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Assessment of nutritional status in relation to socio economic determinants among Sabar tribes of Jhargram district of West Bengal, India

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ABSTRACT

Background: This cross-sectional study was undertaken to assess the nutritional status in relation to socio-economic determinants among sabar tribes of Jhargram district, West Bengal.

Methods: Nutritional status of 169 children, adolescent and adult male and female tribal people was taken to measure body height, body weight and BMI. Socio economic status including family income, occupation, family size, educational status, source of drinking water, use of sanitary latrine, smoking habit and prevalence of diseases among sabar tribal people was recorded by questionnaire study.

Results: Undernutrition is prominent among sabar children and adolescent. The people of this area were relatively underprivileged to access to safe drinking water and sanitary latrine. The health status of sabar people of this locality was associated strongly with family income and educational status. Although other factors like safe drinking water use of sanitary latrine, occupation, no of children in a family, smoking habit showed insignificant association. Besides, occupation and life style related diseases were very common among adult sabars.

Conclusions: Percentage of undernourished people especially children and adolescent in this study is large, they required a variety of interventions to improve quality of life like- assessment of nutritional status, causes of nutritional deficiencies and imbalance, formulation of diet plan and its implementation where required.

Keywords: BMI, Nutritional status, Socio-economic determinants, Sabar tribal

INTRODUCTION

Proper nutrition is fundamental to good health and development over a prolonged period which is neglected in several components of body composition. Gender, age, nutrition, physical activity and hormonal status are the main determinants of body composition among healthy adults. Undernutrition may have a significant effect on body composition as it develops due to nutritional deficiency which results in organ dysfunction, reduced body mass, abnormal blood chemistry and worsened clinical outcomes. ²

Sabar is one of the most backward tribal communities in West Bengal, traditionally living in the deep forest areas. They mostly belong to a low economic stratum depending predominantly on daily wage labour (100 days work). Their level of education is very low and most of them are non-literate. They live mostly in mud houses and very few of them got brick build houses made by the central government housing scheme without proper kitchen and toilet facilities.

The tribal population is at a high risk of undernutrition because of the socio cultural, socio economic and

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environmental factors influencing food intake and health-seeking behaviour.^{3,4} The basic problem of the tribal people is poverty. The problems of the low standard of living, hunger, starvation malnutrition, agricultural illiteracy, disease, poor sanitary and housing facilities are serious compared to the non-tribals.⁵

World Health Organization has recommended that anthropometry could be used to assess the nutritional and health status of adults.⁶ According to the 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. It was observed that the health status of the tribes was comprehensive area-specific and health related studies were limited.⁷ Carolyn and Harpham⁸ observed that the health status of a population is influenced by environmental conditions, health services, characteristics of the population and socio-economic condition. Several research studies on the tribal population of India revealed that the prevalence of chronic energy deficiency was high among the tribal population. Women being vulnerable section, the impact on their health is much high. The health and nutritional status of the tribal population clearly indicates that the goal of health for all cannot be fully achieved unless due to attention is paid to the vulnerable sections of the society i.e., the tribal population especially women and children.⁹

Diez¹⁰ related individual health outcomes to socioeconomic characteristics of the community and the community health infrastructure. However, such work on native Sabar tribal population of different age groups is scanty in reality. Thus, the present study on children and adult male and female Sabar tribes was carried out to correlate the health status and related socio-economic parameters.

The objective of the present study was to assess the nutritional status of the Sabar population on the basis of body composition and to study the correlation of the nutritional status with socio-economic factors.

METHODS

This cross-sectional study was conducted among 169 sabar children, adolescents and adult people having age range 8 to 60 years of Jhargram district of West Bengal from January to March 2019. Participants were selected at random based on their availability during fieldwork/camp from three different villages of Lalgarh district, block Binpur, Paschim Midnapore. Necessary permission was obtained from local administration and community leaders along with NGO organizations. The participants were informed and explained about the purpose of this survey and consent from each adult and guardian for children was taken before data collection.

Socio-demographic characteristics like age, occupation education, income, house type sanitation, electrification,

smoking habit, number of children in a family were collected from participants in case of adults and from the mother in case of the children by using a pretested questionnaire to access the socio-economic status.

Anthropometric measurements of body height and body weight were measured by standard technique. Body height and body weight were recorded to the nearest 0.5cm/kg by anthropometric rod for height and weight machine for weight. BMI (body mass index) was calculated by using the formulae BMI = weight (in kg)/height (m2). Participants were divided into three BMI categories in accordance with WHO (1995)⁶

Undernutrition (BMI $<18.5 \text{ kg/m}^2$) Normal (BMI $18.5 - 24.9 \text{ kg/m}^2$) Overweight (BMI $\ge 25.0 \text{ kg/m}^2$)

For statistical analysis, descriptive statistics were done to get mean and standard deviation. The chi-square test was used to see the association between the different sociodemographic variables and nutritional categories. One way ANOVA and independent sample t-test were performed to find out significant difference among different socio-demographic categories in mean body height, body weight and BMI.

RESULTS

Table 1 shows the socio-demographic characteristics of the Sabar population. It represents age, educational status, family income, occupation, house type, smoking habit, alcohol intake and source of drinking water. The participants were categorized into children (8 to 17 years), adult male and adult female (18 to 60 years) group. A total of 169 subjects were taken from tribal villages of the Jhargram district. The educational status of the participants was divided into - non literate, primary (class I to V), secondary (class VI -X) and college level (class XI and above). The income group was categorized into - Low-income group (monthly up to Rs 3000), moderate income group (monthly Rs 3000-4000) and high-income group (monthly Rs 4000-5000). Types of houses were divided into three types kutcha (made of mud and bamboo), semi pucca (made of brick wall and floor, the roof was thatched) and pucca houses (made of brick and cement). The Source of drinking water was mainly two – tubewell and tap water. Sanitary latrine is rare in these villages, so it is categorized into - present and absent. Most of the adult males were smokers and alcoholics. Thus habit among male participants was categorized into – smoker (49%), non-smoker (28%), and other forms of tobacco like gutka, khaini (22.14%), alcoholic (81%), non-alcoholic (19%). Sex wise occupational status of the male participants (81%) included 100 days labour, agriculture worker, cattle farming, small businessman and others. Occupation of female participants was mainly collection of wood from the forest, cattle farming, leaves collection from the forest and 100 days labour.

Table 1: Distribution of the socio demographic characteristics among the studied population.

Male 31 18.34 (age: 9-17 years) Female 28 16.56 Adult Male 53 31.56 (age: 18-60 years) Female 57 33.72	Variables			Frequency	Percentage (%)
Adult Male 53 31.56 (age: 18-60 years) Female 57 33.72	Children	Male		31	18.34
Section Female Section Secti	(age: 9-17 years)	Female		28	16.56
Children Male	Adult	Male		53	31.56
Children Male	(age: 18-60 years)	Female		57	33.72
Non-literate Female Adult Male 20 37.73 Non-Section 1 20 3 5.26 Adult Female 3 5.26 3 5.26 Class I - V Children Male 14 45.16 Adult Male 17 32.07 25 Adult Male 17 32.07 36.84 Class VI - X Female 21 36.84 Class VI - X Female 18 54 Adult Male 9 45 45 Adult Male 14 16 16 Female 22 17 17 Class XI and above 6 6 Adult Male 2 2 2 17 20 Children Male 8 6 6.45 8 6.45 Female 3 7 7 7 Adult Male 2 2 2 2 2 Adult Male 2 2 2 2 2 Female 3 3 7 7 Adult Male 2 2 2 2 2 Adult Male 3 11 10 10 10 Sanitary Latrine 6 7 2 2 2 2 2 Present 3 1 8 3 3 18 3 4 3 Abent 4 2 2 2 2 4 4 Morning Water 7 10 2 8 3000 7 70 414 2 2 4 R S 3000 - Rs 400	Educational Status	•			·
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Adult Male 20 37.73 Female 3 5.26 Children Male 14 45.16 Female 7 25 Adult Male 17 32.07 Female 21 36.84 Children Male 9 45 Female 18 54 Adult Male 14 16 Female 18 54 Adult Male 14 16 Female 22 17 Adult Male 14 16 Female 22 17 Adult Male 3 7 Adult Male 2 2 Female 3 7 Adult Male 2 2 Adult Male 2 2 Female 3 7 Adult Male 2 2 Female 11 10 Sanitary Latrine Present 31 18.34 Absent 128 75.74 Absent 128 75.74 Absent 128 75.74 Absent 400 80 47.33 Running tap water 89 52.66 Upto Rs 3000 70 41.42 Monthly income Rs 3000 71 42.01 Rs 4000 - Rs 4000 71 42.01 Rs 4000 - Rs 5000 28 16.56 Smoker 26 49.05 Smoking Habit (Males) Non Smoker 15 28.3 Other form of tobacco 12 22.64 Alcohol Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Alcohol Present 43 35.66 Business 3 5.66 Business 3 5.66 Business 3 5.66 Occupation Female Wood Collection 28 49.12 Female Wood Collection 28 49.12 Female Wood Collection 28 49.12 Female House House 48 28.4 House Type Kutcha House 21 12.42 Semi Pucca House 48 28.4 House Type House House 162 98.85	Non literate		Female	_	_
Class I - V	Non-interate	Adult	Male	20	37.73
Class I - V Adult Male 17 32.07 Adult Permale 17 52.07 35.07 Female Permale 21 36.84 36.84 Class VI - X Children Male 9 45 Adult Male 18 54 54 Adult Male 14 16 16 Female 22 17 17 Adult Male 8 6.45 6.45 Female 3 7 7 7 Class XI and above Present Adult Male 2 2 2 2 Adult Male 2 2 2 2 Present 31 18.34 11 10 Sanitary Latrine Absent 128 75.74 11 28 75.74 Prinking Water Running tap water Dybox Running tap water Pube well Running tap water Running tap wat			Female	3	5.26
Adult Male 17 32.07 Female 21 36.84 Children Male 9 445 Female 18 54 Adult Male 14 16 Female 22 17 Adult Male 8 6.45 Female 3 7 Adult Male 8 6.45 Female 3 7 Adult Male 2 2 Female 11 10 Female 11 10 Sanitary Latrine Present 31 18.34 Absent 128 75.74 Tube well 80 47.33 Running tap water 89 52.66 Whothly income Rs 3000 70 41.42 Rs 3000 - Rs 4000 70 41.42 Rs 3000 - Rs 5000 70 41.42 Rs 4000 - Rs 5000 28 16.56 Smoking Habit (Males) Non Smoker 15 28.3 Other form of tobacco 12 22.64 Alcohol Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Daily Labor 20 37.73 Carpenter 3 5.66 Business 3 5.66 Carpenter 3 5.66 Female Wood Collection 28 49.12 Female Wood Collection 28 49.12 Female Wood Collection 28 49.12 Female Parsent 100 40.95 Female Wood Collection 28 49.12 Female Wood Collection 28 49.12 Female Running and cattlle cultivation 19 33.33 Female Running and cattlle cultivation 19 33.33 Female Running and cattlle cultivation 19 33.33 Female Pucca House 48 28.4 House Type Farming and cattlle cultivation 19 17.54 Female Running and cattlle cultivation 19 33.33 Running and cattlle cultiv		Children	Male		
Adult Male 17 32.07	Class I V		Female	7	25
Class VI - X	Class 1 - V	Adult	Male	17	32.07
Class VI - X					36.84
Adult Male 14 16		Children	Male	9	45
Adult Female 22 17	Class VI V			18	54
Class XI and above	Class VI - A	Adult	Male	14	16
Children Female 3 7			Female	22	17
Class XI and above		Children	Male		6.45
Adult Female 11 10	Class VI and above	Ciliuicii	Female	3	7
Present 31	Class AI and above	Adult	Male	2	2
Absent 128 75.74			Female	11	10
Absent 128 75.74	Sanitany I atnina	Present		31	18.34
Nonthly income Running tap water 89 52.66	Santary Latrille	Absent		128	75.74
Nonthly income Rinning tap water 89 52.66	Drinking Water	Tube well		80	47.33
Monthly income Rs 3000 - Rs 4000 71 42.01 Rs 4000 - Rs 5000 28 16.56 Smoker 26 49.05 Smoking Habit (Males) Non Smoker 15 28.3 Other form of tobacco 12 22.64 Alcohol Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Daily Labor 20 37.73 Carpenter 3 5.66 Business 3 5.66 Student 4 7.54 Others 11 20.75 Female Wood Collection 28 49.12 Farming and cattle cultivation 19 33.33 100 days work 10 17.54 House Type Kutcha House 21 12.42 Semi Pucca House 100 59.17	Drinking water	Running tap water		89	52.66
Rs 4000 - Rs 5000 28		Upto Rs 3000		70	41.42
Smoking Habit (Males) Smoker 26 49.05 Non Smoker 15 28.3 Other form of tobacco 12 22.64 Alcohol Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Daily Labor 20 37.73 Carpenter 3 5.66 Business 3 5.66 Student 4 7.54 Others 11 20.75 Female Wood Collection 28 49.12 Farming and cattle cultivation 19 33.33 Pucca House 48 28.4 Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85	Monthly income	Rs 3000 - Rs 4000		71	42.01
Smoking Habit (Males) Non Smoker 15 28.3 Other form of tobacco 12 22.64 Alcohol Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Daily Labor 20 37.73 Carpenter 3 5.66 Business 3 5.66 Business 3 5.66 Student 4 7.54 Others 11 20.75 Female Wood Collection 28 49.12 Farming and cattle cultivation 19 33.33 Cultivation 19 33.33 Pucca House 48 28.4 House Type Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85		Rs 4000 – Rs 5000		28	16.56
Other form of tobacco 12 22.64 Yes 43 81.83 No 10 18.86 Male Farmer 12 22.64 Daily Labor 20 37.73 Carpenter 3 5.66 Business 3 5.66 Business 3 5.66 Student 4 7.54 Others 11 20.75 Female Wood Collection 28 49.12 Farming and cattle cultivation 19 33.33 100 days work 10 17.54 Pucca House 48 28.4 Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85					49.05
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No	Alcohol			43	
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cultivation 100 days work 10 17.54 Pucca House 48 28.4 House Type Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85		Female		28	49.12
Pucca House 48 28.4 House Type Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85				19	33.33
House Type Kutcha House 21 12.42 Semi Pucca House 100 59.17 Present 162 95.85			100 days work	10	17.54
Semi Pucca House 100 59.17 Present 162 95.85				48	28.4
Present 162 95.85	House Type	Kutcha House		21	12.42
Present 162 95.85		Semi Pucca House		100	59.17
	Electrification	Present		162	95.85
Absent 7 4.14	Electification	Absent		7	4.14

Table 2: Mean±SD values of physical parameters of sabar children, adolescent and adult of Jhargram District, West Bengal.

	Sabars	Age (years)	Weight(kg)	Height(cm)	BMI
	Male (8-12 years)	9.58±1	24.17±2.67	125.05±6.64	14.85±1.77
	Female (9-12 years)	10.77 ± 1.16	25.77±5.04	128.27 ± 9.68	15.53±1.39
	Significance Level	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001
	Male (13-17 years)	15.07±1.38	42.85 ± 10.82	150.64±10.81	18.53±2.41
	Female (13-17 years)	13.8±0.91	36.75±6.50	145.3±6.09	17.42±2.50
Children	Significance Level	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001
	Male (8-17 years)	12.06±3.01	32.61±11.99	136.61±15.54	16.51±2.77
	Female (9-17 years)	11.85±1.81	29.69±7.66	134.35±11.84	16.21±2.03
	Significance Level	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001
	Male (18-60 years)	35.54±12.03	55.81±7.28	160.28±7.57	21.67±2.56
	Female (18-60 years)	34.29±12.25	43.33±5.25	148.84±4.86	19.52±2.22
Adults	Significance Level	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001	Significant, P<0.001

Table 3: Nutritional status of Sabar population of Jhargram based on BMI.

Nutritional	BMI	Frequency	7	Percentage (%)			
Status	reference value	Children (N=59)	Adult Male (N=53)	Adult Female (N=57)	Children	Adult Male	Adult Female
CED Grade III	>16.0	29	0	2	49.1	0	3.5
CED Grade II	16 - 16.9	13	2	6	22	3.7	10.5
CED Grade I	17 - 18.4	7	4	8	11.8	7.5	14
Normal	18.5 - 24.9	10	43	39	16.9	81.1	68.4
Overweight	≥ 25	0	4	2	0	7.5	3.5

Table 4: Percentage prevalence of underweight, obese, and overweight of Sabar population of Jhargram based on BMI.

Adult males (n=53)			
Physiological status	Grading of BMI (CDC)	No. of individuals	Percentage
Underweight	<18.5	6	11.53
Normal	18.5 - 24.9	43	81.13
Overweight	25 - 29.9	4	7.69
Obese	>30	0	0
Adult females (n=57)			
Underweight	<18.5	16	28.07
Normal	18.5 - 24.9	39	68.42
Overweight	25 – 29.9	2	3.51
Obese	>30	0	0
Children males (n=31)			
Underweight	<18.5	23	74.19
Normal	18.5 - 24.9	8	0
Overweight	25 – 29.9	0	25.80
Obese	>30	0	0
Children females (n=28)			
Underweight	<18.5	26	89.28
Normal	18.5 - 24.9	2	0
Overweight	25 – 29.9	0	10.71
Obese	>30	0	0

Table 5: Mean±SD values for Anthropometric variables among different socio-economic characteristics of Sabar tribal popu lation.

Premium Pre	Parameters	Upto Rs. 3000	Rs. 3000 – Rs. 4000	Rs. 4000 and above	F	Significance	Upto Rs. 3000	Rs. 3000 – Rs. 4000	Rs. 4000 and above	F	Significance
Height (In cm) 161.27 t 8.91 160.75 t 7.20 157.63 t 5.80 0.86 Not significant 147.90 t 4.63 151.78 t 4.88 147.66 t 2.51 3.73 Significant Meight (in kgs) 8.83 t 8.86 53.95 t 6.47 55.63 t 5.10 1.97 Not significant 41.70 t 3.51 47.92 t 4.42 53.56 t 14.22 9.52 Significant Meight (in kgs) 21.66 t 1.70 20.60 t 1.55 19.93 t 5.87 2.53 Not significant 14.70 t 1.70 1.70 Not significant 14.70 t 1.70 1.70 1.70 1.70 Not significant 14.70 t 1.70 1.70	Family Income	Adult	-	Males			Females				
Weight (in kgs) S8.38±8.86 S3.95±6.47 S5.63±5.10 1.97 Not significant 41.70±3.51 47.92±4.22 S3.56±14.22 9.52 Significant S1.1±1.97 20.00±1.55 19.93±5.87 2.53 Not significant S1.2±1.25	Frequency (n)	18	23	11			40	14	3		
BMI	Height (In cm)	161.27±8.91	160.75±7.20	157.63±5.80	0.86	Not significant	147.90±4.63	151.78±4.88	147.66±2.51	3.73	Significant
Prequency (n) Property Prop	Weight (in kgs)	58.38±8.86	53.95±6.47	55.63±5.10	1.97	Not significant	41.70±3.51	47.92±4.42	53.56±14.22	9.52	Significant
Frequency (n) 7 17 7 7 6.29 Significant 120.33±5.64 16 6 6 6 6 6 6 6 6	BMI	22.16±2.12	20.92±2.41	22.53±3.24	2.05	Not significant	19.11±1.97	20.60±1.55	19.93±5.87	2.53	Not significant
Height (In cm) 123.28±7.29 137.17±16.02 148.57±9.76 6.29 Significant 120.33±5.64 137.37±9.91 140.33±11.11 8.55 Significant 24.57±2.76 32.05±12.88 42±9.48 4.64 Significant 22.16±2.04 31.03±7.26 33.66±7.89 5.15 Significant 14.74±2.70 16.33±2.50 18.74±2.18 4.63 Significant 15.3±1.17 16.01±2.47 16.33±1.81 0.37 Not significant 15.05±1.18 16.01±2.47 16.33±1.81 0.37 Not significant 158.84±8.61 161.08±6.92 1.07 Not significant 18.35±1.18 147.69±4.28 7.73 Significant 158.84±8.61 161.08±6.92 1.07 Not significant 18.35±2.1 147.69±4.28 7.73 Significant 18.05±1.85 12.2±2.51 3.9 Not significant 18.95±2.08 19.78±2.5 1.73 Not significant 18.05±1.68 134.213.19 1.38.05±1.68 134.213.19 1.38.05±1.68 134.213.19 1.48.05±1.68 134.05±		Children Males	S				Children Femal	les			
Weight (in kgs)	Frequency (n)	7	17	7	-	-	6	16	6		
BMI	Height (In cm)	123.28±7.29	137.17±16.02	148.57±9.76	6.29	Significant	120.33±5.64	137.37±9.91	140.33±11.11	8.55	Significant
Frequency (n) 19 33 35 35 36 10.08±6.92 36 39 36 39 36 36 36 36	Weight (in kgs)	24.57±2.76	32.05±12.88	42±9.48	4.64	Significant	22.16±2.04	31.03±7.26	33.66±7.89	5.15	Significant
Frequency (n) 19 33 1.07 Not significant 151.33±5.21 147.69±4.28 7.73 Not significant 151.33±5.21 147.8±2.25 7.73 Not significant 151.33±5.21 147.8±1.18 7.74	BMI	14.74±2.70	16.33±2.50	18.74±2.18	4.63	Significant	15.3±1.17	16.01±2.47	16.33±1.81	0.37	Not significant
Height (In cm) 158.84±8.61 161.08±6.92 1.07 Not significant 151.33±5.21 147.69±4.28 7.73 Significant 43.83±6.12 43.10±4.86 0.23 Not significant 43.83±6.12 24.83 Not significant	Drinking Water	Tube Well	Running Tap V	nning Tap Water T		Tube Well	Running Tap	Water	-		
Meight (in kgs) 57.47±7.75 54.88±6.95 1.55 Not significant 43.83±6.12 43.10±4.86 0.23 Not significant	Frequency (n)	19	33				18	39			
BMI	Height (In cm)	158.84±8.61	161.08±6.92	-	1.07	Not significant	151.33±5.21	147.69±4.28	•	7.73	Significant
Children Males	Weight (in kgs)	57.47±7.75	54.88±6.95		1.55	Not significant	43.83±6.12	43.10±4.86		0.23	Not significant
Frequency (n) 20	BMI	22.6±2.48	21.2±2.51		3.9	Not significant	18.95±2.08	19.78±2.25		1.73	Not significant
Height (In cm) 138.05±16.85 134±13.19 0.47 Not significant 29.88±8.14 29±6.19 0.06 Not significant 29.88±8.14 29.88±8.14 29±6.19 0.06 Not significant 29.88±8.14 29±6.19 0.06 Not significant 29.88±8.19 0.06		Children Males	S				Children Femal	les			
Weight (in kgs) 34.05±12.98 30±9.97 0.8 Not significant 29.88±8.14 29±6.19 0.06 Not significant 16.69±3.10 16.2±2.14 0.22 Not significant 16.23±2.2 14.78±1.18 2.38 Not significant 16.23±2.2 14.78±1.18 2.38 Not significant 16.29±7.10 16.69±3.10 15 11	Frequency (n)	20	11				22	6			
BMI 16.69±3.10 16.2±2.14 0.22 Not significant 16.23±2.2 14.78±1.18 2.38 Not significant Smoking Habit Smoker Non-Smoker Others Frequency (n) 26 15 11 Height (In cm) 160.29±7.90 160.6±5.88 159.81±9.31 0.03 Not significant Weight (in kgs) 56.62±8.23 52.53±4.92 58.27±6.42 2.44 Not significant BMI 22.03±2.73 20.18±2.06 22.84±1.93 7.14 Significant Sabar Children Female (n=28) Frequency (n) 14 9 9 9 7 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant Veight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Height (In cm)	138.05±16.85	134±13.19		0.47	Not significant	134.04±12.6	135.5±9.41		0.07	Not significant
Smoking Habit Smoker Non-Smoker Others Frequency (n) 26 15 11 Height (In cm) 160.29±7.90 160.6±5.88 159.81±9.31 0.03 Not significant Weight (in kgs) 56.62±8.23 52.53±4.92 58.27±6.42 2.44 Not significant BMI 22.03±2.73 20.18±2.06 22.84±1.93 7.14 Significant Education level Sabar Children Male (n=31) Sabar Children Female (n=28) Primary level Class I- IV Class V - X Significant Frequency (n) 14 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Weight (in kgs)	34.05±12.98	30±9.97		0.8	Not significant	29.88±8.14	29±6.19		0.06	Not significant
Frequency (n) 26 15 11 Height (In cm) 160.29±7.90 160.6±5.88 159.81±9.31 0.03 Not significant Weight (in kgs) 56.62±8.23 52.53±4.92 58.27±6.42 2.44 Not significant BMI 22.03±2.73 20.18±2.06 22.84±1.93 7.14 Significant Education level Sabar Children Male (n=31) Frequency (n) 14 9 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	BMI	16.69±3.10	16.2±2.14		0.22	Not significant	16.23±2.2	14.78±1.18		2.38	Not significant
Height (In cm)	Smoking Habit	Smoker	Non-Smoker	Others							
Weight (in kgs) 56.62±8.23 52.53±4.92 58.27±6.42 2.44 Not significant BMI 22.03±2.73 20.18±2.06 22.84±1.93 7.14 Significant Education level Sabar Children Male (n=31) Sabar Children Female (n=28) Primary level Class I- IV Class V - X Class X and above Class I- IV Class V - X Class X and above Frequency (n) 14 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Frequency (n)	26	15	11							
BMI 22.03±2.73 20.18±2.06 22.84±1.93 7.14 Significant Education level Sabar Children Male (n=31) Primary level Class I- IV Class V - X above Class X and above Frequency (n) 14 9 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Height (In cm)	160.29±7.90	160.6±5.88	159.81±9.31	0.03	Not significant	•				
Education level Sabar Children Male (n=31) Sabar Children Female (n=28) Primary level Class I- IV Class V - X Class X and above Primary level Class I- IV Class V - X Class X and above Frequency (n) 14 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Weight (in kgs)	56.62±8.23	52.53±4.92	58.27±6.42	2.44	Not significant					
Primary level Class I- IV Class X and above Primary level Class I- IV Class V - X Class X and above Class I- IV Class V - X Class X and above Class I- IV Class V - X Class X and above Class I- IV Class I- IV Class X and above Class I- IV Class X and above Class I- IV Clas	BMI	22.03±2.73	20.18±2.06	22.84±1.93	7.14	Significant	•				
Class I- IV Class V - X above Class I- IV Class V - X above Frequency (n) 14 9 9 7 18 3 Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Education level	Sabar Children	Male (n=31)				Sabar Children	Female (n=28)			
Height (In cm) 124.35±6.83 136.66±8.88 158±5.97 54.16 Significant 120.57±5.19 136.88±8.79 151.33±1.15 19.51 Significant Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant		•	Class V – X					Class V – X			
Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Frequency (n)	14	9	9			7	18	3		
Weight (in kgs) 24.14±2.71 29.66±6.12 50.75±5.44 86.2 Significant 22.42±1.98 30.25±6.01 43.33±2.88 17.82 Significant	Height (In cm)	124.35±6.83	136.66±8.88	158±5.97	54.16	Significant	120.57±5.19	136.88±8.79	151.33±1.15	19.51	Significant
BMI 14.89±1.93 15.7±1.34 20.29±1.21 29.81 Significant 15.41±1.11 16.01±1.96 19.23±1.81 5.1 Significant	Weight (in kgs)	24.14±2.71	29.66±6.12	50.75±5.44	86.2	Significant	22.42±1.98	30.25±6.01	43.33±2.88	17.82	
	BMI	14.89±1.93	15.7±1.34	20.29±1.21	29.81	Significant	15.41±1.11	16.01±1.96	19.23±1.81	5.1	Significant

Continued.

Parameters	Upto Rs. 300	Rs. 3000 – Rs. 4000	Rs. 4000 and abo	H'	Significance	Upto Rs. 3000	Rs. 3000 – Rs. 4000	Rs. 4000 and above	F	Significance
	Non literate	Class I – I	V Class V	-X Class above	XI and F	Significance				
Adult Sabar Ma	le (n=52)			-		•				
Frequency (n)	19	17	14	2						
Height (In cm)	159.05±8.08	162.47±7.72	158.85±6.90	164±0.00	0.97	Not signif	cant		•	
Weight (in kgs)	56.4±6.83	53.64±6.25	58.07±9.05	52.5±2.12	1.13	Not signif	cant			
BMI	22.1±2.26	20.34 ± 2.08	22.96±2.89	19.55±0.78	3.94	Significan	t			
Adult Sabar Fen	nale (n=57)									
Frequency (n)	3	21	22	11	•	•			·	
Height (In cm)	149.33±2.08	147.9±5.94	149.22±3.49	149.72±5.6	5 0.42	Not signif	cant			
Weight (in kgs)	45.33±13.05	43.85±3.16	43±5.46	42.45±5.88	0.33	Not signif	cant			
BMI	20.36±5.77	19.99±1.80	19.28±2.24	18.87±1.61	0.84	Not signif	cant			

Table 6: Association between socio demographic variables and nutritional status of Sabar children (8 to 17 years) of Jhargram district, West Bengal.

			Nutritional categories Undernourished	Normal	Total	Chi square	df	Significance
	Primary Level	Male	14 (60.83)	0 (0)	14 (45.16)			
Educational status	(Class I To V)	Female	7 (28)	0 (0)	7 (25)	36.003	2	0 (Significant)
Educational status	Class VII to V	Male	8 (34.78)	1 (12.5)	9 (29)			
	Class VI to X	Female	17 (68)	1 (33.33)	18 (64.28)			
	Class X	Male	1 (4.34)	7 (87.5)	8 (25.8)			
	and above	Female	1 (4)	2 (66.66)	3 (40.71)			
	Upto Rs 3000	Male Female	7 (30.43) 6 (24)	0 (0) 0 (0)	7 (22.58) 6 (21.42)	6.349	2	0.0042 (Significant)
				4 (50)	17 (54.83)	-	-	
	D = 2000	Male	13 (56.52)	. (5 5)	- ()			
Family Income	Rs 3000 – Rs 4000	Female	14 (56)	2 (66.66)	16 (57.14)			
	D . 4000	Male	3 (13.04)	4 (50)	7 (22.58)			
	Rs 4000 – Rs 5000	Female	5 (20)	1 (33.33)	6 (21.42)			

Continued.

			Nutritional categories		Total	Chi square	df	Significance
		Male	14	6	20			
	Tube well		60.86	75	64.51	0.745	1	0.388
Source of Drinking Water		Female	19 (76)	3	22			(Non Significant)
				100	78.57			
		Mala	9	2	11			
	Running	Male	39.13	25	35.48			
	Т	F1-	6	0	6			
	Tap water	Female	24	0	21.42			
		Male	2	2	4			0.0039
	Present		8	33.33	12.9	8.32	1	(Significant)
Use of Sanitary Latrine		Female	3	4	7			
			14.28	57.14	25			
		Male	23	4	27			
	Absent		92	66.67	87.1			
		Female	18	3	21			
			85.71	42.86	75			

Table 7: Association between socio demographic variables and nutritional status of Sabar Adult Female of Jhargram District, West Bengal.

		Nutritional Categories	;		T-4-1	Ch: C	-1¢	G! *G*
	•	Undernourished	Normal	0verweight	Total	Chi Square	ar	Significance
	Non Literate	1	1	1	3			
	Non Literate	6.25	2.56	50	5.26			
	Primary Level	4	17	0	21	11.307	6	0.079
Educational Status	(Class I to V)	25	43.58	0	36.84			(Non Significant)
	Class VI to V	8	13	1	22			
	Class VI to X	50	33.33	50	38.59			
	Class X and above	3	8	0	11			
	Class A and above	18.75	20.51	0	19.29			
	Upto Rs 3000	14	26	0	40			
	Opto Ks 5000	87.5	66.66	0	70.17			
Family income	Rs 3000 – Rs 4000	0	13	1	14	19.08	4	0.0008
	KS 3000 – KS 4000	0	33.33	50	24.56			(Significant)
	Rs 4000 – Rs 5000	2	0	1	3			
	KS 4000 – KS 3000	12.5	0	50	5.26			

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		Nutritional Categories			Total	Chi Square	df	Significance
	TD 1 11	7	12	0	19	-		
Source of	Tube well	46.66	30	0	33.33	2.4	2	0.3
Drinking Water	D	8	28	2	38			(Non Significant)
	Running Tap water	53.33	70	100	66.66			
	Donasat	4	10	0	14			
Use of Sanitary	Present	25	25.64	0	24.56	0.7	2	0.71
Latrine	A 1	12	29	2	43			(Non Significant)
	Absent	75	74.35	100	75.44	-		
		5	22	1	28			
	Wood collection	29.41	57.89	50	49.12			
Occupation						6.632	4	0.156
	Leaf collection	6	12	1	19			(Non Significant)
	and cattle cultivation	35.29	31.57	50	33.33	-		
	100 days work	6	4	0	10			
		35.29	10.52	0	17.54	-	_	
	Nana	3	4	0	7			
	None	18.75	10.81	0	12.28	8.884	6	0.18
	0	4	3	1	8			(Non Significant)
No. of children	One	25	8.1	25	14.03	-		
	T	5	24	1	30			
	Two	31.25	64.86	25	52.63	-	-	
	. Т	4	6	2	12			
	>Two	25	16.21	50	21.05			
	TT	0	4	0	4			
	Headache	0	9.75	0	7.01	7.367	8	0.498
	Montina	5	6	1	12			(Non Significant)
	Vertigo	35.71	14.63	50	21.05			
	Dain to all in a sin	4	18	0	22			
Disease	Pain/pelvic pain	28.57	43.9	0	38.59			
	C	3	10	1	14			
	Gynaecological problem		24.39	50	24.56	•	-	
	Gynaecologicai problem	21.42	24.39	30	24.50			
	None None	21.42	3	0	5			

Table 8: Association between socio demographic variables and nutritional status of Sabar Adult Male of Jhargram district, West Bengal.

		Nutritional Categories			T-4-1	Cl.: C	16	G**C*
		Undernourished	Normal	Overweight	Total	Chi Square	df	Significance
	Non Literate	1	18	1	20			
	Non Literate	16.66	40.9	33.33	37.73			
	Primary Level	4	13	0	17			0.357
Educational Status	(Class I to V)	66.66	29.54	0	32.07	6.625	6	
	Class VI to X	_1	11	2	14			(Non Significant)
	Class VI to A	16.66	25	66.66	26.41			
	Class X and	0	2	0	2			
	above	0	4.54	0	3.77			
	Upto Rs 3000	1	15	1	17			
	Opto Ks 3000	16.66	34.09	33.33	32.07			0.101
Family Income	Rs 3000 – Rs	_ 5	19	0	24	7.748	4	
	4000	83.33	43.18	0	45.28		•	(Non Significant)
	Rs 4000 – Rs	0	10	2	12			
	5000	0	22.72	66.66	22.64		•	
Source	Tube well	1	15	3	19			0.195
of	Tube well	20	34.09	75	35.84	3.271	2	
Drinking Water	Running Tap	4	29	1	34			(Non Significant)
	water	80	65.9	25	64.15			
	Present	1	10	2	13			0.44
Use of Sanitary	rieschi	16.66	23.25	50	24.52	1.639	2	
Latrine	Absent	5	33	2	40			(Non Significant)
	Ausent	83.33	76.74	50	75.47			
	Smoker	_ 2	21	3	26			
	Sillokei	33.33	51.21	50	49.05		•	0.83
Smoking Habit	Non smoker	_ 2	12	1	15	1.479	4	
	Non smoker	33.33	29.26	16.66	28.3			(Non Significant)
	others	_ 2	8	2	12			
	oulers	33.33	19.51	33.33	22.64		•	
	Farmer	1	10	1	12			
	rarmer	20	22.77	25	22.64			
	Daily labor / 100	_ 2	17	1	20			0.913
Occupation	days work	40	38.63	25	37.73	2.074	4	
	Collection of	_ 1	7	0	8			(Non Significant)
	wood	20	15.9	0	15.09			
	others	1	10	2	13			
	oulers	20	22.72	50	24.52			

The distribution of the socio-economic characteristics of the studied population indicated 37.73% adult males and 5.26% adult females were non literate, but a maximum number of males (32%) and females (36.84%) had educational status up to primary level and meagre 19.29% males and 3.77% had education level up to undergraduate The maximum number of male and female children (38.59%) had education up to madhyamik or secondary level (Class X). Adult males and females reported their monthly income upto Rs 3000 to Rs 4000 by 100 days' work or collection of wood and leaves from forest or agriculture labour. 47% of Sabar people collect their drinking water from tubewell and 52% from supplied tap water. 49% of male Sabar people were smokers and 22% use tobacco in another form. Similarly, 81% of males were addicted to alcohol use. It was also remarkable that 76% of people did not use sanitary latrine due to lack of facilities in their villages. 59% people of these Sabar villages had semi pucca house followed by 28 % with pucca houses. 96% people of these Sabar villages has electricity. 37% male Sabar people in this locality were daily labour followed by 22 % agriculture workers but females (49%) were wood collectors followed by cattle farming.

Table 2 represents Mean±SD values of physical parameters -body height, body weight and BMI of preadolescent (8-12 years), adolescent (13-17 years) children, adult male and female sabar tribes of Jhargram district of if West Bengal. Children and adolescent male and female as well as adult male and female sabar people when compared, it was found that male children, adolescent and adult sabars showed significantly higher values in physical parameters than their female counter part.

Table 3 demonstrate the nutritional status of the studied Sabar population-based on BMI where the prevalence of undernutrition (BMI <16, CED grade III) for children, adult males and adult females was 49.1%, 0%, and 3.5%. The same for CED grade II (BMI 16-16.9) was 22%, 3.7% and 10.5% respectively for Sabar children, adult males and adult females. Prevalence of CED grade I (BMI 17-18.4) undernutrition was 11.8%, 7.5%, and 14% respectively. 81.1% adult males and 68.4% adult females were normal BMI range but 7.5% adult males and 3.5% adult females were in the overweight category.

Table 4 represents the result of one-way ANOVA as well as independent sample t-test for anthropometric variables among different socio-demographic characteristics of the studied population. In case of family income statistically significant difference was observed for mean body height (F = 9.52, P = 0.0002) for adult females but no significant difference was found in the case of adult males, i.e., increase in family income do not affect their body height, body weight and BMI. But in the case of Sabar children family income significantly (P < 0.01 - 0.001) influence their body height, body weight and BMI. Regarding the source of drinking water BMI (22.6 ± 2.48) was found to

be significant in adult males using water from tubewell but body height for adult females was significantly higher (151.33±5.21) than those females using tap water. No significant difference was found in body height, body weight and BMI among children using tubewell or tap water as a source of drinking water. Interestingly educational level significantly affects the anthropometric parameters of Sabar children but no such difference was found in adult males and females when education level was considered except BMI of adult male Sabar. When smoking habit was considered as socio-demographic character for adult male statistically significant difference was observed in the case of BMI (F=7.14, P= 0.00) when smokers, non-smoker and other forms of tobacco were compared.

Table 5 represents the association between sociodemographic variables and nutritional categories of the Sabar population of Jhargram. Significant associations were obtained in educational status and family income in children. Only family income had a significant association with nutritional status in adult females but no significant association was found in male adult nutritional status with socio-economic parameters. 83.33% of undernourished adult males were found with low to moderate (Rs 3000 - 4000 per month) family income, absence of use of sanitary latrine and running tap water as a source of drinking water. In the case of adult Sabar females, 87.5% of women are undernourished with low family income (less than Rs 3000), 7.5% are undernourished with the absence of sanitary latrine and 53.33% are undernourished with the use of running tap water as a source of drinking water.

DISCUSSION

This cross-sectional study was conducted to determine the effect of socio-demographic factors on health conditions among Sabar tribes (adult males, adult females and children) between age 18 to 60 years for adults and 9 to 19 years for children and adolescents of Jhargram district of West Bengal India. It has been observed that the prevalence of undernutrition is maximum for male children (74 -90%) and female children (89 -28%). To find the socio-demographic factors of health condition, a chi-square test was performed which revealed statistically significant association for different variables like family income, educational status with nutritional categories. Adult females showed significant association only with family income but adult males showed no such association with socio-demographic factors. On the other hand, family income depicted a statistical impact on body weight and body height for both adult males and females as well as children. The education level of Sabar children significantly (p<0.001) affects their body weight, body height and BMI. The smoking habit of adult males significantly (p<0.001) influence their BMI value.

In a similar study of Sabar males of Purulia district, Das et al. explained that family size and family income influence the living standard specifically housing and sanitary condition should be better and should influence their health status.¹

The current study focuses on a similar association of family income with health status and nutritional level for Sabar people of Jhargram. 11,12

This study has revealed that education also influences the health status of Sabar tribes. 37.73% adult males and 5.26% adult females were non-literate. 32% adult males and 36.84% adult females had education levels up to primary standard which is much lower than the tribal literacy rate of India and state level literacy of West Bengal (68.2%). This study shows a statistically significant (p<0.001) association between educational level and anthropometric variables like body weight, body height and BMI among Sabar tribal children (both males and females). But adult Sabar males and females showed no significant association between nutritional status and educational level when one way ANOVA test was performed. This result does not corroborate with the previous study conducted in India. 13-15

Other aspects of health are family size is related to family income regarding nutritional status that affects the standard of living especially housing and sanitary condition. Smaller the family size and the better the family income, better will be the domain of health.^{11,12}

Ghosh et al. found that the prevalence of undernutrition among tribal women of West Bengal depends on literacy and the number of children in the family. In contrast, a positive association was not elicited with the educational levels of tribal women in Kainatty and their nutritional status. ^{16,17} But the prevalence of undernutrition might be due to the use of smoking tobacco among them. ¹⁸ Probably due to similar reasons we have found undernutrition (33.33%) among Sabar adult males in our study.

Therefore, the present study indicates a higher risk of undernutrition among tribal adolescents (9-18 years) due to socio economic, socio cultural and environmental factors influencing food intake and health seeking behaviour like the use of sanitary latrine, use of safe drinking water and sufficient nutrition through food. Besides inadequate health care facilities, illiteracy and socio-economic disadvantages tribal among the populations perpetuate the vicious cycle undernutrition. 19 Poor accessibility and affordability of nutrients due to low income and social status of tribal population along with lack of knowledge and perception about nutritious diet, illiteracy, rigid customs and beliefs leads to many health problems among tribal adolescents but still struggle to perceive for necessary health facilities.20,21

Maximum male Sabar adults participants are daily wage labour (37.7%) i.e., 100 days workers and landless

agricultural workers (22.64%). So, they are mainly from low to medium income families. Female Sabar adults mostly earn money from wood collection (49.12%), leaves and cattle cultivation (33%) and 100 days labour (17.5%). So, they are also in low to middle income group. Female adults mostly suffer from Vertigo (21.05%) of which 35.71% are undernourished. Pain in different parts of the body mainly the knee, pelvic and shoulder region (38.59%) along with headache (71%) occur due to work related stress (carrying an excessive load on their head) of which 28.57% were undernourished. 24.56% of female Sabar suffered from gynaecological problems of which 21.4% were undernourished.

This indicates that family income or per capita income and occupation have revealed a positive impact on health status which has a good agreement with the NNMB report. ¹³ But in our study, no significant association has been found between occupation and number of children (in case of female) and prevalence of some diseases with nutritional status, probably due to the small sample size in our study.

Again, safe drinking water and lack of sanitation facilities have adverse effects on health and nutrition, economy and development.²²Contaminated drinking water and practice of open defecation contributes significantly to spread the communicable diseases as well as the cause of other intestinal infection. Undernutrition is prevalent in adult males (83%) and females (75%), only 24.52% male and 25% female adults use toilet in their premises. The reason might be the lack of initiatives from the government and partly the villagers who prefer to go to open space for defecation. Therefore, the whole scenario indicated the failure of government policies and the lack of awareness among Sabar tribal people of this locality. It has also been mentioned that Sabar adult females (24.6%) suffer from gynaecological problems of which 24.2% were undernourished due to this unhealthy practice, poor sanitation and hygiene standard exacerbate the severity and impact of undernutrition.

CONCLUSION

From the present study, it can be concluded that the undernutrition among Sabar tribal people especially the children and adolescents is very prominent and they are exposed to the risks of different health problems in future and nutritional issues like growth retardation in adulthood. Besides, female adult Sabar tribes mostly suffer from neurological, gynaecological musculoskeletal disorders due to occupational hazards that they are forced to do to earn money for supporting their family. Besides the tendency of the village people to avoid the use of sanitary latrine as well as lack of latrine facilities in their premises are the main cause of gynaecological diseases. The undernutrition and other health issues of adult male Sabar people might be associated with their smoking habit alcohol intake, insufficient general awareness due to lack of education.

Long-standing history defines the negligence of the part of government and partly the conservative attitude, high percentage of non-literate people, discrimination in terms of occupation as well as a source of income might be the reason for undernutrition among Sabar tribes of Jhargram.

Therefore, to improve the health condition which depends on economic strength as well as proper education of these Sabar tribes, intervention by the state government need to be introduced along with effective health care infrastructure and health awareness among these population of Sabar tribes of Jhargram.

Recommendations

In this context Government should take initiatives, policymakers and implementing local authorities should consider socio-economic determinants of health for improvement of quality of life which in turn will give economic strength to this poor and vulnerable sabar tribal people of Jhargram.

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