

Nutritional Status of Reproductive Ethnic Woman Living in Chittagong Hill Tracts of Bangladesh: Influence of Socio-economic and Nutritional Factors

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Abstract

Aim

This cross sectional study assessed the nutritional status of ethnic reproductive women aged between 15-40 years, comprising 85 lactating women (LW) and 86 non-pregnant-non-lactating women (NPNLW) who lived in various parts of three hilly districts (Bandarban, Khagrachari and Rangamati) of the Chittagong Hill Tracts (CHTs) of Bangladesh.

Materials and Method

Research tool was pretested semi-structured questionnaire for this observational study. Anthropometric indices like weight, height and mid-upper-arm-circumference (MUAC) were used in assessing the nutritional status.

Results

Most (44.4%) of the ethnic women were Marma, followed by Chakma (39.8%), Bam (8.2%) and Tripura (5.8%). No significant ($P>0.05$) differences were observed in socio-economic variables between LW and NPNLW. Overall, mean age of the women was 28 (± 7.2) years; mean family income was 18,822.2 (± 3091) BDT and majority (86%-87%) were reported to be food secured throughout the year. Mean Dietary calorie (2631 \pm 798 kcal) intake of both groups were up to the mark according to the recommended dietary allowances (RDAs) and most (80.3%-86%) of them also possessed good nutritional knowledge. However, no significant ($P>0.05$) differences were observed in dietary calorie intake and nutritional knowledge score between two groups of women. Overall, most (68.4%) of the women had normal body mass index (BMI kg/m^2), 11.7% were found to be undernourished or thin and 19.9% were overweight. It was noticed that better nutritional status of LW and NPNLW were significantly associated with literacy ($P<0.05$), occupancy in household chores ($P<0.05$), better income ($P<0.05$), food security ($P<0.05$), recommended calorie intake level ($P<0.05$) and better nutritional knowledge score ($P<0.05$).

Conclusion

This study showed that vast majority of the ethnic reproductive women of CHTs are in better nutritional status with normal BMI (kg/m^2) and daily calorie intake according to RDA. Most of them were food secured and their nutritional knowledge score was also up to the mark. Better socio-economic condition, nutritional knowledge and accurate calorie intake play a vital role in achieving healthy nutritional status of the two women groups of CHTs.

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Introduction

An ethnic group is a socially defined category of population who recognize with one another based on common ancestral, social, cultural or national experience. They tend to segment themselves with a different origin, cultural heritage, history, language, ideology, religion and ritual [1]. Bangladesh has been culturally enriched by the colourful lifestyle of different ethnic people. Around 44.4 % of ethnic population lived in three hilly districts of Chittagong Hill Tracts (CHTs) with eleven ethnic multi-lingual minorities (e.g. Bawm, Chak, Chakma, Khyang, Khumi, Lushai, Marma, Mro, Pangkhua, Tangchangya, and Tripura). Ethnic minorities or tribal communities possess distinct culture, language, religion, cuisine, dressing style, physical appearance and even landscape from the main land population [1, 2].

In an women`s life reproductive age is identified as those child bearing years between menarche and menopause, roughly from ages 15 to 44 years. The term is imprecise, since some women can become pregnant and bear children at younger or older ages [3]. This is one of the most vulnerable group in term of health and nutrition related issues. Blood loss during periods and delivery, extra nutritional requirements during pregnancy and lactation makes this age group a prime concern of any nation. Nutritional status is the current physical status of a person or a group of people in relation to their state of nourishment. Good nutritional status is considered as a reflection of superior standard of living and both social and nutritional awareness, it is not only a determinant but also an outcome of development. Anthropometry is the measurement of body height, weight and proportions of an individual and

an efficient indicator of nutritional status [4]. Previous studies [5-9] on ethnic people of Chittagong Hill Tracts were documented as malnourished, poor, uneducated and underprivileged because of their limited earning and employment opportunities, poverty, unhygienic housing and water sources, limited access to education and other necessary social and health services, most of which are almost two decades earlier. Nutritional status of ethnic reproductive women (15-40 years) in Chittagong Hill Tracts is not properly addressed yet in the context of present uprising economy of Bangladesh. Positive changes in socio-economic status (SES) could influence the nutritional status as well as food security. The aim of this study was to assess the prevalence of nutritional status of lactating (LW) and non-pregnant non-lactating women (NPNLW) of the CHTs and to find out the impact of their present socio-economic condition and different nutritional factors (e.g. food security, dietary calorie intake and nutritional knowledge) on nutritional status of the two groups of reproductive women.

Materials and Methods

It was a cross sectional study, conducted among the ethnic communities of both the urban and rural areas of Bandarban, khagrachori and Rangamati of the CHTs between the year 2013-2014. A total of 171 participants (85 lactating and 86 Non-pregnant non-lactating) were selected from 156 households as study sample to determine the nutritional status. Verbal permissions and written consent were taken prior the study. Study was approved by the ethical review board of the Biological Science, University of Dhaka. A well semi-structured questionnaire was developed and

documented to record data on socio-demographic variables (e.g. age, educational attainments, occupation, marital status and income etc.) and nutritional variables (e.g. food security, dietary calorie intake and nutritional knowledge). 'Nutritional status' was assessed by the anthropometric measurements such as height, weight and mid-upper-arm circumference (MUAC) [10-12]. The weight and height were measured by using digital 'weight scale' and manual 'Height Scale' respectively. Body Mass Index (BMI kg/m^2) was computed using the standard equation: $\text{BMI} = \text{Weight (kg)} / \text{height (m}^2\text{)}$ [11, 12]. MUAC tapes were used to measure MUAC to the nearest 0.1 cm. MUAC cut off point (22.4 cm) was applied for evaluating nutritional status [4, 12].

'Food security' was measured using a set of questions addressing debt situation of the family [13]. 'Calorie intake and dietary patterns' were assessed using a pretested food frequency questionnaire (FFQ) and one day 24-hour dietary recall. A set of standard measuring cups were used to estimate the quantity of food being consumed (serving size in grams). This method is used widely to compare nutrient intakes with specific dietary recommendations. Food conversion factors [14] were used to convert cooked food weight to raw food weight. Nutrients values were calculated per 100 g of raw food consumed by using the food composition database for Bangladesh [15, 16]. Dietary calorie intake was compared with standard RDA value to obtain dietary adequacy [17]. 'Nutritional knowledge' score was assessed by another set of questionnaire comprising 45 questions about nutrition (food groups, balanced diet, nutrient rich foods, nutritional diseases, food habit etc.) bearing one point for each right answer and zero for each wrong answer.

Statistical Analysis

Both statistical software packages (version 21.0 SPSS Inc. Chicago, IL, USA) and Microsoft excel were employed for data entry and analysis. Descriptive statistics and compare means were mainly used to analysis the data. Association of nutritional status of the ethnic reproductive women with socio-economic factors or nutritional factors (all categorical variables) were assessed by chi-square and fisher's exact test. For quantitative variables the differences were tested using one sample t-test. P-value was set at 5% level of

significance.

Results

In socio-demographic profile (table 1), Most (44.4%) of the tribal women were Marma, followed by Chakma (39.8%), Bam (8.2%) and Tripura (5.8%). Mean age of lactating women (LW) and non-pregnant-non- lactating women (NPNLW) was 26 y and 28 y respectively ($P=.567$) and vast majority of women of both groups were between 18-40 years old. It was also observed that most of LW (76.5%) and NPNLW (66.3%) were literate, married (91.3%), mainly involved in household chores (78.4%). Maximum families (87.0% -89.5%) of the two women groups ($P=.530$) earned more than 6000 BDT per month, and majority (86%-87%) were reported to be food secured throughout the year. Mean Dietary calorie intake (2631 ± 798) of both groups were up to the mark according to the recommended dietary allowances (RDAs) and vast majority (80.3%-86%) of them also possessed good nutritional knowledge. However, no significant ($P>0.05$) differences were observed in dietary calorie intake (2731 vs. 2531 kcal) and nutritional knowledge score (33.8 vs. 35.4) between two women groups.

Table 2 compared the anthropometric indices of the two women groups, no significant differences ($P>0.05$) were observed between mean BMI (22.1 vs. $22.6 \text{ Kg}/\text{m}^2$) of the two groups. Overall, majority (68.4%) of women were in normal status (BMI $22.3 \pm 3.9 \text{ Kg}/\text{m}^2$), 11.7% found to be underweight (BMI $< 18.5 \text{ Kg}/\text{m}^2$) and 19.9% were overweight (BMI $\geq 25.0 \text{ Kg}/\text{m}^2$). According to MUAC measurements, 87.2% participants had the MUAC ≥ 22.4 cm and were considered to have normal weight.

Table 3 demonstrates the relationship of nutritional status (categories of BMI Kg/m^2) of ethnic people with their socio-economic variables, food security, dietary calorie intakes and nutritional knowledge. It was noticed that better nutritional status of lactating and NPNL women were significantly associated with literacy ($P<0.05$), occupancy in household chores ($P<0.05$), better income ($P<0.05$), food security ($P<0.05$), recommended calorie intake level ($P<0.05$) and better nutritional knowledge score ($P<0.05$). Association of nutritional status with age and

Table 1. Socio-economic and Nutritional Variables of the Reproductive Ethnic Women

Socio-economic variables	Total % (N)	Lactating women (n=85) % (n)	Mean± SD	NPNL Women (n=86) % (n)	Mean± SD	P-value
Tribe/ethnicity types						
Marma	44.4 (76)	52.9 (45)		36.0 (31)		
Chakma	39.8 (68)	41.2 (35)		38.4 (33)		
Bam	8.2 (14)	0.0 (00)		16.3 (14)		
Tripura	5.8 (10)	4.7 (04)		6.9 (06)		
Tonchaonga	0.6 (1)	0 (00)		1.2 (01)		
Others	1.2 (2)	1.2 (01)		1.2 (01)		
Age group						
15- 17 years	6.0 (10)	0.0(0)	26.40	11.6 (10)	28.40±9.	t=-575
18-40 years	94.0 (161)	100 (85)	±4.8	88.4 (76)	0	P=0.567
Education						
Illiterate	28.6 (49)	23.5 (20)		33.7 (29)		$\chi^2 = 0.102$
Literate	71.5 (122)	76.5 (65)		66.3 (57)		P= 0.749
Occupation						
Agriculture	7.0 (12)	4.7 (4)		9.3 (8)		$\chi^2 = 2.334$
House hold chores	78.4 (134)	90.6 (77)		66.3 (57)		P= 0.969
Non-Agriculture	14.6 (25)	4.7 (4)		24.4 (21)		
Marital status						
Unmarried	8.7 (15)	0.0 (0)		17.4 (15)		-
Ever Married	91.3 (156)	100 (85)		82.6 (71)		-
Family Income (BDT)						
<6000	11.7 (20)	13.0 (11)	17986.6	10.5 (9)	18679.9±1	t = -0.631
≥ 6000	88.3 (151)	87.0 (74)	±5768.9	89.5 (77)	901.7	p = 0.530
Nutritional variables						
Food insecurity						
Never	86.5 (148)	87.0 (74)		86.0 (74)		$\chi^2 = 2.077$
Occasionally	13.5 (23)	13.0 (11)		14.0 (12)		P= 0.150
^a Dietary Calorie Intake (kcal)						
<RDA	20.5 (35)	18.8 (16)	2731.0	22.0 (19)	2531.0±79	t = 0.590
≥RDA	79.5 (136)	81.2 (69)	±803.2	78.0 (67)	0	p = 0.532
Nutrition Knowledge Score						
14-29	17.0 (29)	14.0 (12)		19.7(17)		t = -1.664
30-45	83.0 (142)	86.0 (73)	33.8 ±8.2	80.3 (69)	35.4 ±6.0	p = 0.100

^aRDA for dietary energy of lactating women¹⁷

In 0-6 months of lactation Sedentary worker – 1875 +550 kcal

Moderate worker- 2225+550 kcal

In 6-12 months of lactation sedentary worker – 1875 +400 kcal

Moderate worker- 2225+400 kcal

^aNPNL women sedentary worker – 1875 kcal

Moderate worker- 2225 kcal

Table 2. Anthropometric Indices and Nutritional Status of the Ethnic women

Parameters	Lactating Woman (n=85)		NPNL Woman (n=86)		P-value	All (n=171)	
	% (n)	Mean± SD	% (n)	Mean± SD		% (n)	Mean± SD
Height (cm)							
126-150	46.0 (39)	147.7±2.4	48.0 (41)	145.2±7.4	t=-1.259	p=0.211	151.5 ± 6.7
151-180	54.0 (46)	156.4±4.3	52.0 (45)	155.4±3.0	p=0.211	53.2 (91)	
Total	100 (85)	151.6±5.7	100 (86)	150.5±7.5		100 (171)	
Weight (kg)							
31-50	55.0 (47)	44.5±4.2	52.0 (45)	45.4±3.7	t =0.288	53.8 (92)	51.1 ± 8.3
51-75	45.0 (38)	58.7±6.4	48.0 (41)	57.5±5.6	p=0.774	46.2 (79)	
Total	100 (85)	50.9±8.7	100 (86)	51.1±7.7		100 (171)	
MUAC (cm)							
<22.4 cm	13.0 (11)	21.5±0.5	13.0 (11)	21.2±0.4	t =0.824	12.8 (22)	25.4± 2.6
≥22.4 cm	87.0 (74)	25.7±2.5	87.0 (75)	26.3±2.1	p=0.412	87.2 (149)	
Total	100 (85)	25.4±2.75	100 (86)	25.6±2.6		100 (171)	
BMI (kg/ m²)							
<18.5	11.0 (9)	16.5±1.2	13.0(11)	17.3±1.7	t =1.249	11.7 (20)	22.3 ± 3.9
18.5-24.99	71.0 (60)	21.2±1.8	66.0 (57)	21.9±1.8		68.4 (117)	
≥25.0	18.0 (16)	27.4±2.4	21.0 (18)	28.1±51	p=0.215	19.9 (34)	
Total	100 (85)	22.12±3.4	100 (86)	22.6±4.3		100 (171)	

Significant: p<0.05, Descriptive statistics, Compare mean: One sample t-test

Table 3. Association of the Nutritional Status of Ethnic Women groups with their Socio-economic and Nutritional Factors

Socio-economic status	BMI (Kg/m ²)							
	Lactating Woman (n=85)			P-value (Fisher's exact test)	NPNL Woman (n=86)	P-value (Fisher's exact test)		
	Low (<18.5)	Normal (18.5-25)	overweight (≥25)		Low (<18.5)		Normal (18.5-25)	over-weight (≥25)
Age in years								
15-17 years	-	-	-	constant	3	6	1	χ ² =2.982
18-40 years	90	60	16		8	51	17	p=0.227
Education								
Illiterate	6	10	4	χ ² =9.343	8	17	4	χ ² =8.176
Literate	3	50	12	p=0.00	3	10	14	p=0.02
Occupation								
Agriculture	3	1	0	χ ² =10.146	5	2	1	
Household chores	6	56	15	p=0.02	4	41	12	χ ² =13.084
Non-Agriculture	0	3	1		2	14	5	p=0.00
Marital status								
Unmarried	-	-	-	constant	4	9	2	χ ² =3.064
Ever married	9	60	16		7	48	16	p=0.222
Income (BDT)								
<6000	4	7	0	χ ² =8.236	4	5	0	χ ² =7.798
≥ 6000	5	53	16	p=0.01	7	52	18	p=0.01
Nutritional factors								
Food insecurity								
Never	5	55	14	χ ² =7.178	7	49	18	χ ² =6.959
Occasionally	4	5	2	p=0.02	4	8	0	p=0.02
Calorie intake								
<RDA	6	8	2	χ ² =11.502	2	9	8	χ ² =6.027
≥RDA	3	52	14	p=0.00	9	48	10	p=0.049
Nutrition								
14-29	4	7	1	χ ² =6.182	5	11	1	χ ² =6.247
30-45	5	53	15	p=0.03	6	46	17	p=0.04

Significant p<0.05

marital status of LW could not be established as cell values of both '15-17 age group' and 'unmarried status' were zero. However, no significant association of Age and marital status with nutritional status of NPNL women was found ($P > 0.05$).

Discussions

This study postulates that overall 68.4% ethnic reproductive women had normal BMI ($18.5\text{-}24.99 \text{ kg/m}^2$), 11.7% were thin or having Chronic Energy Deficiency (CED) ($\text{BMI} < 18.5 \text{ kg/m}^2$) and 19.9% were overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$). The average dietary calorie intake (2631 kcal) and normal BMI ($22.3 \pm 3.9 \text{ kg/m}^2$) of ethnic LW and NPNLW of this study indicate better socio-economic profile, food security and quality dietary, educational attainment of ethnic participants than previous records [6-9] which collectively upgrade the nutritional status of these women groups. This results are somewhat similar with other studies [18, 19]. Study [18] conducted by Haque and Akhter (2014) among both the male and female members of ethnic communities in CHTs showed better nutritional status of ethnic minorities where prevalence of underweight, normal weight and overweight was 4.7%, 78%, and 17.3% respectively, while previous 'Nutrition and Health Surveillance in the Chittagong Hill Tracts, 2000' conducted by Helen Keller International (HKI) [5] observed that chronic energy deficiency among Non-pregnant women was 27%. Other dietary factors (data were not shown) those contribute for better nutritional status of these women groups could be their more intake (56.0-63.7%) of green leafy vegetables (GLVs) and non-leafy vegetables (50.3% -59.1%) especially at lunch and milk consumption (17-21.1%) than Bengalese. However, their meat (1.8-8.8%) and fruit (0.6-3.5%) consumption was poor and their rice consumption patterns are similar to Bengalese. Prevalence of common non-communicable diseases was very low in CHTs ethnic community than Bengalese.

This study showed mean family income was 18,822.2 BDT and majority (86%-87%) were reported to be food secured throughout the year and only 13.5% were food insecure occasionally which are also reflected in Nutrition, Health, Demographic Survey, Bangladesh (2013) [19] where higher mean family income documented for CHTs that exceeded the national

average household income and expenditure. This is also indicating a major alleviation of living standards of the ethnic people in the CHTs. However, two decades earlier study [6] indicated that 77.25% ethnic households were not food secured and Barakat *et al* (2009) [7] showed monthly family income and expenditure of ethnic people were 5,200 and 4,750 BDT respectively.

Globally a large number of studies [20-26] addressed tribal community, asserted that they are at the lowest stratum of the society due to geographical and cultural isolation, low levels of literacy, multiplicity of the language, high levels of poverty etc. Neighbouring country India where almost half of the world's tribal population (called scheduled tribe) resided [20] and majority of the studies [20-26] conducted in India reported that the socioeconomic and nutritional status (both anthropometric and dietary) of these ethnic minorities were not up to the mark and worse nutritional situation prevails than ours. Nutritional knowledge of the tribes was reported also unsatisfactory than ours [20].

Over many years, the ethnic people of Chittagong Hill Tracts had suffered from a lot of political (25 years of civil war, which formally ended in 1997 with the signing of a peace accord with Government of Bangladesh), economic and social problems. Post war, area's remoteness, poor communication and unique socio-economic characteristics, multiplicity of languages have made it difficult to provide basic social services to inhabitants of the CHTs. Thus, CHTs had largely been excluded from mainstream development programmes in Bangladesh. Access to the CHTs was especially challenging for international staff [27]. Earlier studies [5-9] on ethnic people of Chittagong Hill Tracts were documented as poor, malnourished, underprivileged, neglected, food unsecured, deprived from basic needs, no health services and job opportunities, and mostly (64%) lived in lower socio economic standards by Jhum cultivation (primitive techniques by burning the trees which made lands infertile and imbalanced the eco-system and created huge environmental damages) followed by agriculture labor (12.5 %).

Previously literacy rate in the CHTs was also lower than that national level and seven out of every ten women in the CHTs were illiterate. Earlier survey [7] reported that 54.5% of the ethnic household heads had

no formal education and 53.9% of the ethnic people were illiterate. But in the last couple of years this scenario has been changed, which also reflected in this study and showed 71.5% literacy rate, more than half (57.3%) of which completed secondary education. Compared to previous surveys [7], an acceleration of literacy rate is seen in another study [18] among ethnic people of the CHTs that showed 63.3% literacy rate. This increased literacy could be the outcomes of various projects and services like – provision of new schools, mother language based multi lingual pre-primary education and new recruitment and training of teachers provided for ethnic people in the CHTs by local, national and international NGOs.

For many years various development projects [27-33] being run by either government or local or international NGOs to accelerate the lifestyle pattern of ethnic communities in the Chittagong Hill Tracts, which also reflected through their current better nutritional status in present study. Different development programmes were running during data collection and every ethnic household in the CHTs is currently under some kind of development project conducted by either local NGOs or international NGOs. Thus the road of progress was slow and difficult for these ethnic people but gradually these developmental projects and programs had helped ethnic communities of CHTs to upgrade their socio-economic status, offered them an improved living standards (quality education, quota facilities both in higher education and government jobs, various job opportunities, better health care facilities, freedom of expression). The improvement in standard of living of the ethnic people of CHTs is more or less evident and obvious. Thus, comparing previous records, a conclusion can be made that there has been an increasing trend in improving the nutritional status of the ethnic reproductive women of CHTs over the decades.

Conclusion

Ethnic people are in a better nutritional status than reported before. Prevalence of chronic energy deficiency are lower than that of overweight in both groups. Upgraded socio-demographic status in CHTs ensured better nutritional status. Economic stability, high literacy rate, food security, adequate food intakes

and proper nutrition knowledge appears to be the important fundamental factors responsible for better nutritional status of the ethnic reproductive women in Chittagong Hill Tracts.

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Conflict of Interests

Authors have declared no conflict of interest.

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