Nutritional status and energy balance of tribal women of reproductive age group of Meghalaya, India

Elvina Shongsir Monsang and Namita Singh

India has largest concentration of tribal communities in the world except that in Africa. Tribal women are often neglected in terms of nutrition which leads to nutritional deficiencies, mortality and death. The importance and necessity to study the nutritional status of the tribal females of the northeast India was felt and in this backdrop, the present study was conducted with the objectives to assess the level of socio-economic development of tribal women of reproductive age, their dietary intakes in terms of quantity and quality and nutritional status. Study conducted in five villages of three districts of Meghalaya among 150 reproductive age group tribal women selected through stratified random sampling method and data were collected by a pretested interview schedule. Study revealed that almost half (49.33%) of the tribal women weights were in the category of 40-50 kg. Similarly majority of the tribal women's heights were in the category of 145-150 cm (38.0%). Person with normal BMI was 63.33 per cent. The overall prevalence of CED was 24 per cent. The Mean ± SD of the BMI was 21.06 ± 3.55 kg/m². Three-fifth of the subject population fell under negative energy balance (64%).

Key Words : Nutritional status, BMI, CED, Energy balance, Tribal women

INTRODUCTION

India being a diversified country has a heterogeneous people living in urban, semi-urban and rural areas. India has largest concentration of tribal communities in the world except that in Africa (Lal and Devanna, 2016). According to 2011 census, out of the total population in India, the tribal population is about 8.6 per cent. Health and

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nutritional status of tribal population indicates that the goal of achieving better health status for all can only be attained when due attention will given to the vulnerable sections of the society (Nayak and Sreegiri, 2016). Being vulnerable section, the effect on women health is much higher. Women are reflected as the most vulnerable and marginal lines of the society. They are often neglected in terms of nutrition which leads to nutritional deficiencies, mortality and death. Nutrition is one of the crucial parts of life. Nutrition not only enables the individual to live well and provides healthy life but also helps to deal different nutritional problems (Siddiqui *et al.*, 2016). Nutritional status indicates health status of a person (Goswami and Bhattacharyya, 2015). Diet and nutrition play an important role for proper functioning and

maintenance of good health throughout the life (Mittal, 2013). Many developing countries including India, due to prevalence of undernutrition, overweight and obesity bear duel burden of malnutrition (Bharali *et al.*, 2017). Several tribal populations have high rates of chronic energy deficiency problems (Das and Bose, 2012). The overall prevalence of undernutrition, overweight and obesity was 10.50 per cent, 9.94 per cent and 9.57 per cent, respectively (Bharali *et al.*, 2017).

Energy balance exerts significant influence on the nutritional status. With all efforts for the upliftment of the oppressed class, there still exists large variation in different caste groups and SC/ST people today who are at the most disadvantageous position (Mishra *et al.*, 2011). Energy intake, energy expenditure and energy balance are affected by socio-economic factors *viz.,* type and size of family, occupation and income. Energy expenditure is influence by the individual intake (Singh, 2009). Energy balance is the difference between energy intake and energy expenditure. Energy balance covers positive energy balance and negative energy balance. The condition of positive energy balance arises when the energy intake is more compared to energy expenditure whereas negative energy balance occurs when energy expenditure is more compared to calorie intake. FAO/ WHO/ UNU state that the energy requirement of an individual is the level of energy intake from food that will balance energy expenditure when the individuals has a body size and composition, and level of physical activity, consistent with long-term good health and that will allow for the maintenance of economically necessary and socially desirable physical activities. In children and pregnant or lactating women, the energy requirement includes the energy needs associated with the deposition of tissues or the secretion of milk at consistent rates with good health.

Several studies has been conducted on the tribes regarding their culture, status of women in relation to their socio-cultural problems, employment, food behaviour, health, etc. However, the studies on the nutritional status of tribal women especially in the state of Meghalaya are scarce. Thus, the importance and necessity to study the nutritional status of the tribal females of the northeast India was felt and in this backdrop, the present study was conducted in an exploratory type of research design with the objectives; to assess the level of socio-economic development of tribal women of reproductive age and to assess energy balance of subjects and their nutritional status.

METHODOLOGY

It is a cross sectional study conducted in five villages of three districts of Meghalaya among 150 randomly selected reproductive age group tribal women. In Meghalaya, three major tribes, Khasi, Garo and Jaintia are visible, who have different cultures, norms, taboos, customary laws, languages etc (Lahiri and Das, 2010). Among the eleven districts in Meghalaya, West Garo Hills district, Ri- Bhoidistrict and West Jaintiya Hills district were selected purposively for the study to cover three major tribal groups (Garo, Khasi and Jayantia) and easy accessibility of the researcher. The villages were selected by stratified random sampling technique. Women of reproductive age group *i.e.* 15-49 years were considered as unit of study. Female with at least one child below 5 years of age were selected for the study. In this study a predesigned and pretested interview schedule was used as a primary tool. Personal interview method was used by the researchers to obtain the relevant data on various aspects. Anthropometric measurements such as height and weight were recorded by using weighing machine and measuring tape. The twenty four hours recall method was used for assessing energy intake and energy balance. Appropriate statistical analyses namely frequency and percentage distribution, mean distribution, range, standard deviation etc. were included wherever required. Microsoft Excel was used for statistical analyses. This research paper is a part of Post Graduate research conducted by the student before starting the data collection the study was presented in front of Institutional Ethical Committee (IEC) and ethical clearance was taken.

OBSERVATIONS AND ASSESSMENT

The research findings of the present study are discussed under the following heads:

General information:
The general information of the subjects is shown in the Fig. (1-8). Out of the total 150 subjects, 134 (89.34%) were married, 14 (9.33%) were divorced and 2 (1.33 %) were widow. Majority of the tribal women were living in nuclear family (64.67%), with majority in family size of 2 to 5 members (50.67%). The study shows that most of

the tribal females had high school education (32.67%). It also reveals that majority of them were unemployed (67.33%) and for majority of them, income source was daily labour (32%). More than one-fifth (30.67%) was having income of Rs.5000/- to Rs.9999/-. Out of the total subjects, three-fifth (60%) of the subjects belonged to the upper lower class category. Majority (72%) of them used firewood as their main source of cooking fuel. The chart (Fig. 9) clearly showed that majority of the tribal females belonged to the age group of 26-35 years (62%), followed by the age group of 15-25 years (18.67%), 36-45 years (16.67%) and above 45 years (2.66%).

Anthropometric measurement:

The anthropometric measurement *viz.,* Height, weight and BMI is shown in the Tables 1, 2 and 3. Majority (49.33%) of the study tribal women weight was in the category of 40 to 50 kg, followed by 50 to 60 kg (24.67%), next 30 to 40 kg (16%) and then greater than 60 kg (10%). Similarly the height of the tribal females

was highest in the group of 145 to 150 cm (38%), followed by 150 to 155 cm (37.33 %), 155 to 160 cm (18.67%), 145 cm (4.67%), and more than 160 cm (1.33%). The subjects' BMI was classified as per WHO BMI classification and found that majority of them (63.33%) had normal BMI. The overall prevalence of CED was 24 per cent where 10.67 per cent was in the category of CED Grade –I (Mild), 7.33 per cent was under the category of CED Grade II (moderate) and 6 per cent was under CED Grade –III (severe). The prevalence of obesity was 12.67 per cent in which pre-obese was 10 per cent and 2.66 per cent had obsess class-I. Therefore, the overall weight, height and BMI were 48.5 kg ± 8.83 kg, 151.61 ± 4.5 cm and 21.06± 3.55 kg/m², respectively. The overall prevalence of under nutrition and obesity were 24 per cent and 12.67 per cent, respectively. However the present findings had somewhat lower percentage when compared to the findings of Mittal (2013); Banik *et al.* (2007); Rao *et al.* (2010) and Kaur and Kaur (2011) but higher than the findings of Bharali *et al.* (2017) and
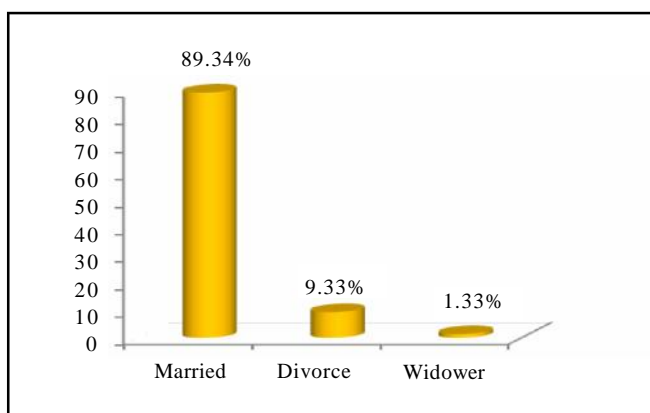
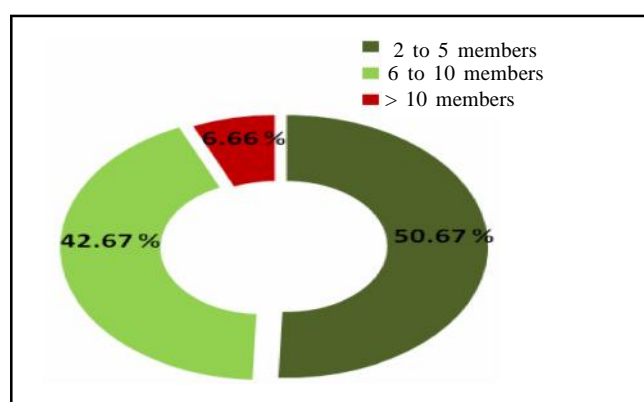

Fig. 1 : Marital status of the study women
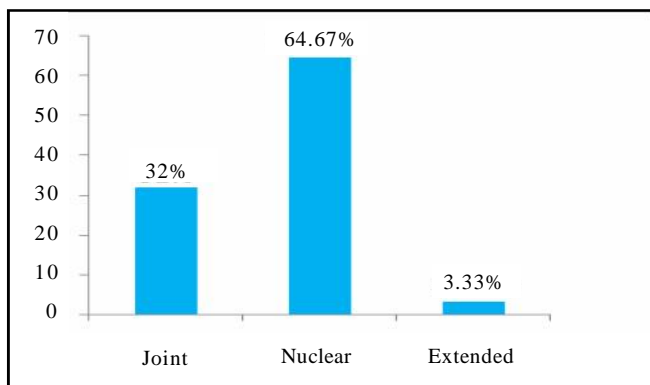

Fig. 3 : Family size of the subjects

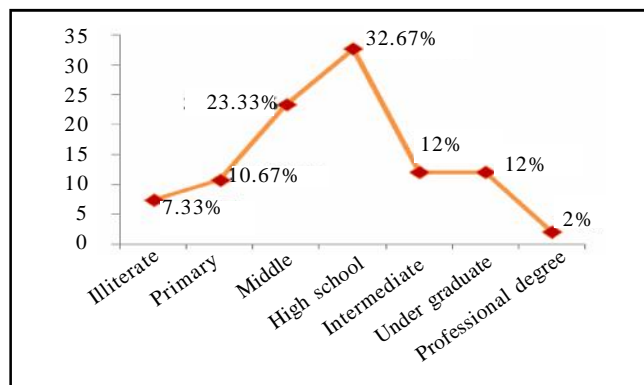**Fig. 2 : Distribution of the subjects as per type of family**

Fig. 4 : Qualification of the subjects
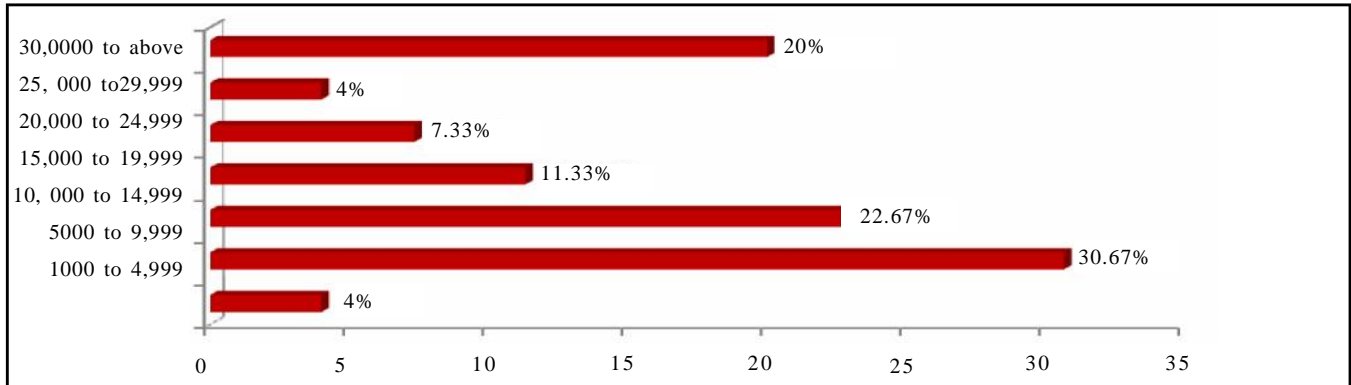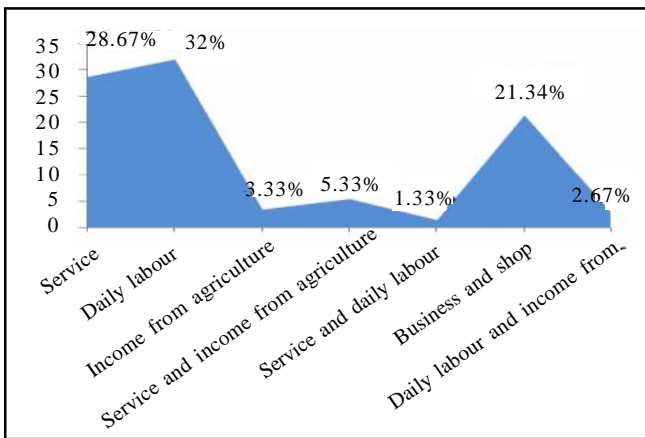
Fig. 5 : Family income per month

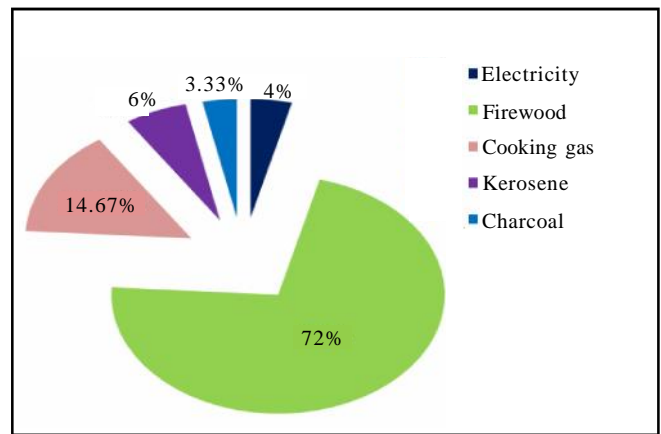**Fig. 6 : Family income source**

Fig. 8 : Cooking fuel
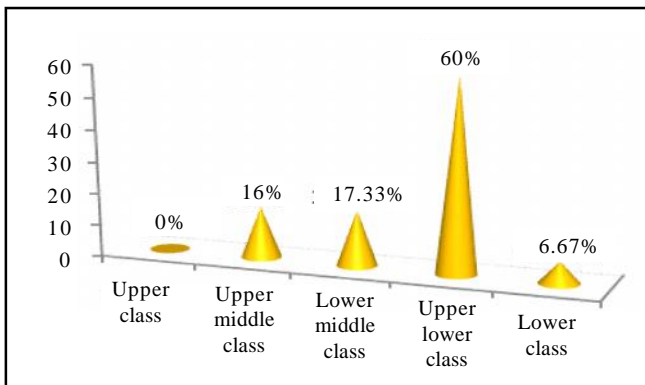
Fig. 7 : Socio-economic status
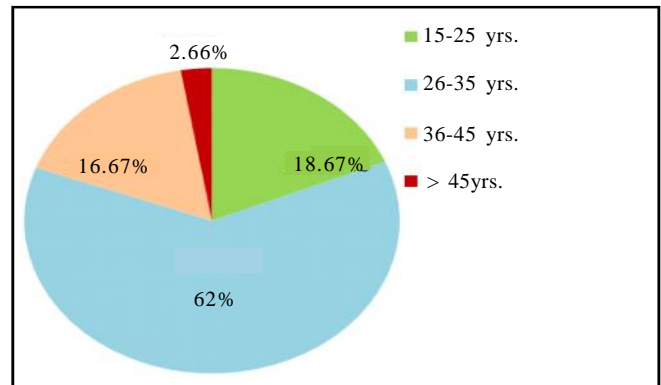
Fig. 9 : Age of the subjects

Ghosh-Jerath *et al*. (2016).

Energy balance:

Out of total 150 subjects, more than three-fifth of the subjects' population fell under negative energy balance (64%). According to their physical activity pattern, the study subjects were categories into three groups *viz.*, Sedentary, moderate and heavy worker. The overall mean energy intake, expenditure and energy balance for sedentary were 1697.75±236.49 kcal/d, 1680.43±196.29 and 15.74±297.68, for moderate 2069±329.8kcal/d, 2362.12±171.35 and -414.28±368.41 and for heavy

Fig. 10 : Energy balance

Table 1: Weight of the subjects

Sr. No	Weight (kg)	Frequency	Per cent
1.	30-40	24	16.0
2.	40-50	74	49.33
3.	50-60	37	24.67
4.	>60	15	10.0
	Total	150	100
	Mean ± SD = 48.5 ± 8.83 kg		Range 30 kg – 84 kg

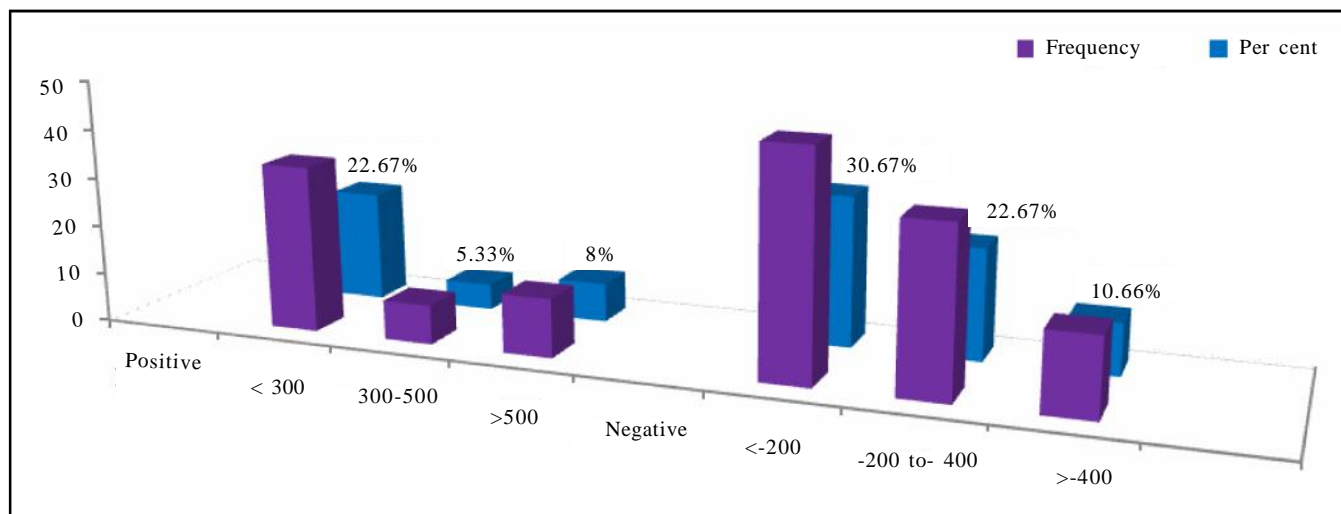**Table 2: Height of the subjects**

Sr. No	Height (cm)	Frequency	Per cent
1.	< 145	7	4.67
2.	145-150	57	38.0
3.	150-155	56	37.33
4.	155-160	28	18.67
5.	>160	2	18.67
	Total	150	100
	Mean ± SD = 151.61 ± 4.5 cm		Range 140 cm – 162 cm

Table 3: Body mass index (BMI) of the subjects based on chronic energy deficiency (CED) classification

Sr. No	Class	BMI (kg/m²)	Frequency	Per cent
1.	CED Grade – II (Severe)	<16.00	9	6.0
2.	CED Grade – I (Moderate)	16.00-16.99	11	7.33
3.	CED Grade – (Mild)	17.00-18.49	16	10.67
4.	Normal	18.50-24.99	95	63.33
5.	Overweight	≥25.00	19	12.67
		Total	150	100
	Mean ± SD = 21.06 ± 3.55 kg/m²			Range 13.0 kg/m² – 37.84 kg/m²

1944.06±124.79kcal/d, 2653.39±28.93 and -534.02 ±296.28, respectively (Table 4). Though the energy intake by the subjects were low (Table 4.), more than four-fifth (85.33%) of the subjects' activity pattern was sedentary. This could be because females with at least one child below 5 years of age were selected for the study, majority of them were housewives living in nuclear family and were looking after their child and not much engaged in agricultural activity. The study revealed the existence of negative energy balance among the study population. Similarly, Mishra *et al.* (2011) and Singh (2009) also reported the prevalence of negative energy balance in their studies. The difference in mean score was observed to be statistically significant between age, family

size and per capita income with regards to daily energy intake and energy expenditure of the subjects (Table 5) (Nanda and Dhar, 2017; Pande *et al.,* 2014; Rao *et al.,* 2006; Shadap and Pala, 2017 and Wani and Jan, 2016).

Summary and Conclusion:

This study depicted a clear picture of nutritional status of tribal females of reproductive age group of Meghalaya. Nutritional status is very significant as it is correlated with the health status. The present study revealed that the prevalence of CED and negative energy balance occurs among the tribal women of Meghalaya. One third of them were found to be under the category of CED.

Table 4: Study subjects according to their activity pattern, mean energy intake and expenditure					(n=150)
Type of activity	Frequency	Per cent	Mean energy intake (kcal/day)	Mean energy expenditure (kcal/d)	Mean energy balance
Sedentary	128	85.33	1697.75±236.49	1680.43±196.29	15.74±297.68
Moderate	18	12.0	2069±329.8	2362.12±171.35	-414.28±368.41
Heavy	4	2.67	1944.06±124.79	2653.39±28.93	-534.02±296.28

Table 5: Effect of demographic and socio-economic factors on daily energy intake and daily energy expenditure of the study subjects							
Parameters	n	Energy intake		t-value	Energy expenditure		t-value
		Mean	S.D.		Mean	S.D.	
Size of family							
≤ 4	46	1727.49	259.38	2.01*	1807.49	326.43	2.02*
5-7	70	1795.45	237.69	2.81*	1810.24	350.13	1.99*
>7	34	1687.78	249.12	2.03*	1726.00	261.03	2.04*
Age							
15-25	28	1814.59	308.27	4.15*	1842.15	392.58	2.05*
26-35	93	1901.25	237.64	3.58*	1803.05	326.47	3.18*
36-45	25	1695.25	212.49	2.66*	1717.15	260.74	2.06*
>45	4	1966.45	274.45	2.42*	1678.34	145.58	1.98*
Per capita income							
< 1000	13	1697.88	181.28	2.07*	1804.81	386.27	2.11*
1000 to 1500	30	1725.71	238.35	2.05*	1713.49	210.77	2.03*
1500-2000	33	1735.36	291.70	2.01*	1759.47	255.74	2.00*
2000-2500	11	1595.01	298.89	2.11*	1824.45	464.13	2.19*
2500-3000	19	1749.12	317.31	2.04*	1814.7	280.74	2.05*
>3000	44	1789	289.34	2.02*	1811.54	378.61	2.01*

* indicate significance of value at P=0.05

Thus, it can be concluded that there is a need to formulate appropriate strategies and meticulous planning for nutritional and health programmes, improvements in education and nutrition-health related knowledge and awareness opportunities for improving the nutritional status through improvement of health and nutrition practices among parents and community members.

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