



Socio-Demographic Characteristics and Prevalence of Under Nutrition among Adult Sabars of Bankura District, West Bengal, India

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Abstract

Nutritional status is an important index of economic growth and development. The status of nutrition of a given population has positively or negatively influenced nation's economic growth. Our study was designed to find out the relationship between socio-demographic characteristics and nutritional status among adult Sabars. The present cross-sectional study was conducted at six villages under Ranibandh block of Bankura District, West Bengal. A total 226 adults (males = 111 and females = 115) Sabars, aged above 18 years in these village were included in the study. The mean (SD) values of age, family members, family income per month, and per-capita income were 37.32 (16.62) years, 4.63 (1.85) members, 2725.2 (1424.3) Rupees, 691.58 (545.32) Rupees, respectively. The prevalence of illiteracy was 45.0% and 82.6%, respectively among males and females. There was a statistically significant (Chi-square = 39.67, $p < 0.001$) difference between two sexes. Among males more than 65.8% were daily wage laborers. Among females collection of products was the main occupation (28.7%). The frequency of use of drinking water from tube well, tap and well were 79.2%, 11.1% and 4.4%, respectively. The mean (SD) height, weight, mid-upper arm circumference (MUAC) and (body mass index (BMI) of the subjects were 159.88 (5.93) cm, 49.6 (7.42) kg, 28.38 (7.83) cm and 19.4 (2.59) kg/m² respectively, among males. The mean (SD) height, weight, MUAC and BMI among females were 1148.9 (5.04) cm, 40.1 (5.88) kg, 22.9 (2.34) cm and 18.0 (2.30) kg/m², respectively. All mean values were higher among men. The rates of under nutrition were higher (60.0%) among the illiterate group than the literate group (37.0%) based on BMI. Likewise, based on MUAC, the rates of under nutrition were higher (41.4%) among illiterates compared to literates. The prevalence of under nutrition based on BMI and MUAC was high according to the World Health Organization (WHO) guideline, indicating critical nutritional situation. To reduce the nutritional stress among this ethnic group, immediate appropriate nutritional intervention programmes should be initiated. Serious efforts are needed to increase their educational status and per-capita income.

Keywords: Sabar, BMI, MUAC, Educational Status, Nutritional Status

Introduction

The tribal population is at a higher risk of under-nutrition, because of the socio-cultural, socio-economic and environmental factors influencing food intake and health seeking behavior (Basu *et al.* 1990 and Rao *et al.* 2015). The health problems of any community

are influenced by interplay of various factors including social, economic, biological and political ones. Nutritional status of a population is an important tool to study health of any population. Nutritional status of the population largely depends on the consumption of food in

relation to the need and requirement. Some studies have shown a relationship between the tribal eco-system and their nutritional status (Rao & Rao 1994; Tiwari 2007). The basic problem of the tribal people is poverty. The problems of low standard of living, hunger, starvation, malnutrition, illiteracy, disease, poor sanitary and housing facilities, etc. are serious compared to the non-tribals (Vasudevachary 2006). The quality of human resource of any country is largely determined by the quality of its economic development which in turn is a reflection of health and nutritional status.

Health status is an important index of economic growth and development. The status of health of a given population has positively or negatively influenced nation's economic growth. Indicators of health are dependent on other factors like per capita income, nutrition, sanitation, safe drinking water, social infrastructure, medical care facilities, employment status, poverty, etc which affect the health of every individual. There is direct relationship between health and development (Sharma 2012). Generally, at household level, cultural norms and practices and socio-economic factors determine the extent of health problems among tribals. Their misery is compounded by poverty, illiteracy, ignorance of causes of diseases, hostile environment, poor sanitation, lack of safe drinking water and blind beliefs, etc. Some of the preventable diseases such as tuberculosis, malaria, gastroenteritis, measles, tetanus, whooping cough, skin diseases (scabies), etc. are also high among the tribals. The situation in India is not only different but often very complex due to regional disparities and rural-urban divide. Despite rapid strides in socio-economic development, health and education, the widening economic, regional and gender disparities are posing challenges for the health sector (Das 2012). Nutrition is one area in which traditional lifestyle of tribals and their lack of awareness plays a major role.

The Sabars (also Shabar and Saora) are one of the scheduled tribes in India who live mainly in Jharkhand, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal. During the British Raj, they were classed as one of

the '*criminal tribes*' under criminal tribes' act 1871, and still suffer from social stigma and ostracism in modern times. They are also known as Saora. The Sabar tribe finds mention in the Hindu epic Mahabharata, while in some parts of East Singhbhum district, mainly in Musabani, they are known as Kariya. According to 2001 census, the total population of Sabars in West Bengal was 43,599. Sabars are the 10th largest group in West Bengal, comprising 1.0 % of the total tribal population. In our study, an attempt was made to assess the socio-economic and nutritional status of the adult Sabar tribal population who lived at Ranibandh Block of Bankura District, West Bengal.

Materials and Methods

Study area

The present cross-sectional study was conducted from six villages (Bethuala, Maula, Kotro, Botdanga, Sagardanga, Katiyam) under Ranibandh block of Bankura district of West Bengal during March 2017.

According to the 2011 census, Bankura district has a population of 3,596,292, roughly equal to the nation of Lithuania or the US state of Connecticut. This gives it a ranking of 80th in India (out of a total of 640). The district has a population density of 523 inhabitants per square kilometer (1,350/m²). Its population growth rate over the decade 2001-2011 was 12.64%. Bankura has a sex ratio of 954 females for every 1000 males and a literacy rate of 70.95%.

Ranibandh CD Block has an area of 428.51 km². Ranibandh is located at 22°51'50"N 86°47'05"E. Ranibandh CD Block is located in the south-western part of the district. Ranibandh CD Block is bounded by Khatra and Hirbandh CD Blocks on the north, Raipur on the east, Binpur II CD Block, in Paschim Medinipur district, on the south and Manbazar I, ManbazarII and Bandwan CD Blocks, in Purulia district, on the west. It is located 41 km from Bankura, the district headquarters.

Ranibandh block is located approximately 233 km from Kolkata, the state capital of West Bengal.

The participants

The participants were selected from six villages (Bethuala, Maula, Kotro, Botdanga, Sagardanga, Katiyam) under Ranibandh block of Bankura district of West Bengal. A total of 226 adult (males = 111 and females = 115) Sabar tribal people, aged above 18 years in those village areas were included in the study. The vast majority of the subjects were illiterate and very low-waged manual labourers belonging to low socio-economic status. Ethical considerations were guided by the Helsinki declaration (Goodyear *et al.*, 2007). The district level and relevant local administrative authorities and community leaders were informed about the objective of the present study. Verbal informed consent was obtained from each participant in their own language prior to each interview and measurement procedure.

Anthropometric measurements

Anthropometric measurements of height (cm), MUAC (cm) and weight (kg) of each subject were measured by one investigator (SB), following the standard techniques of Lohman *et al.* (1988). Both height and circumference were recorded to the nearest 1 mm and weight to nearest 500 g.

Assessment of Nutritional Status

BMI was computed as weight (kg)/height (m²). Nutritional status was evaluated using internationally accepted BMI guidelines (WHO 1995) as follows:

- CED III :BMI < 16.00 kg/m²
- CED II :BMI = 16.0-16.9 kg/m²
- CED I :BMI = 17.0-18.4 kg/m²
- Normal : BMI = 18.5-24.9 kg/m²
- Overweight : BMI = 25.0-29.9 kg/m²

We followed the World Health Organization's classification (1995) of the public health

problem of low BMI, based on adult populations worldwide. This classification categorizes prevalence according to percentage of a population with BMI < 18.5 kg/m².

- Low (5 - 9%): warning sign, monitoring required.
- Medium (10 - 19%): poor situation.
- High (20 - 39%): serious situation.
- Very high (≥ 40%): critical situation.

The MUAC can be used for evaluating nutritional status studies among third world adults. The following cut-off points were used:

Nutritional status	Among men	Among women
Under-nutrition	MUAC < 23.0 cm	MUAC < 22.0 cm
Normal	MUAC ≥ 23.0 cm	MUAC ≥ 22.0 cm

Statistical analysis

After collecting data, analysis was done using SPSS (Version 16.00) software. Descriptive statistics was performed to find the mean value, SD, maximum value, minimum value and percentiles. Student's *t*-test was performed to determine sex differences in mean height, weight, MUAC and BMI. Chi-square test was performed to determine the association between two discrete variables. Level of significance was set at $p < 0.05$.

Results:

Table 1 shows the socio-demographic characteristics of the studied population. It presents the mean (SD) value of age, family members, family income per month, and per-capita income which were 37.32 (16.62) years, 4.63 (1.85) members, 2725.2 (1424.3) Rupees and 691.58 (545.32) Rupees, respectively.

Table 1: Socio-Demographic Characteristics of the Studied Population

Variable	Mean (N=226)	Standard deviation	Minimum	Maximum	Percentiles		
					25	50	75
Age (year's)	37.32	16.62	18	100	23.75	31.50	50.0
Family member	4.63	1.85	1	12	3.0	4.50	5.0
Family income/ month (Rs.)	2725.2	1424.3	300	12000	1500.0	3000.0	3900.0
Per capita income (Rs.)	691.58	545.32	66.67	5000.0	364.58	600.0	900.0

Figure 1: The studied area

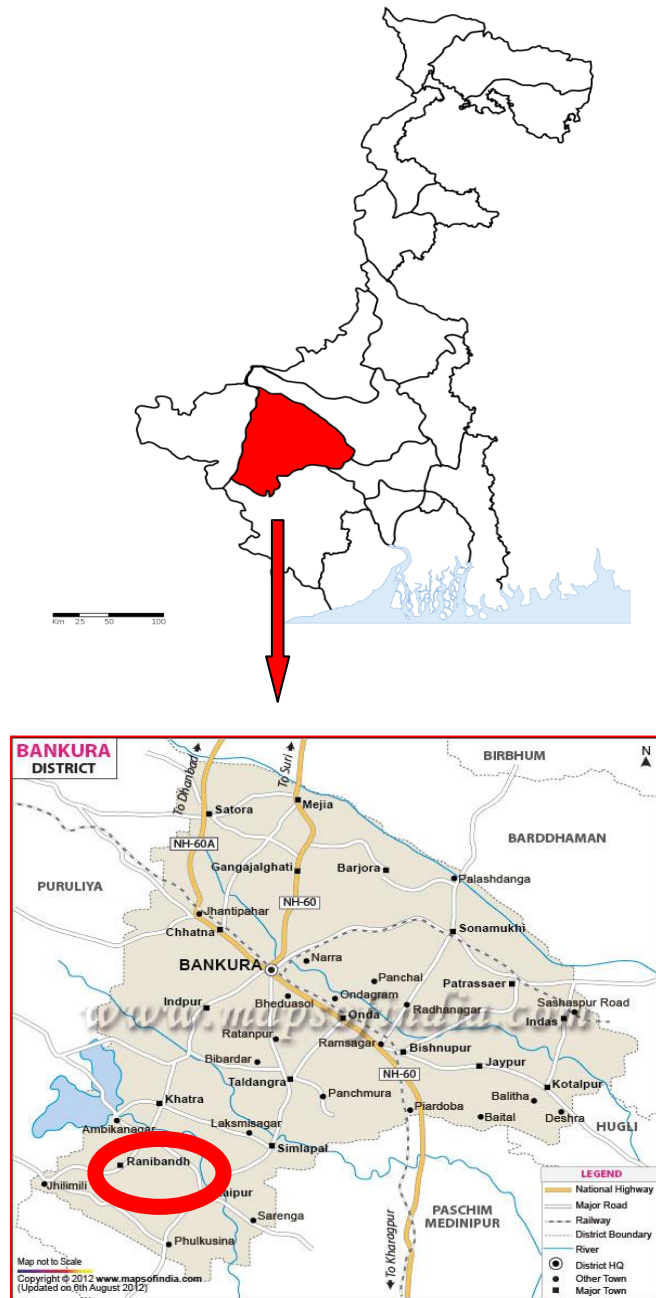


Table 2: Educational Status of the Participants

Category	Educational Status						Total
	Illiterate	Can sign	Primary	Upper primary	Secondary	H.S& above	
Male	50 (45.0%)	35 (31.5%)	15 (13.5%)	9 (8.1%)	1 (0.9%)	1 (0.9%)	111
Female	95 (82.6%)	11 (9.6%)	7 (6.1%)	0 (0%)	2 (1.7%)	0 (0%)	115
Combined sex	145 (64.2%)	46 (20.4%)	22 (9.7%)	9 (4.0%)	3 (1.3%)	1 (0.4%)	226

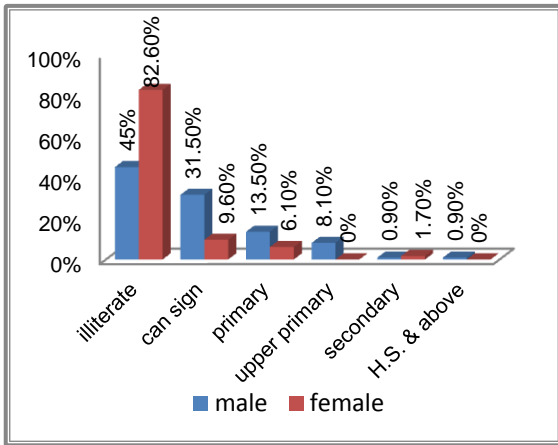
Chi-square = 39.67, df = 5, p < 0.001

Table 2 outlines the sex wise educational status of the participants. In case of males, 50 were (45.0%) illiterates, 35 (31.5%) could sign,

15 (13.5%) had passed out from primary school, 9 (8.1%) from upper primary, 1 (0.9%)

from secondary and 1 (0.9%) was higher secondary and above.

Figure 2: Educational Status of the participants



In case of females, 95 (82.6%) were illiterates, 11 (9.6%) could sign, 7(6.1%) had passed out from primary school and 2 (1.7%) from secondary school. There was a significant sex difference.

Table 3 shows the sex wise occupational status of the participants. In case of males, 23 (20.7%) were unemployed, 12 (10.8%) were agriculturalists, 73 (65.8%) were daily wage labourers, 1 (0.9%) were government officers while 2 (1.8%) collected forest products. In case of females, 61 (53.0%) were unemployed, 1 (0.9%) was in private service and 33 (28.7%) were collecting forest products. No women were involved in agricultural work. There was a significant sex difference.

Table 3: Occupational Status of the Studied Population

Category	Occupation Category						Total
	Not applicable	Agriculture	Daily wage labour	Govt. service	Pvt. service	Collection of the forest products	
Male	23 (20.7%)	12 (10.8%)	73 (65.8%)	1 (0.9%)	0	2 (1.8%)	111
Female	61 (53.0%)	0	20 (17.4%)	0	1 (0.9%)	33 (28.7%)	115
Combined Sex	84 (37.2%)	12 (5.3%)	93 (41.2%)	1 (0.4%)	1 (0.4%)	35 (15.5%)	226

Chi-square = 88.80, df = 5, p < 0.001

Figure 3: Occupational status

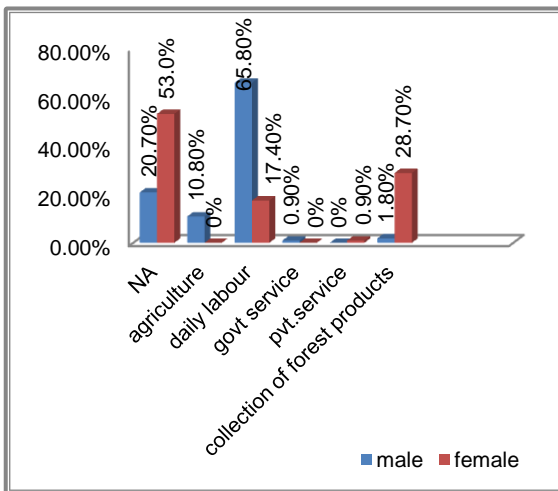


Table 4: Sources of Drinking Water

Sources of drinking water	Frequency	Percentage (%)
Tube well	179	79.2
Tap water	25	11.1
Well	10	4.4
Others	12	5.3

Figure 4: Sources of drinking water

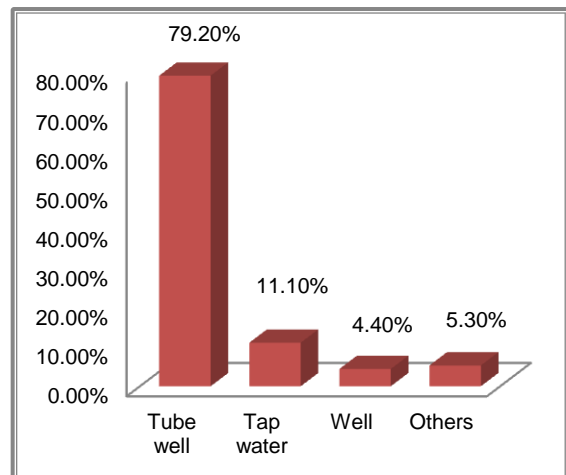


Table 4 shows the sources of drinking water of the studied population. Overall, 79.2% persons had access to tube well water, 11.1% used tap water and 4.4% drank water from well.

Table 5 presents the mean (SD) values of height, weight, MUAC and BMI. The mean value of height, weight, MUAC and BMI were higher among males 159.9 (5.9) cm, 49.7 (7.4) kg, 25.2 (3.9) cm, and 19.4 (2.6) kg/m² respectively than females {148.9 (5.4) cm, 40.1 (5.9) cm, 22.9 (2.3) cm, and 18.1 (2.3) kg/m²}. There were statistical significant differences ($p < 0.001$) between the sexes.

Table 5: Anthropometric Characteristics

Variables	Male (n = 111)		Female (n = 115)		't' value
	Mean	SD	Mean	SD	
Weight (kg)	49.6	7.42	40.12	5.88	10.760*
Height (cm)	159.88	5.93	148.99	5.04	14.880*
MUAC (cm)	25.24	3.89	22.86	2.34	5.576*
BMI (kg/m ²)	19.43	2.59	18.04	2.3	4.235*

* $p < 0.001$

Figure 5: Relationship Between Educational Status and Nutritional Status Based on BMI

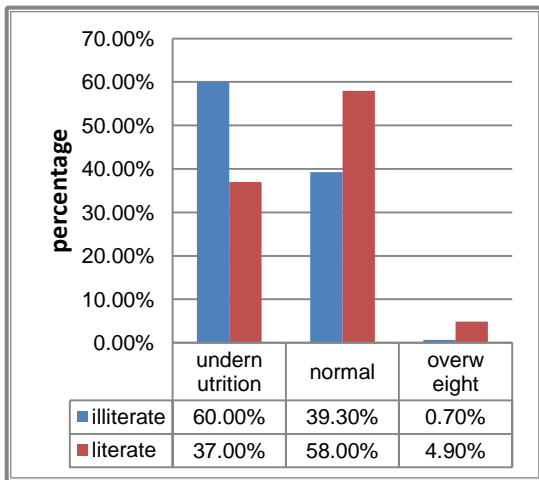


Table 6 outlines the relationship between educational status and nutritional status based on BMI. We found a strong relationship between education and nutritional status. Among illiterates, 60.0% belonged to the under-nutrition group, 39.3% were normal and 0.7% were overweight. On the other hand among literates 37.0% were categorized as under-nutrition, 58.0% were normal while

4.90% were overweight. Educational status was significantly associated with nutritional status.

Table 6: Relationship between Educational Status and Nutritional Status based on BMI

Educational Category	Nutritional Status Based on BMI			Total
	Under nutrition (%)	Normal (%)	Over weight (%)	
Illiterate	87 (60.0%)	57 (39.3%)	1 (0.7%)	145
Literate	30 (37.0%)	47 (58.0%)	4 (4.9%)	81
Total	117 (51.8%)	104 (46.0%)	5 (2.2%)	226

chi-square = 13.48, df = 2, $p < 0.001$

Figure 6: Relationship between Educational Status and Nutritional Status based on MUAC

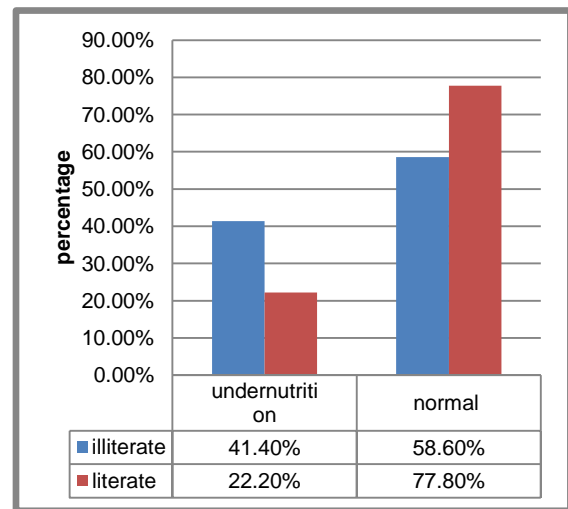


Table 7 highlights the relationship between educational status and nutritional status based on MUAC. Here also there was a strong relationship between education and nutrition. Among illiterates 41.4% belonged to the under-nutrition group while 58.6% were normal. On the other hand among literates, 22.2% belonged to the under-nutrition group while 77.8% were normal. Here also there was a significant association between educational status and nutritional status.

Table 7: Relationship between Educational Status and Nutritional Status based on MUAC

Educational Category	MUAC Category		Total
	Under nutrition	Normal	
Illiterate	60 (41.4%)	85 (58.6%)	145
Literate	18 (22.2%)	63 (77.8%)	81
Total	78 (34.5%)	148(65.5%)	226

Chi-square = 8.43, df = 1, p < 0.01

Table 8: Comparison of mean BMI kg/m² and prevalence of CED among the various tribal population of India

Community	Mean BMI (kg/m ²)		CED Prevalence (%)		Study area (State)	Reference
	Male	Female	Male	Female		
Santal	20.5	19.5	30.5	38.5	West Bengal	Mukhopadhyay 2010
Santal	19.5	18.1	55.0	52.5	West Bengal	Das & Bose 2010
Munda	19.35	---	35.8	---	West Bengal	Bose <i>et al.</i> 2011
Oraon	19.46	---	37.5	---	West Bengal	Bose <i>et al.</i> 2011
Birhor	20.5	20.2	19.4	33.3	West Bengal	Das <i>et al.</i> 2013
Bhumij	18.6	---	52.3	----	West Bengal	Ghosh & Bose 2015
Mahali	19.9	17.9	42.2	63.6	West Bengal	Ghosh & Bose 2017
Savara	18.5	---	53.0	---	Orissa	Chakrabarty <i>et al.</i> 2008
Oraon	18.8	19.3	47.0	30.7	Orissa	Beck & Mishra, 2010
Savar	18.9	19.3	38.0	49.0	Orissa	Bisai & Bose, 2012
Oraon	18.0	---	53.1	---	Jharkhand	Chakraborty & Bose, 2008
Mannan	20.2	19.1	23.1	52.2	Kerala	John & Ramadas, 2008
Jarwa	18.9	19.8	5.5	---	Andaman & Nicobar Island	Sahani, 2004
Onge	19.7	21.2	12.9	29.2	Andaman & Nicobar Island	Rao <i>et al.</i> , 2006
Mech	20.5	---	6.0	---	Assam	Khongsdier, 2001
Miris	19.6	---	34.0	---	Assam	Khongsdier, 2001
Pnars Khasis	19.9	---	14.3	---	Meghalaya	Khongsdier, 2001
War Khasis	20.1	---	35.0	---	Meghalaya	Khongsdier, 2002
Tangkul Naga	---	21.2	---	16.2	Manipur	Mungreiphy <i>et al.</i> , 2012
Bhotias	19.5	---	45.3	---	Uttarakhand	Kapoor <i>et al.</i> , 2012
Sabar	19.4	18.0	52.0	65.0	West Bengal	Present study

Discussion

The health and nutrition problems of the vast tribal population of India are as varied as the tribal groups themselves who present a bewildering diversity and variety in their socioeconomic, socio-cultural and ecological settings. The level of malnutrition is high among the tribal population (Deka 2011). Numerous studies have already been done on their socio-economic and nutritional status. From the outcomes, it is evident that there is a strong relationship between them. Nutritional status of the Garo people of Mymensingh district represents a gloomy picture. Underweight, normal, overweight and obesity levels were 30%, 46%, 16% and 8%, respectively. Low level of income as well as illiteracy may be the reason behind that

situation (Naser 2015). Tribal people are particularly vulnerable to malnutrition due to their traditional socio-cultural practices and low literacy level. In another study, the low socio-economic status of Saharia is quite apparent from their income and educational level. The impact of low socio-economic status is clearly evident in the prevalence of CED among males (48.8%) and females (37.2%). A higher prevalence of CED as well as overweight among males in comparison to females reflects the higher sensitivity in terms of BMI to their environment. It was also observed that the level of undernutrition on the basis of MUAC was higher among Saharia females (Kapoor *et al.* 2009). In the present study, we also found a relationship between socio-

economic status and nutritional status. Most of the men were engaged in daily wage labour (65.8%) while women were mainly collectors of forest products (28.7%). While some males (10.80%) undertook agricultural work none of the women did. There was a significant sex difference. In present study we also found that females were more undernourished than males.

In general, the literacy rate of tribal population in India as well as in West Bengal is very poor. Dropping out of school is very common among the tribal population. Many tribal schools have high dropout rates. Children attend for the first three to four years of primary school only to lapse into illiteracy later. Few who enter continue up to the tenth grade; of those who do, few manage to finish high school. Therefore, very few are eligible to attend institutions of higher education, where the high rate of attrition continues. Eldest members of tribes often are loath to send their children to school, needing them, they say, to work in the fields (Thirumani and Sindhuja 2015). In a study comparing the educational status of males and females, Bhaina tribals of Bilaspur, Chhattisgarh, showed a significant difference in distribution of educational status ($p < 0.0001$). More than 30% of the studied population was observed to be illiterate (males = 17.7% and females = 42.9%). Proportion of female population goes on decreasing when moving towards higher educational status (Singh et al. 2014). Among the tribal women (Gujjar and Bakerwal) of Kashmir, 52.6% of the respondents were literate. (Hamid and Vaida 2017). The present study among the Sabar tribe of Bankura district substantiates this fact. Females (82.6%) were more illiterate than males (45.0%). This difference was statistically significant ($p < 0.001$). We also found a strong statistically significant relationship between educational status and nutritional status (both BMI and MUAC), illiterates were more undernourished than literates.

In case of education a recent study has been done on three different tribal communities – Kolha, Bhumija and Bathudis of Odisha (Behera 2017). Here the author found that male literacy rate was higher than females.

Among these three tribal communities, literacy rate was highest among Bathudi households followed by Kolha and the lowest was in Bhumija households. Moreover, the literacy of tribal households were lower than the average literacy rate of district, state and national average as per 2011 census.

Apart from these socio-cultural obstacles, the religion, education and economic factors do alter the food behaviours (Sarkar 2016). Simultaneously, the source of water plays an important role in influencing nutrition status. Malnourishment may not contribute to death directly but diseases like diarrhoea, measles, malaria and pneumonia are often the cause death of malnourished people. The intergenerational cycle of undernutrition is concomitant with high incidence of babies born with low birth weight (22 %) resulting in more susceptibility to infections. While overall picture of undernutrition is shockingly high, the status is further exacerbated by the significant inequalities across states and socioeconomic groups – girls, rural areas, the poorest and scheduled tribes and castes are the worst affected and these inequalities appear to be increasing (Shinde and Patil 2016). The role of the WHO Guidelines for Drinking Water Quality accents an integrated approach to water quality assessment and management from source to consumer. It emphasizes on quality preservation and prevention of contamination and confers to be proactive and participatory, and address the needs of those in developing countries who have no access to piped community water supplies. The guidelines emphasize the protection of microbial quality to obstruct waterborne infectious disease as an essential goal. In addition, they address protection from chemical toxicants and other pollutants (Sarkar 2016). In our study, most of the villagers (79.20%) access tube well water as their source of drinking water while 11.1% used tap water and 4.4% drank water from well.

Umpteen studies have already been done by many researchers on health and nutritional status of tribal population of different regions of India, related with anthropometry. **Table 8** demonstrates the comparison of mean BMI

kg/m² and prevalence of CED (%) among several tribal population of India. This table represents that, the mean BMI was higher among Santals, Birhors of West Bengal and Mech of Assam, in case of males. In case of females, mean BMI was higher among Birhors of West Bengal, Onges of Andaman & Nicobar Island and Tangkhul Nagas of Manipur.

According to the WHO guideline, percentage of prevalence of CED was very high ($\geq 40\%$) among Santals (Das & Bose 2010), Bhumijis (Ghosh & Bose 2015), Mahalis (Ghosh & Bose 2017) of West Bengal, Savaras (Chakrabarty et al, 2008), Oraons (Beck & Mishra, 2010) of Orissa, Oraons (Chakraborty & Bose, 2008) of Jharkhand and Bhotias (Kapoor et al., 2012) of Uttarakhand, in case of males. On the other hand in case of females, we found that percentage of prevalence of CED was very high ($\geq 40\%$) among Santals (Das & Bose 2010), Mahalis (Ghosh & Bose 2017) of West Bengal, Savaras (Chakrabarty et al, 2008) of Orissa and Mannans (John & Ramadas, 2008) of Kerala. Sabars females of present study, was also belonged to the critical situation according to this guideline. Thus, these numerous studies clearly showed that, in general, the percentage prevalence of CED was higher among females than males of the tribal populations.

Conclusion

In conclusion, the present study clearly showed that there is a need to identify, reorganize and reallocate resources for tribal

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communities, based on their requirements. The design of the development programs and the health needs of the tribal population have to be identified keeping in mind their habitat and socio cultural practices. The prevalence of under nutrition based on BMI and MUAC was high according to the World Health Organization (WHO) guidelines, indicating critical nutritional situation. To reduce the nutritional stress among this ethnic group, immediate appropriate nutritional intervention programmes should be initiated. Serious efforts are needed to increase their educational status and per-capita income.

Recommendation

Thus, we suggest that similar studies be undertaken to determine the prevalence of undernutrition among Sabars of another region, as well as other ethnic groups, especially in rural areas. Those studies will help us to generate new data which can be used for comparison with the prevalence of under nutrition in the local, national and international context. There are many such nutritionally vulnerable tribal populations in India.

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