

**International Journal of Experimental Research and Review (IJERR)**

©Copyright by International Academic Publishing House (IAPH)

ISSN: 2455-4855 (Online)

*Original Article*

Received: 15<sup>th</sup> August, 2016; Accepted: 19<sup>th</sup> October, 2016; Published: 30<sup>th</sup> December, 2016

---

**Nutritional status of adult Bengalee slum dwellers of Midnapore town, Paschim  
Medinipore, West Bengal, India**

**Priyanka Das<sup>1</sup>, Argina Khatun<sup>1</sup>, Ashish Mukhopadhyay<sup>2</sup>, Mithu Bhadra<sup>3\*</sup> and Kaushik Bose<sup>1</sup>**

<sup>1</sup>Department of Anthropology, Vidyasagar University, Midnapore, West Bengal, India;

<sup>2</sup>Department of Anthropology, A.P.C. College, New Barrackpore, West Bengal, India;

<sup>3</sup>Department of Anthropology, Dinabandhu Mahavidyalaya, Bongaon, West Bengal, India

**\*Corresponding Author:** drmithubhadra@gmail.com

**Abstract**

A cross sectional study of 1000 Bengalee adults slum dwellers (male = 494, female = 506) aged 18-81 years of Midnapore town, Paschim Medinipore, West Bengal, India was undertaken to study their age and sex differences in nutritional status. The age range of this study was 18 to 81 years. Subjects were classified into five age groups, each with a width of 10 years. The groups were 18-29.9 (males=238, females=186), 30-39.9 (males=105, females=119), 40-49.9 (males=61, females=98), 50-59.9(males=46, females=55), and >60 (males=44, females=48) years. Two basic variables (height and weight) and a single derived variable (BMI) have been used in the present report. Nutritional status was determined following World Health Organisation (WHO) guidelines (WHO, 1995) to facilitate international comparison. The overall frequencies of CED among males and females were 20.85% and 24.31%, respectively. Based on WHO classification, the prevalence of CED among this population was high (20-39%) and thus, the situation is serious in both sexes. These rates were, in general, lower than the recently reported studies.

**Keywords:** Anthropometry, BMI, chronic energy deficiency, slum dwellers.

**Introduction**

According to the 2011 census, India has 1210569573 slum populations, out of them West Bengal has 91276115 and Paschim Medinipore has 5913457 slum populations. Slum is a region of a city marked by poverty and inferior living conditions. Information on anthropometric characteristics, socio economic conditions and nutritional status of

Slum population were studied in different countries all over World.

The use of anthropometry as an indicator of nutritional and health status of adults has now been well established (WHO, 1995).The body mass index (BMI) is an indicator of overall adiposity and low BMI and high levels of undernutrition (based on BMI) is a major

public health problem, especially among rural underprivileged adults of developing countries (WHO, 1995). Although adult nutritional status can be evaluated in many ways, BMI is the most widely used because its use is inexpensive, non-invasive, and suitable for large scale surveys (Ferro-Luzzi et al., 1992; James et al., 1994; Lohman et al., 1988).

Thus, BMI is the most established anthropometric indicator used for assessment of adult's nutritional status (Lee and Nieman, 2003, Moy and Atiya, 2003). Body mass index is generally considered a good indicator of not only the nutritional status but also the socio-economic condition of a population, especially adult populations of developing countries (Ferro-Luzzi et al., 1992; Khongsdier, 2002; Nube et al., 1988; Shetty and James, 1994). A BMI < 18.5 kg/m<sup>2</sup> is widely used as a practical measure of chronic energy deficiency (CED), i.e., a "steady" underweight in which an individual is in energy balance irrespective of a loss in body weight or body energy stores (Khongsdier, 2002). Such a "steady" underweight is likely to be associated with morbidity or other physiological and functional impairments (James et al., 1988; Shetty and James, 1994; WHO, 1995).

Several recent investigations have studied the nutritional status based on BMI among different populations along with different tribes (Chakraborty et al., 2006; Ahmed et al., 1998; Bose et al., 2006; Bose et al., 2007; Clausen et al., 2006; Khongsdier, 2002; Pryer et al., 2006; Pryer et al., 2003; Shetty et al., 1994; Bose and Chakraborty, 2005; Mittal and Srivastava, 2006; Datta Banik et al., 2007).

In view of this, the present investigation was undertaken to study the nutritional status of adult Bengalee slum dwellers of Midnapore town, Paschim Medinipore, West Bengal, India.

### **Materials and methods**

The study was conducted in an urban slum situated in several wards of Midnapore town. Midnapore is approximately 130 kms from Kolkata, the provincial capital of West Bengal. One thousand (n=1000) adult slum dwellers lived in Midnapore town (males, 494 and females, 506) participated in this study. The age range of this study was 18 to 81 years. Subjects were classified into five age groups, each with a width of 10 years. The groups were 18-29.9 (males=238, females=186), 30-39.9 (males=105, females=119), 40-49.9 (males=61, females=98), 50-59.9 (males=46, females=55), and >60 (males=44, females=48) years. Overall response rate was found to be around 80%. The municipal authorities and local community leaders were informed before commencement of the study. Informed consent was also obtained from each participant.

A total of fourteen anthropometric variables included height, weight, sitting height, height acromion and circumferences like mid-upper arm, chest, waist and hip; along with, skinfold thickness of biceps, triceps, sub-scapular, suprailiac, medial calf and anterior thigh measurements were made in the present survey but only two basic variables (height and weight) and a single derived variable (BMI) have been used in the present report. Instruments were standardized before the commencement of data collection. All the anthropometric measurements were taken internationally accepted standard protocol (Lohman et al., 1988) and body mass index (BMI) was computed using the standard equation:  $BMI (kg/m^2) = Weight (kg) / height (m^2)$ .

Nutritional status was determined following World Health Organisation (WHO) guidelines (WHO, 1995) to facilitate international comparison.

The following BMI ( $\text{kg}/\text{m}^2$ ) cut-off points were used:

CED grade III:	BMI < 16.0
CED grade II:	BMI = 16.0 – 16.9
CED grade I:	BMI = 17.0 – 18.4
Normal:	BMI = 18.5 – 24.9
Overweight:	BMI $\geq$ 25.0
Obese:	BMI $\geq$ 30.0

Therefore CED (Chronic Energy Deficiency), in general was defined as BMI < 18.5  $\text{kg}/\text{m}^2$ . The WHO classification (WHO, 1995) of the public health problem of low BMI, based on adult populations worldwide, was followed. This classification categorizes prevalence according to percentage of a population with BMI < 18.5.

- 1) Low (5-9%) Warning sign, monitoring required,
- 2) Medium (10-19%) Poor situation,
- 3) High (20-39%) Serious situation
- 4) Very high ( $\geq$  40%) Critical situation

At the preliminary stage of the present interpretation, intra-observer technical errors of measurements (TEM) were calculated based on replicate measurements on 30 random selected subjects. All statistical analyses were computed using the SPSS Package (SPSS 16) on a computer.

## Results

Table 1 presented Overall mean, standard deviation (SD) and t-values of anthropometric variables of slum dwellers. The mean age of the males was low (34.75 years, SD 14.72), compared with females (37.05 years, SD 14.24) having a statistically significant ( $t=2.50$ ,  $p<0.05$ ). The mean height of the males was high (160.65 cm, SD 7.88), compared with females (148.64, SD 6.37) having a statistically significant ( $t=26.49$ ,  $p<0.05$ ). The mean weight of the males was high (55.37 kg, SD 10.22), compared with females (48.46 kg, SD 10.00) having a statistically significant ( $t=$

10.80,  $p<0.05$ ). The mean body mass index (BMI) of the males was low (21.45  $\text{kg}/\text{m}^2$ , SD 3.67), compared with females (21.93  $\text{kg}/\text{m}^2$ , SD 4.35) having not statistically significant ( $t=1.89$ ,  $p<0.05$ ).

Table 2 presented the age group-wise distribution of slum dwellers belonging to different nutritional status. The overall prevalence of CED (Chronic Energy Deficiency) of males and females (Fig 1) were 20.85% and 24.30%, respectively. The highest percentage of CED of males were (34.09%) in the eldest age group (>60 years) and the lowest percentage of CED of males were (15.24%) in the age group of 30-39.9 years. The highest rate of overweight of males were (19.05%) in the age groups (30-39.9 years) and the lowest rate of overweight of males were (9.24%) in the youngest age groups (18-29.9 years). The highest rate of obese of males were (8.70%) in the age groups (50-59.9 years) and the lowest rate of obese of males were (1.68%) in the youngest age groups (18-29.9 years).

The highest percentage of CED of females were (29.17%) in the eldest age group (>60 years) and the lowest percentage of CED of females were (10.91%) in the age group of 50-59.9 years. The highest rate of overweight of females were (25.45%) in the age groups (50-59.9 years) and the lowest rate of overweight of females were (16.67%) in the youngest age groups (18-29.9 years). The highest rate of obese of females were (6.72%) in the age groups (30-39.9 years) and the lowest rate of obese of females were (2.15%) in the youngest age groups (18-29.9 years).

## Discussion

The mean BMI of the present study of males was higher than those reported recent studies (Bose et al., 2006, Chakraborty et al., 2009) but slightly lower than those reported recent studies (Ebada et al., 2009).

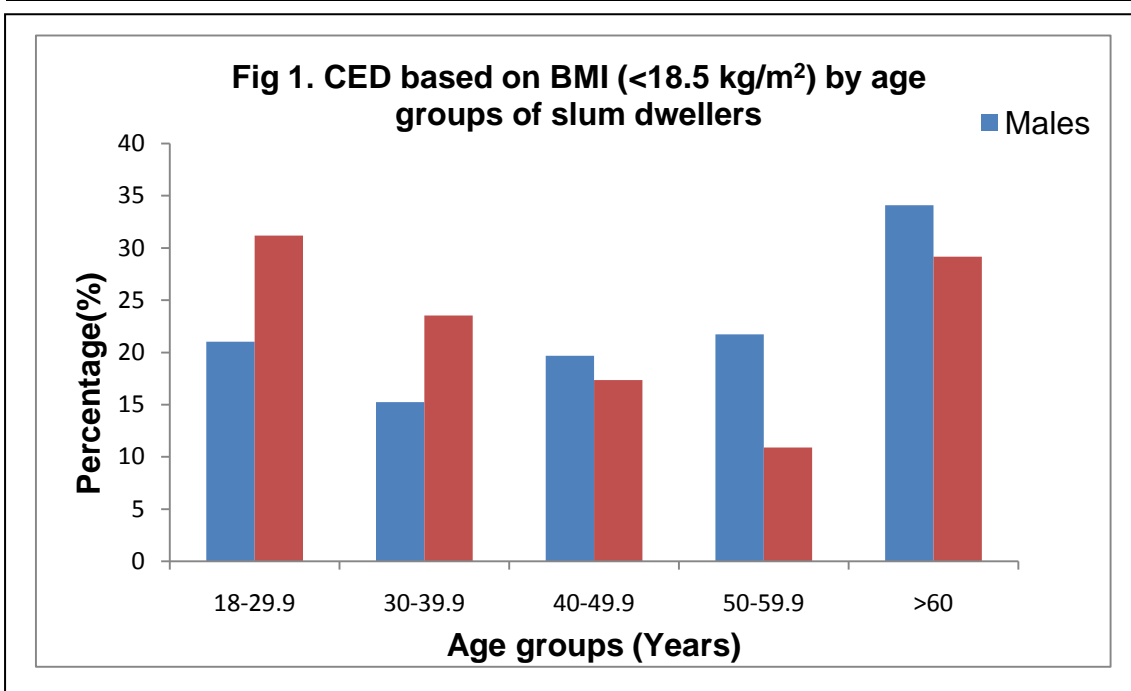
**Table 1. Overall mean, standard deviation (SD) and t-values of anthropometric variables of slum dwellers.**

VARIABLES	Males		Females		t- value
	Mean	SD	Mean	SD	
Age (Years)	34.75	14.72	37.05	14.24	2.51*
HT (cm)	160.65	7.88	148.64	6.37	26.49*
WT (KG)	55.37	10.22	48.46	10.00	10.80*
BMI (kg/m <sup>2</sup> )	21.45	3.67	21.93	4.35	1.89**

\*-significant at 0.05 level; \*\*- not significant at 0.05 level

**Table 2. Frequency and percentage (%) of nutritional status by BMI (WHO, 1995) by age groups of slum dwellers.**

Age (Years)	Sex	Nutritional Status (%)			
		CED (BMI 18.4kg/m <sup>2</sup> )	NORMAL (BMI 18.5-24.9 kg/m <sup>2</sup> )	OVERWEIGHT (BMI 25-29.9 kg/m <sup>2</sup> )	OBESE (BMI >30kg/m <sup>2</sup> )
18-29.9	Male (238)	50 (21.01)	162 (68.07)	22 (9.24)	4 (1.68)
	Female (186)	58 (31.18)	93 (50.00)	31 (16.67)	4 (2.15)
30-39.9	Male (105)	16 (15.24)	67 (63.81)	20 (19.05)	2 (1.90)
	Female (119)	28 (23.53)	59 (49.58)	24 (20.17)	8 (6.72)
40-49.9	Male (61)	12 (19.67)	40 (65.57)	7 (11.48)	2 (3.28)
	Female (98)	17 (17.35)	56 (57.14)	21 (21.43)	4 (4.08)
50-59.9	Male (46)	10 (21.74)	25 (54.35)	7 (15.21)	4 (8.70)
	Female (55)	6 (10.91)	33 (60.00)	14 (25.45)	2 (3.64)
≥ 60	Male (44)	15 (34.09)	20 (45.46)	8 (18.18)	1 (2.27)
	Female (48)	14 (29.17)	23 (47.92)	9 (18.75)	2 (4.16)
All age	Male (494)	103 (20.85)	314 (63.56)	64 (12.96)	13 (2.63)
	Female (506)	123 (24.30)	264 (52.18)	99 (19.57)	20 (3.95)



The mean BMI of females of present study higher than those reported recent studies (Bose et al., 2006, Bose et al., 2007) but slightly lower than those reported recent studies (Ebada et al., 2009).

The prevalence of CED among slum dwellers of males was much lower than those recently reported studies (Chakraborty et al., 2009, Bose et al., 2006). The prevalence of CED among slum dwellers of females was much lower than those recently reported studies (Bose et al., 2007, Bose et al., 2006). Using the World Health Organization criteria (WHO, 1995) the prevalence of CED among this population (Slum dwellers) was high (20-39%) and thus, the situation is serious in both sexes.

It is clear that the slum dwellers of Midnapore town were high prevalence of CED. The public health implications of these findings are very important because high CED is likely to be associated with morbidity or other physiological and functional impairments (James et al., 1994; Shetty et al., 1994; WHO, 1995). Immediate nutritional intervention programs are initiated for implementation among this population.

#### **Acknowledgement**

The municipal authorities and local community leaders were thankfully acknowledged for their help for this study. All the subjects who participated in the study are gratefully acknowledged.

#### **References**

Ahmed, S. M., Adams, A., Chowdhury, A.M. and Bhuiya, A. (1998). Chronic energy deficiency in women from rural Bangladesh: some socioeconomic determinants. *J. Biosoc. Sci.* 30: 349-358.

Bisai, S., Bose, K., Khatun, A., Ganguli, S., Das, P., Dikshit, S., Pradhan, S. and Mishra, T.

Nutritional stress in Kora Mudis of two districts in West Bengal, India-A comparative statement.(a book). Environment Education: global Issues and Policies. Published by A.P.H Publishing Corporation, New Delhi.

Bose, K., Bisai, S., Das, P., Dikshit, S. and Pradhan, S. (2007). Relationship of Income with Anthropometric Indicators of Chronic energy deficiency among Adult Female Slum dwellers of Midnapore Town. *J. Hum. Ecol.* 22(2): 171-176.

Bose, K., Ganguly, S., Mamta, H., Mukhopadhyay, A. and Bhadra, M. (2006). High Prevalence of undernutrition among adult Kora Mudi tribals of Bankura District, West Bengal, India. *Anthropological Science.* 114: 65-68

Bose, K., Bisai, S., Das, P., Dikshit, S. and Pradhan, S. (2006). Inter relationship of income chronic energy deficiency, morbidity and Hospitalization among Adult Male Slum dwellers of Midnapore Town. *J. Biosoc. Sci.* 39: 779-786.

Bose, K. and Chakraborty, F. (2005). Anthropometric characteristics and nutritional status based on body mass index of adult Bathudis: a tribal population of Keonjhar District, Orissa, India. *Asia Pacific Journal of Clinical Nutrition.* 14: 80-82.

Ebada, C.E., Adedoyin, A.R. and Odejide, A. S. (2009). Relationship between Socioeconomic status and Body Mass Index Among Adult Nigerians. *AJPARS.* 1: 1-6.

Chakraborty, R., Bose, K. and Bisai, S. (2006). Body mass index and chronic energy deficiency among urban bengal Male Slum Dwellers of Kolkata, India: Relationship with Family Income. *Int. J. Anthropology.* 21: 209-215.

- Chakraborty, R., Bose, K. and Bisai, S. (2009). Relationship of family income and house type to body mass index and chronic energy deficiency among urban Bengalee male slum dwellers of Kolkata, India. *Journal Homo of Comparative Human Biology*. 60: 45-57.
- Clusen, T., Charlton, K. E. and Holmboe-Ottesen, G. (2006). Nutritional status, tobacco used and alcohol consumption of older persons in Botswana. *J. Nutr. Health Aging*. 10: 104-110.
- Datta Banik, S., Bose, K., Bisai, S., Bhattacharya, M., Das, S., Jana, A. and Purkait, P. (2007). Chronic Energy Deficiency among the Adult Dhimals of Naxalbari, West Bengal –Comparative with other Tribes of eastern India. *Food and Nutrition bulletin*. 28 (3): 348-352.
- Ferro-Luzzi, A., Sette, S., Franklin, M. and James, W.P.T. (1992). A simplified approach of assessing adult chronic deficiency. *Eur. J. Clin. Nutr.* 46: 173-186.
- James, W.P.T., Ferro-Luzzi, A. and Waterlow, J.C. (1998). Definition of chronic energy deficiency in adults. Report of a working party of the International Dietary Energy Consultative Group. *Euro. J. Clin. Nutr.* 42: 969-981.
- Khongdier, R. (2002). Body mass index and morbidity in adult males of the War Khasi in Northeast India. *Eur. J. Clin. Nutr.* 56: 484-489.
- Khongdier, R., Varte, R. and Mukherjee, N. (2005). Body Excess male chronic energy deficiency among adolescents: a cross sectional study in the context of patrilineal and matrilineal societies in Northeast India. *Eur. J. Clin. Nutr.* 59: 1007-1014.
- Lee, R.D. and Nieman, D.C. (2003). Nutritional assessment. Mc Graw Hill, New York.
- Loman, T.G., Roche, A.F. and Martorell, R. (1988). Anthropometric Standardization reference manual. Human Kinetic Books, Chicago.
- Mittal, P.C. and Srivastava, S. (2006). Diet, nutritional status and food related traditions of oraon tribes of New Mal (West Bengal), India. *Rural and Remote Health*. 6: 385-395.
- Moy, F.M. and Atiya, A.S. (2003). Waist circumference as a screening tool for weight management: evaluation using receiver operating characteristic curves for Malay students. *Asia Pacific Journal of Public Health*. 15: 99-104.
- Nube, M., Asenso-Okyere, W.K. and Van-den-Bloom, GJM. (1998). Body mass index as an indicator of standard of living in developing countries. *Eur. J. Clin. Nutr.* 77: 1186-1191.
- Pryer, J.A. and Rogers, S. (2006). Epidemiology of undernutrition in adults in Dhaka slum households, Bangladesh. *Eur. J. Clin. Nutr.* 60: 815-822.
- Pryer, J.A. and Rogers, S. (2003). Factors affecting nutritional status in female adults in Dhaka slums, Bangladesh. *Soc. Biol.* 50: 259-269.
- Shetty, P.S. and James, W.P.T. (1994). Body mass index : a measure of chronic energy deficiency in adults. Food and Nutrition paper no.56. Food and Agricultural Organization, Rome.
- World Health Organization (1995). Physical status: the use and interpretation of anthropometry. Technical Report series no. 854. World Health Organization, Geneva.