nutrient Intake of the Tribal Women in relation to Marital Status (Mean $\pm$ S.D.)

<i>Marital status</i>	<i>Calories (KCAL)</i>	<i>Protein (g)</i>	<i>Iron (mg)</i>	<i>Vit-A (μg)</i>	<i>Thiamine (mg)</i>	<i>Ribo-flavin (mg)</i>	<i>Niacin (mg)</i>	<i>Vit-C (mg)</i>	<i>Folic Acid (μg)</i>	<i>No. of persons in each group</i>
Married	2081.4 (± 534.5)	45.2 (± 22.7)	18.8 (± 8.1)	2094.9 (± 3852.4)	1.6 (± 0.5)	0.6 (± 0.7)	23.3 (± 6.5)	84.53 (± 70.8)	136.7 (± 123.2)	69
Unmarried	2054.7 (± 563.2)	46.7 (± 44.8)	16.3 (± 3.7)	2027.68 (± 3769.5)	1.5 (± 0.4)	0.7 (± 0.2)	22.4 (± 5.9)	100.7 (± 59.9)	115.3 (± 99.7)	51

Table 11 : Average Daily Nutrient Intake of the Tribal Women in relation to Type of Family (Mean $\pm$ S.D.)

<i>Type of family</i>	<i>Calories (KCAL)</i>	<i>Protein (g)</i>	<i>Iron (mg)</i>	<i>Vit-A (μg)</i>	<i>Thiamine (mg)</i>	<i>Ribo-flavin (mg)</i>	<i>Niacin (mg)</i>	<i>Vit-C (mg)</i>	<i>Folic Acid (μg)</i>	<i>No. of persons in each group</i>
Extended	2173.7 (± 620.8)	41.4 (± 21.3)	19.8 (± 14.8)	1814.1 (± 2549.0)	1.6 (± 0.6)	0.7 (± 0.2)	22.6 (± 6.3)	92.23 (± 51.9)	149.1 (± 93.9)	31
Nuclear	2168.3 (± 519.7)	45.7 (± 59.6)	24.7 (± 72.1)	2731.48 (± 4134.1)	1.5 (± 0.4)	0.8 (± 0.3)	23.1 (± 6.3)	98.97 (± 70.8)	151.0 (± 118.1)	89

Table 12 : Average Daily Nutrient Intake of the Tribal Women in relation to their Education (Mean $\pm$ S.D.)

<i>Educational status</i>	<i>Calories (KCAL)</i>	<i>Protein (g)</i>	<i>Iron (mg)</i>	<i>Vit-A (μg)</i>	<i>Thiamine (mg)</i>	<i>Ribo-flavin (mg)</i>	<i>Niacin (mg)</i>	<i>Vit-C (mg)</i>	<i>Folic Acid (μg)</i>	<i>No. of persons in each group</i>
Illiterate	2248.6 (± 620.4)	41.6 (± 26.4)	18.7 (± 10.7)	2407.3 (± 3729.8)	1.6 (± 0.5)	0.8 (± 0.3)	23.6 (± 6.7)	83.2 (± 69.2)	149.5 (± 129.9)	43
Upto Primary	2188.1 (± 475.6)	43.8 (± 85.3)	14.6 (± 66.9)	2390.18 (± 4332.4)	1.5 (± 0.4)	0.7 (± 0.2)	22.5 (± 6.5)	100.8 (± 55.8)	188.5 (± 151.1)	40
Upto Middle	2103.9 (± 506.8)	44.3 (± 17.7)	14.9 (± 3.7)	2043.4 (± 2680.7)	1.6 (± 0.7)	0.6 (± 0.1)	21.7 (± 5.3)	87.7 (± 44.5)	104.2 (± 97.6)	12
Upto High School	2058.9 (± 368.8)	49.2 (± 6.3)	17.8 (± 3.9)	2890.9 (± 3340.5)	1.4 (± 0.4)	0.7 (± 0.2)	20.0 (± 3.9)	118.2 (± 72.8)	143.0 (± 114.9)	25

women upto high school.

Employment Status and Nutrient Intake

Among employed women higher intake of calories (2201.5kcal), protein (45.6g), iron (20.2mg), vitamin A(2597.0 μ g), thiamine (1.6mg) and riboflavin (0.8 mg) was observed (Table 13). In contrast to all these observations

the average intake of vitamin C and folic acid was found to be more (125.3 mg vitamin C and 149.8 μ g folic acid) among unemployed women.

Although in most of the cases there was numerical differences in calories, protein and other nutrient intake among unemployed and employed, married and unmarried women belonging

to nuclear and extended families (Tables 10, 11, 13), the test of hypothesis reveals no significant difference in calorie, protein and other nutrient intake among such dichotomous groups. This shows that factors like employment status, marital status or type of family do not contribute to nutrition level among Munda women.

The calorie content of the diet of Munda women of the present study met 97 per cent of RDA but compared with the diet of Maria Gonds of Central India (Pingale, 1973), tribals of East Godavari (Pushpamma et al., 1983),

tribal women of Gujarat (Gopal Das et al., 1983) and Maria Gonds of Maharashtra (Hanumantha Rao et al., 1992) the Munda women of Sambalpur have lower calorie intake, i.e. 2958, 2206, 2244, and 2630, respectively against 2160.4 kcal of present study (Table 14). Protein intake was 88.8 per cent of RDA in the present study whereas reports are available on higher intake by many tribal population (Pingale, 1973; Pushpamma et al., 1983; Gopal Das et al., 1983; Rajyalaxmi, 1991 and Hanumantha Rao et al., 1992). The calorie and the protein gap ob-

Table 13 : Average Daily Nutrient Intake of the Tribal Women in relation to their Occupation (Mean $\pm$ S.D.)

Occupational Status	Calories (KCAL)	Protein (g)	Iron (mg)	Vit-A (μ g)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vit-C (mg)	Folic Acid (μ g)	No. of persons in each group
Unemployed	2059.9 (± 388.4)	41.0 (± 25.2)	17.1 (± 4.5)	2348.6 (± 5001.0)	1.3 (± 0.3)	0.7 (± 0.2)	22.9 (± 4.5)	125.3 (± 59.6)	149.8 (± 137.6)	27
Employed	2201.5 (± 581.9)	45.6 (± 57.6)	20.2 (± 17.1)	2597.08 (± 3229.8)	1.6 (± 0.5)	0.8 (± 0.3)	22.8 (± 6.9)	95.70 (± 94.4)	126.3 (± 111.8)	93

Table 14: Comparison of Nutrient Intake of Sample Tribal Women with RDA and the Nutrient Intake Patterns of other Tribal Women of the Country

Type of Nutrients	Maria of Gond Central India (1973) ¹	Koyas of Central India (1973) ²	Tribals of East Godavari (1983) ³	Tribal of Gujarat (1983) ⁴	Four tribes of A.P. (Tatapuv, Savara, Gadaba, Kondader (1991) ⁵	Maria Gonds of Maharastra (1992) ⁶	Jenu Kurubas of Karnataka (1993) ⁷	Munda Women of Present study ⁸	ICMR RDA (1990) ⁹	Per cent RDA met
Calories (Kcal)	2958 (± 326)	1824 (± 402)	2206	2244 (± 28)	1729	2630	1665	2160.4 (± 616.4)	2225	97
Protein (g)	73.92 (± 8.15)	61.08 (± 15.85)	54	81 (± 1.5)	46.2	62.2	42	44.4 (± 56.4)	50	88.8
Iron (g)	33.85 (± 3.61)	26.02 (± 6.82)	25	27 (± 0.8)	44.6	26.1	19.6	16.9 (± 6.2)	30	56.3
Vitamin-A (β -carotene- μ)	613.51 (± 27.83)	602.51 (± 126.89)	344	764 (± 43)	620	405	614	2321.4 (± 4882.8)	2400	96.7
Thiamine (mg)	1273 (± 0.23)	1.69 (± 0.47)	0.82	-	1.35	2.47	0.87	1.5 (± 0.8)	1.1	136.4
Riboflavin (mg)	0.944 (± 0.13)	0.70 (± 0.15)	0.78	-	0.832	1.48	1.64	0.7 (± 0.4)	1.3	53.8
Niacin (mg)	-	-	15	-	15.15	27.1	8	23.88 (± 6.8)	14	170.6
Vitamin-C (mg)	23.63 (± 8.47)	24.32 (± 4.79)	21	28 (± 5.2)	20.3	36.4	46	86.7 (± 59.3)	40	216.8
Folic acid (μ g)	-	-	-	-	-	-	-	138.1 (± 99.3)	100	138.1

1 and 2 : Pingale (1973); 3: Pushpamma et al. (1983); 4: Gopaldas et al. (1983); 5: Rajyalakshmi (1991); 6 and 7: Hanumantha Rao et al. (1992, 1993); 8: Present Study (1997); 9: ICMR, RDA (1990)

served in the present study might be due to low calorie and low protein content in their food stuff and also due to use of negligible amount of fats in their diets. However, the tribals being habituated to drinks daily, the contribution of calories from it should also be taken into account while computing the calorie deficit. The iron content of their diet met only 56.3 per cent of RDA but intake of iron in all other groups of tribal community were found to be higher than the present study. This might be due to the selection of the low cost fruits and vegetables by Munda women which have low iron content. The requirement of the minerals in the diet of the sample women were mainly available from cereals, millets and GLVs.

The requirement of β carotene (Vitamin A) met 96.7 per cent of the RDA. Other studies on tribals of Central India, Orissa, East Godavari and some tribes of Andhra Pradesh reported an average intake of 344 μ g to 764 μ g β carotene (Table 14) and was lower than the intake of the women in the present study. This might be attributed to variation in the intake of GLVs. The intake of B complex vitamin, thiamin and niacin were adequately met whereas the intake of riboflavin met only 64 per cent of RDA. Similar trend was reported by Pingale (1973), Sen Gupta (1980), Pushpamma et al. (1983) and Rajyalakshmi (1991). The millets and the vegetables form the major source of thiamine and niacin. However, the observation of malnutrition symptoms observed during survey indicates that B complex deficiency is one of the major nutritional problems in this area. The consumption of alcohol might be a contribution factor in this regard. Inadequate consumption of food rich in riboflavin (milk, eggs and flesh food) is perhaps the reason for wide gap between intake and requirement of riboflavin.

The intake of vitamin C by the tribal women was found to be almost double of RDA. The intake of vitamin C by the tribal women in different parts of India were found to be much less. Hanumantha Rao et al. (1993) observed a high intake of vitamin C among the Jenu Kurubas of Karnataka.

The test of hypothesis using standard error reveals that there exists no significant difference between the RDA and mean nutrient intakes

among sample Munda women with regard to calories, protein, vitamin A. However, the difference between the RDA and the mean iron and riboflavin intake of the present study were significant at 1 per cent level indicating a significantly lower consumption of iron and riboflavin. The difference in the average intake of thiamine, niacin, vitamin C and folic acid with their respective RDA were also significant at 1 per cent level indicating a significantly higher intake of thiamine, niacin, vitamin C and folic acid among Munda women of Sambalpur.

CONCLUSION

People all over the world are suffering from a multitude of illness because of ill chosen and badly combined diets. Besides to fulfill the requirement of the body the diet should include varieties of different food stuffs to provide adequate amount of nutrients. An unvaried diet thus is not only distasteful, but it also may have serious consequences. Thus a balanced diet in which various food stuffs are mixed in suitable proportion is highly essential to carry out the normal functions of the body.

From the present study it was observed that though the Munda women live in an urban complex having better health care facilities, yet their food and nutrient intake in general was found to be deficient. Thus it is suggested that some awareness should be created in this area by way of providing nutrition education to these women for proper selection, combination and consumption of varieties of low cost food stuffs.

REFERENCES

- Ghose, S. 1985. "Discrimination Begins at Birth," paper prepared for the UNICEF Journalists, Workshop on the Female Child, New Delhi.
- Gopalan, C., B.V. Ramasatri and S.C. Balasubramanian (eds.) 1994. "Nutritive Value of Indian Foods", Hyderabad: National Institute of Nutrition. ICMR.
- Gopaldas, T., A. Gupta and K. Saxena. 1983. "The Phenomenon of Sanskritization in a Forest Dwelling Tribe of Gujarat, India: Nutrient Intake and Practices in the Special Groups," *Ecology of Food and Nutrition*, 13: 1-18.
- Gore, A.P., T. Shobha and M. Kulkarni. 1977. "Nutritional

- Status of Tribes in the Indravati River Basin," *Indian Journal Of Nutrition and Dietetics*, 14 : 167-171.
- Government of Orissa. 1995. Statistical Outline of Orissa : Bhubaneswar; Directorate of Economics and Statistics.
- Hanumantha Rao, D. et al. 1992. "Nutritional Status of Maria Gonds-A Primitive Tribe of Maharastra," *Indian Journal of Nutrition and Dietetics*, 29: 61-66.
- . 1993. "Assessment of Nutritional Status of Jenu Kurubas - A Primitive Tribe of Karnataka," *Indian Journal of Nutrition and Dietetics*, 30: 66-71.
- Indian Council of Medical Research. 1981. *Recommended Dietary Intakes for Indians*. New Delhi: ICMR.
- . 1984. *Recommended Dietary Intakes for Indians*. New Delhi : ICMR.
- . 1990. *Nutrient Requirement and Recommended Dietary Allowance for Indians*. New Delhi : ICMR.
- Karkal, M. and D.Pandey. 1989. *Studies on Women and Population - A Critique*. Bombay : Himalaya Publishing House.
- Khan, M.E., S.K. Ghosh, Dastidar and R. Singh. 1983. "Nutrition and Health Practices among Rural Women - A Study of Uttar Pradesh, India," *Working paper No 31*, New Delhi : Operations Research Group.
- Mohanty, A.K. and P.N. Sahu. 1991. "Food Habits, Childhood Mortality, Growth and Nutritional Status of the Rural Kisans of Sambalpur, Orissa," *Man in India*, 71(4): 601-610.
- Park, J.E. and K.Park. 1991. *Preventive and Social Medicine*. Jabalpur : Banarasidas Bharat.
- Pingale, U. 1973. "Some Studies in Two Tribal Groups of Central India. Part I : Dietary Intake and Nutritional Status," *Plant Foods for Man*, 1: 185-194.
- Pratap, D.R. 1973. *The Dietary Habits and Nutritional Status of Chenchus*. Tribal Culture Research and Training Centre. Tribal welfare Department. Hyderabad, Govt. of Andhra Pradesh, India.
- Pushpamma, P., K.C. Rao and R. Tulpule. 1983. *Profile of Tribal Families in East Godavari District*. ITDA Report, College of Home Science, Agricultural University, Hyderabad, Andhra Pradesh, India.
- Rajyalkshmi, P. 1991. *Tribal Food Habits*. New Delhi : Gian Publishing House.
- Rao, D.H. and K. Satyanarayana. 1974. "Nutritional Status of Tribal Pre School Children of Andhra Pradesh," *Indian Journal of Nutrition and Dietetics*, 11: 328-334.
- Roy, S.K. and A.K. Rao. 1962. "Diets of Some Indian Tribes," *Indian Journal of Medical Research*, 59: 905-914.
- Sabat, K.R., N.C. Das and B.Das. 1997. "Habitat and Nutritional Status of a Kandh Village of Eastern Ghats, Orissa," *Journal of Human Ecology*, 8(1): 13-19.
- Sen Gupta, P.N. 1960. "Dietaries of primitive Tribes". The adibasis (Rev. Ed.). Publications Division, Delhi : 87-95.
- . 1980. "Food Consumption and Nutrition of Regional Tribes of India," *Ecology of Food and Nutrition*, 9: 93-108.