

Diet and Nutritional Status of Women in India

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ABSTRACT The health of women is linked to their status in the society. The demographic consequence of the women has formed expression in various forms, such as female infanticide, higher death rate, lower sex ratio, low literacy level and lower level of employment of women in the non-agricultural sector as compared to men. Generally, at household level, cultural norms and practices and socio-economic factors determine the extent of nutritional status among women. National Nutrition Monitoring Bureau has been carrying out regular surveys on diet and nutritional status of different population groups since 1972. For the purpose of present investigation, the data collected during 1998-99 and 2005-06 on diet and nutritional status of tribal and rural population respectively in nine States of India was utilized. The intake of all the foods except for other vegetables and roots and tubers was lower than the suggested level among rural as well as tribal women. The study revealed inadequate dietary intake, especially micronutrient deficiency (hidden hunger) during pregnancy and lactation. The prevalence of goiter was relatively higher (4.9%) among tribal women compared to their rural counterparts (0.8%). Tribal women were particularly vulnerable to undernutrition compared to women in rural areas. The prevalence of chronic energy deficiency was higher (56%) among tribal NPNL women compared to rural women (36%).

INTRODUCTION

Government of India has been making several efforts in developing health and population policies. However, there are several problems in the implementation of appropriate interventions due to poverty, gender discrimination, illiteracy in the population (Buckshee 1997). According to 2001 census, only 54.3% of Indian women were literate. The literacy level of women can affect reproductive behaviour, use of contraceptives, health and upbringing of children, proper hygienic practices, access to employment and overall status of women in the society. An early marriage and child-birth is a major determinant of women's health and is also responsible for the prevailing wide variation in the socio-economic status. Inadequate and improper utilization of health facilities and wide spread anaemia among all the reproductive age women, leading to high maternal mortality (540 maternal deaths per one lakh live births) (NFHS 2).

Poor health has repercussions not only for

women but also their families. Women with poor health and nutrition are more likely to give birth to low weight infants. They are also less likely to be able to provide food and adequate care for their children. Finally, a women's health affects the household economic well being, and as a women with poor health will be less productive in the labour force. While malnutrition is prevalent among all segments of the population, poor nutrition among women begins infancy and continues throughout their lifetime. (Chatterjee 1990; Desai 1994). Because of prevailing culture and traditional practices in India, the health and nutritional status of women becoming worse effected.

There is a paucity of information on diet and nutritional status of women including non-pregnant non-lactating (NPNL), pregnant and lactating women (less than 12 month of lactation). Therefore, an attempt was made to assess the diet and nutrition profile of women in rural and tribal areas of certain States in India. The present communication is based on the latest data available with National Nutrition Monitoring Bureau (NNMB) collected during 1998-99 and 2005-06 on tribal and rural population respectively.

MATERIAL AND METHODS

The NNMB, located in the National Institute of Nutrition, Hyderabad, India under the aegis of the Indian Council of Medical Research (ICMR)

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has been carrying out regular surveys on diet and nutritional status of different population groups since 1972. For the purpose of present investigation, the data collected during 1998-99, and 2005-06 on diet and nutritional status of tribal and rural population respectively in nine States, viz., Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and West Bengal was utilized. Trained Medical officers, Nutritionists and Social workers, conversant with local language were involved in collection of data using standard equipment and procedures (Jelliffe 1966).

Sampling

Tribal Survey: In each State, 120 villages were selected randomly from the list of Integrated Tribal Development Agency (ITDA) villages. From each selected village, a total of 40 households (HHs) were covered, by adopting probability proportion to size of different tribes. For this purpose, in each village households were grouped according to tribe and from each tribe required number of HHs were covered for survey.

Rural Survey: The villages covered by National Sample Survey Organization (NSSO) for its 54th round of consumer expenditure survey carried out during 1998 formed the sample frame (NSSO 1998). Based on agro-climatic criteria, NSSO divided each State into several strata, each strata consisting of 1.8 million rural population. Out of these strata NNMB covered 16 strata from each State, keeping in view the manpower and other available resources. In each selected stratum 5 villages were randomly selected from the list of villages covered by NSSO. Each village was divided into five natural groups of houses and a total of 20 HHs were covered @ 4 HHs per group.

Investigations

Oral informed consent was obtained for carrying out the survey from the head of the household. Demographic and socio-economic particulars were collected from all the HHs selected for the survey. Anthropometric measurements such as weight, height, mid upper arm circumference and fat fold at triceps were made on all the available individuals in the selected HHs by using standard equipment. They were also examined for clinical signs of nutritional

deficiency. In addition, 24 hour recall method of diet survey was carried out for one day, in a sub sample of 10 HHs by systematic random sampling procedure to assess the food and nutrient intakes of all the individuals who had partaken the meals on that day.

Statistical Analysis

Using SPSS windows version 14.0 statistical analysis including arithmetic mean, standard deviation and percent distribution of households/individuals according to different variables was carried out. The average daily intake of foods by physiological status was computed and compared with the suggested levels of intake (ICMR 1981). The average daily intake of nutrients was calculated using food composition tables (Gopalan et al., 1990), and compared with the recommended daily allowances (ICMR1990). Protein-calorie adequacy status of individuals was categorized according to age/sex/ physiological groups and activity. The protein and energy requirement curves are assumed to follow Gaussian distribution with a coefficient variation of 15%. The expert committee of ICMR has suggested "requirement" for energy as "recommended allowances", while in the case of protein, the "allowance" corresponded to mean \pm 2SD of the requirements. Therefore, for defining the protein – energy adequacy status, 70% of requirements (requirement -2SD) were used as cut-off points for different age/sex/physiological and activity groups.

The individuals were categorized into different grades of nutritional status using Body Mass Index (James et al.1988).

RESULTS

A total of 30,390 households from tribal and 14,256 households from rural area included in the analysis. Of these households, a sub sample of 8,036 and 7,078 HHs were covered for diet surveys from tribal and rural areas respectively. Anthropometric data include 29,709 tribal and 18,603 rural women of NPNL, pregnant and lactating women.

Socio-economic Profile

About 16% of the houses in rural and less than 1% of households in tribal areas are *pucca*

Table 1: Socio-economic profile of the households surveyed

S. No.	Socio-economic variables	Tribal (n=30,390)	Rural (n=14,256)
1.	Type of House		
	Kutcha	39.8	22.3
	Semi Pucca	59.4	61.9
	Pucca	0.8	15.8
2.	Type of Family		
	Nuclear	79.2	63.5
	Extended Nuclear	11.2	18.2
	Joint	9.6	18.4
3.	Major Occupation of Head of the HH		
	Agriculture labour	21.8	15.3
	Other labour	19.4	28.2
	Cultivator	48.2	24.7
	Artisan	1.7	7.0
	Service	4.7	8.9
	Business	1.0	9.2
	Others	3.1	6.7
4.	Family Size		
	1-4	52.1	45.8
	5-7	41.1	45.9
	>7	6.8	8.3
	Average family size	4.6	4.9

(Brick wall with RCC roof) in nature. Whereas significantly higher percent of *kutcha* (mud wall with thatched roof) houses (40%) observed in

tribal compared to rural area (22%) (Table1). The proportions of nuclear families was higher among tribal (79%) than rural (63.5%). In contrast, joint and extended nuclear families were higher in rural (18.4 and 18.2%) than the tribal (9.6 and 11.2%). The average family size was 4.6 and 4.9 in tribal and rural areas respectively. Agriculture and allied occupations were higher (70%) in tribal than the rural (40%).

Food and Nutrient Intake

The intake of cereals and millets was 402 g and 365 g respectively in tribal and rural NPNL women (Table2). Except for other vegetables and roots and tubers, the intake of all the other foods was lower than the suggested level in both the areas. The intake of income elastic foods such as milk, oils and fats was higher in rural than in tribal NPNL, pregnant as well as lactating women, however, the intake of cereals and millets was higher among tribal women.

The intakes of all the nutrients were lower than the recommended levels suggested by ICMR in all the physiological groups in both the areas (Table 3). The deficit was more with respect to

Table 2: Average consumption of food stuffs (g/day) among adult women (above 18 years)

Physiological status	Type of population	n	Cereals and millets	Pulses and legumes	GLV	Other veg.	Roots and tubers	Fruits	Flesh foods	Milk and milk prdts.	Oil and fats	Sugar and jaggery
Non Pregnant & Non lactating	Tribal	1162	402	20	24	54	55	22	26	29	7	17
	Rural	5682	365	27	18	52	63	26	24	80	13	14
Pregnant	Tribal	129	463	23	45	64	41	13	18	18	8	12
	Rural	187	362	27	16	49	55	25	87	87	14	14
Lactating (<12 m)	Tribal	663	440	28	26	46	46	20	17	17	9	16
	Rural	454	406	30	17	56	63	24	80	80	14	13

Table 3: Average intake of nutrients (per day) among adult women (above 18 years)

Physiological status	Type of population	n	Protein (g)	Total fat (g)	Energy (kcal)	Calcium (mg)	Iron (mg)	Vit. A (µg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vit. C (mg)	Free Folic acid (µg)
Non Pregnant & Non lactating	Tribal	1162	43	21.0	1804	319	9.9	118	0.7	0.7	10.5	37	45
	Rural	5682	45	17.3	1703	342	11.4	109	1.1	0.5	13.4	29	47
	RDA	-	50	-	1875	400	30	600	0.9	1.1	12	40	100
Pregnant	Tribal	129	43	16.7	1773	293	9.3	109	0.7	0.7	10.1	36	47
	Rural	187	45	19	1654	352	11.9	111	1.0	0.5	12.4	26	48
	RDA	-	65	-	2175	1000	38	600	1.1	1.3	14	40	400
Lactating (<12 m)	Tribal	663	45	18	1868	274	9.8	113	0.8	0.7	10.8	30	45
	Rural	454	47	17	1852	320	11.8	107	1.2	0.6	14.4	28	52
	RDA	-	75	-	2425	1000	30	950	1.2	1.4	16	80	150

m micronutrients such as iron, vitamin A, riboflavin and free folic acid. The deficit in protein and energy intake was more among pregnant and lactating women, when compared to NPNL women in both tribal and rural areas. The deficit in energy intake was ranged from 19-24% among pregnant and lactating women in both areas. Similar observations was also made with respect to intake of protein.

With regard to protein-calorie adequacy status, in general, about 80% of NPNL women and 58-60% of the pregnant and lactating women consumed adequate amount of both protein and energy (P+C+) (Table 4). The inadequacy for both the nutrients (P-C-) was more in pregnant and lactating women than NPNL women in both the areas.

Distribution of women according to intake of nutrients less than 50% of RDA revealed that more than 70% of the women were not meeting even 50% of the requirement for iron and vitamin A in both areas (Table5). Similar observation was also made with respect to free folic acid, which ranged from 54% to 100% among tribal and rural women.

Nutritional Status

The prevalence of bitot spots, a sign of Vitamin A deficiency was 0.6% among tribal and 0.3%

Table 6: Prevalence (%) of Nutritional deficiency signs among adult women

Nutritional deficiency signs	Tribal women	Rural women
n	23642	18603
Bitot spots	0.6	0.3
Angular Stomatitis	1.1	0.8
Dental caries	13.5	11.7
Dental flurosis	0.6	0.6
Goitre	4.9	0.8
Phrynoderma	2.2	1.3

among rural women (Table 6). The prevalence of angular stomatitis, a sign of B complex vitamin deficiency was 1.1% and 0.8% in tribal and rural women respectively. In about 14% of tribal and 12% in rural women had dental caries. The prevalence of goiter was more in tribal women (4.9%) than rural women (0.8%).

Nutritional status of women was assessed using Body Mass Index (BMI) (Table7). Body Mass Index was computed using height and weight and grade the same using James Classification. In general, the prevalence of chronic energy deficiency (CED) was significantly higher ($P < 0.001$) among tribal women than the rural women. The prevalence of CED was 56% among tribal NPNL women against 36% in rural. Similarly, the prevalence of CED was high with 58% among

Table 4: Protein calorie adequacy (%) status among women

Physiological status	Type of population	n	Protein calorie adequacy status			
			P- C-	P-C+	P+ C-	P+ C+
Non-pregnant non-lactating	Tribal	1162	7.1	2.7	6.5	83.7
	Rural	5682	7.2	1.0	11.8	80.0
Pregnant	Tribal	129	26.4	1.6	11.6	60.5
	Rural	187	22.4	2.7	13.9	61.0
Lactation	Tribal	663	26.5	7.4	8.0	58.1
	Rural	454	18.3	7.5	14.5	59.7

+: Adequate; - : Inadequate

Table 5: Percentage distribution of women according to intake of nutrients less than 50% of RDA

	Non-Preg. Non-Lact.		Pregnant		Lactation	
	Tribal	Rural	Tribal	Rural	Tribal	Rural
Protein	7.3	5.9	20.9	18.2	24.0	13.4
Energy	2.8	4.2	7.0	7.5	7.5	3.7
Calcium	26.5	23.2	31.0	67.4	33.0	72.0
Iron	79.9	68.6	71.3	80.2	75.1	66.5
Vit. A	77.5	84.3	72.9	83.4	78.1	89.9
Thiamin	8.0	5.6	24.8	15.0	19.3	6.6
Riboflavin	24.0	50.8	41.9	62.6	39.7	63.7
Niacin	6.5	4.3	14.7	8.6	15.7	4.2
Vitamin C	29.0	33.3	27.9	36.9	35.6	64.3
Free Folic acid	61.0	55.9	54.3	100.0	59.1	83.5
No. surveyed	1162	5682	129	187	663	454

Table 7: Prevalence (%) of chronic energy deficiency among women by physiological status

<i>BMI Grade</i>	<i>Non-Preg. Non-Lact.</i>		<i>Lactation</i>	
	<i>Tribal</i>	<i>Rural</i>	<i>Tribal</i>	<i>Rural</i>
n	23237	16915	5548	1198
CED III (<16.0)	13.4	8.3	9.3	6.5
CED II (16.0-17.0)	14.9	9.1	15.5	9.5
CED I (17.0-18.5)	27.8	18.8	33.0	23.7
Low – normal(18.5-20.0)	22.2	18.3	25.0	22.5
Normal (20.0-25.0)	20.3	34.1	16.8	31.7
Overweight and obesity (>=25.0)	1.4	11.4	0.4	6.0
Chi-square test	339.9 (p<0.001)		398.3 (p<0.001)	

tribal lactating women against 40% among rural lactating women. The prevalence of overweight and obesity was higher among rural women than their tribal counterparts.

DISCUSSION

Women are generally vulnerable to under-nutrition especially during pregnancy and lactation where the food and nutrient requirements are more during that period. The demographic consequences of the lower status in women has formed expression in various forms such as female infanticide, higher death rate for women compared to men, lower sex ratio, lower literacy rate in female, lower level of employment of women in the non-agricultural sector as compared to men etc. (Srinivasan and Tara 1989).

Most Indian mothers are malnutritional, anaemic and have short pregnancy interval which could have been easily prevented. Women especially in younger age are at high obstetric risk (using the risk criteria of height less than 145 cm and weight less than 38 kg) (Saramma 1989). Several studies serve underscores the relationship between maternal nutrition and incidence of low birth weight (Agarwal 1984). The prevalence of micronutrient deficiencies - a study carried out by NNMB (2003) revealed that the overall prevalence of anaemia was observed to be highest among lactating women (78%) followed by pregnant Women (75%) and adolescent girls (70%).

Generally, at household level, cultural norms and practices and socio-economic factors determines the extent of nutritional status. The high fertility of Indian women is one of the most detrimental socio-cultural influences on nutritional status because the metabolic stresses of pregnancy and lactation may not be adequately compensated by dietary intake before, during or

even after these physiological processes. During pregnancy women is access to foods even more restricted in the traditional Indian household through taboos and ritual observances, which are widely documented in both rural and tribal population (Chatterjee 1989).

Maternal education had a significant influence on nutritional status. Several studies indicated that malnutrition is a serious health concerns that Indian women face (Chatterjee 1990). It threatens their survival as well as that of their children. The negative effects of malnutrition among women are compounded by heavy work demands, by poverty, by child bearing and rearing and by special nutritional needs of women, resulting in increased susceptibility to illness and consequently higher morbidity. A recent study (Dharmalingam et al. 2009) indicated that the impact of Nutritional Status of mother is more pervasive than the impact of other factors on birth weight. The dietary intake of rural pregnant women was lower than the recommended level (Jood et al. 2002).

The results of the present study revealed inadequate dietary intake, especially hidden hunger during pregnancy and lactation period among women. Tribal women were particularly vulnerable to undernutrition compared to their rural counterparts. Because of wide variation in culture, religion and levels of development among different Indian States, it is not surprising that women's health also varies greatly from State to State. The study highlights the need for necessary steps for more community participation in various developmental programmes for removal of poverty and improve literacy rate among females. Health and Nutrition Education has to be strengthened through department of health and ICDS, to bring awareness and behavioral change for better health and nutrition practices to improve the nutritional status of mother and child.

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