

Anthropometric Measurements and Nutritional Status of U-5 Children in Selected Slum Areas of English Bazar Municipality of Malda District of West Bengal

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ARTICLE DETAILS

Article History

Published Online: 10 October 2018

Keywords

Underweight, Wasting, Stunting, BMI, Mid Upper Arm Circumference (MUAC), Head Circumference, WHO Anthro.

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ABSTRACT

The nutritional status of under-five children in selected slum areas of English Bazar Municipality is a perceptive pointer of health, financial system and the sustainable development of Malda District. The research study depicts the consequence i.e. related to anthropometric measurements and other related issues of nutritional status are taken of 336 children. The survey with a prepared Schedule was completed for the duration of 1st July, 2018 to 5th July, 2018 among 336 children aged between 0 to 5 years from different selected slum areas of English Bazar Municipality. As a basic section of this research, children's Underweight status, Wasting and Stunting were examine in order to find out child nutritional status using the WHO growth standard and also Mid Upper Arm Circumference (MUAC) and Head Circumference were measured to determine nutritional status. To determine hypothesis statistical data analysis MS Excel software tools were used and WHO Anthro Software was used to determine the nutritional status of child compared to WHO Standards. Analysis results revealed underweight or weight-for-age (WAZ) (31.9%) as the most common form of malnutrition among children aged under-five, followed by wasted or weight-for-height (WHZ) status (30.3%), and stunting or height-for-age (HAZ) (29.6%). Similarly results revealed severely underweight (18.8%) as the most common form of malnutrition among children aged under-five, followed by severely wasted status (15.2%), and severely stunting (4.2%).

1. Introduction

Anthropometric examination is an almost mandatory tool in any research to assess health and nutritional condition in childhood (Prakash & Yadav, 2017). Anthropometric indices are widely used to assess the health and nutritional status of children. Based on the age, body weight and height, a number of indices such as height-for-age, weight-for-height and body mass index have been suggested (Waterlow JC, Buzina R, Keller W, Lane JM, Nichaman MZ, Tanner JM, 1977). The nutritional status of the children can be evaluated by their growth in terms of physical, mental as well as biological characteristics and stunting, wasting, underweight is the one form of malnutrition (Silva & Silva, 2015) which is the greatest single threat to the world's public health (Brozek, 1978; WHO, 2009) that affect the growth and overall development of the under-five children's which indirectly influence the country's economy (Chase & Martin, 1970). Physical measurements like body weight, height, circumference of arm and calf, triceps skin fold of children have been extensively used to define health and nutritional status of communities. The children are classified using three categories: 'underweight' (low weight-for-age), 'stunting' (low height-for-age) or 'wasting' (low weight-for-height), Stunting is defined as a low height-for-age for children and it measures the past (chronic) child under nutrition. Children with z-scores < -2.00 are said to be stunted and those < -3.00 severely stunted. Wasting is defined as low weight-for-height for children, and it is a measure of current or acute under nutrition. Children with z-scores < - 2.00 are said to be wasted. Underweight is defined as low weight-for-age and it reflects past (chronic) and present (acute) under-nutrition. Children with z-scores < -2.00 are said to be underweight (Srivastava et al. Archives of Public Health 2012). In Malda

District, only 6% total children age 6-23 months receiving an adequate diet that's why the percentage of stunted children is very high than the state and country average i.e. 37.8% where 22.8% were wasted and 37.2% were underweight (NFHS-4, 2015-16, Malda). Anthropometric measurement was then used to determine if children were underweight (weight-for-age), wasting (weight-for-height) and stunting (height-for-age) based on reference data from the National Center for Health Statistics (NCHS)/World Health Organization (WHO) (Hien, N. N., & Kam, S., 2008). Although prevalence of underweight status among under-five children has decreased since 1990, 99 million children under five years of age are underweight around the globe (UNICEF, WHO and World Bank, 2014). UNICEF estimates that nearly 2.6 million children, who die each year due to malnutrition, are equivalent to one-third of all registered child deaths globally (UN Inter-agency Group for Child Mortality Estimation, 2011). The prevalence of stunting is the most commonly used a conventional anthropometric measure/index reflecting long-term chronic under nutrition, linear growth failure and multi-factorial social deprivation and/or a longer-term response to a prolonged food deprivation and/or disease or illness (WHO 1995; Nandy et al. 2005; Prendergast and Humphrey 2014). Malnutrition very much prevailed among the poor, illiterate and marginalised people who are not able to find their basic requirements (WHO, 2009).

2. Objectives

1. To find out the nutritional status of the Children through anthropometric measurements, and

- II. To find out the undernourished or malnourished condition of the Children through anthropometric measurements.

3. Materials and Methods

The data collection process of this study was a primary study (field research). Total 280 children family (respondents/mothers of the Children) have been selected of selected slums in English Bazar Municipality of Malda District and samples had been taken from these clusters (slums) by using the questionnaire and made the interviews. Random sampling technique was used for data collection process.

The survey was done among under-five total 336 children of EBM Selected slums during 1st July, 2018 to 5th July, 2018 with format authorization from the local authority and by taking familiar approval i.e. informal in nature. It was a simple random sample collection survey from the selected slum areas of EBM. Anthropometric data i.e. height, weight, mid-upper arm circumference, head circumference of the child was collected by using a constructed Schedule and after that nutritional status condition of the children has to be assessed. The anthropometric study has been conducted in two steps. **Firstly**, the essential data has been collected or extracted from anthropometric Simple random health survey. **Secondly**, the collected data has been assessed and differentiate with definite standards by analyzing specific sections using anthropometric software environment. The material and methods will be used for collecting and analyzing the data have been explained under the following heading-

A. Quantitative Analysis

Body Mass Index: Body Mass Index is a simple calculation using a person's height and weight.

$$\text{Body Mass Index} = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (meter}^2\text{)}} \text{ or } \frac{\text{weight (lbs)}}{\text{height}^2 \text{ (inches}^2\text{)}}$$

B. Statistical Analysis

Z-Score: The z-score is also being used to analysis for under nutritional status of child and the percentage of children has severely and very severely underweight, stunting, wasting condition. For instance, the z-score of weight for height of an individual is given by the following formula

$$\text{'Z'-score} = \frac{\text{Individual's weight} - \text{Median value of Reference Population}}{\text{SD Value of Reference Population}}$$

C. Software for the Analysis of the Data

WHO Anthro Software: Using WHO Anthro software, Z-score distribution of different nutritional condition like Height for age, weight for height, BMI for age, Head Circumference for age and Mid Upper Arm Circumference (MUAC) distribution will be plotted using WHO Standards value.

With the help of this software, Stunted, Underweighted and Wasted child are calculated with the following steps—

Nutritional survey → Import data from file → WHO global database format → ok.

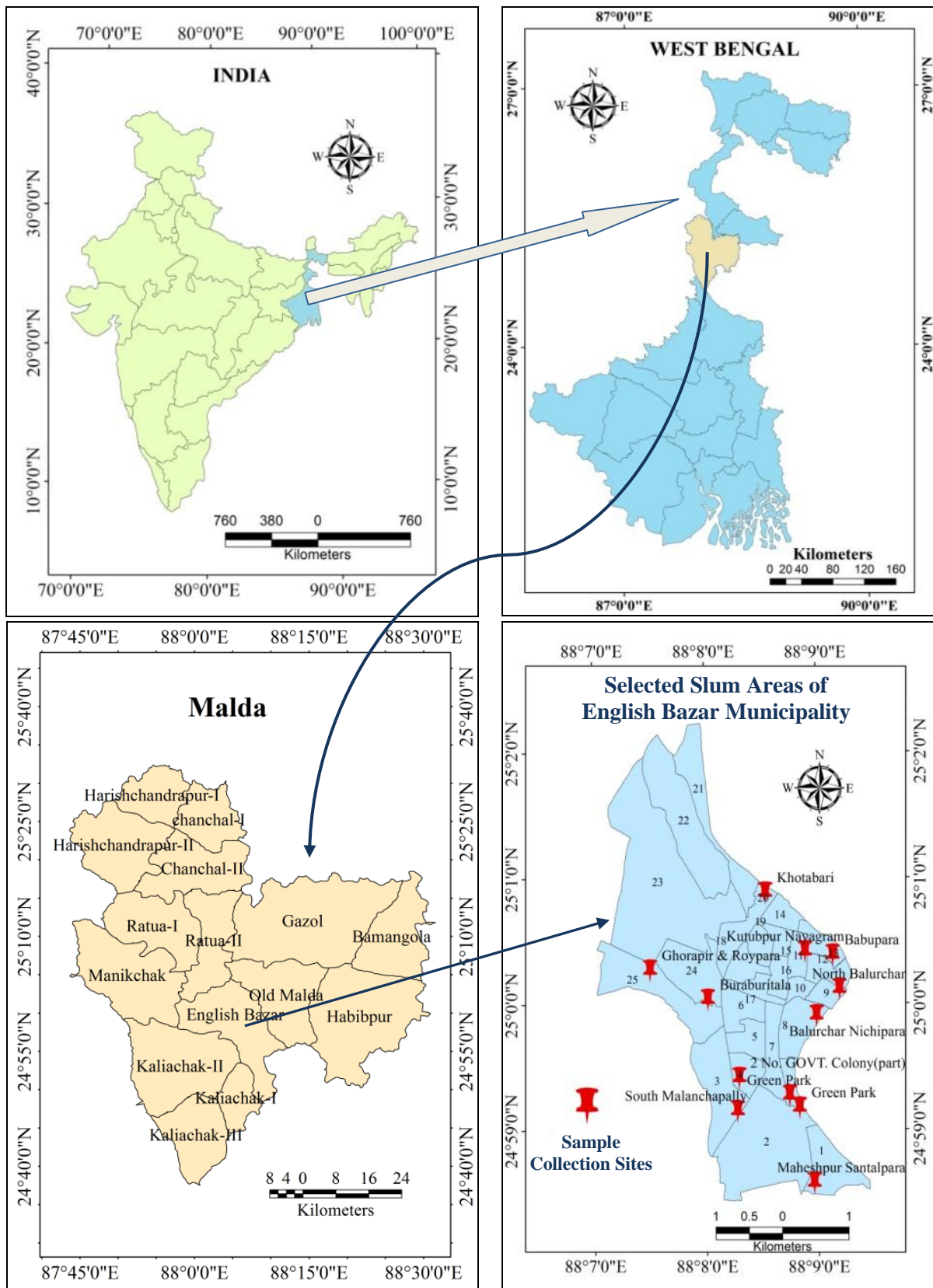
The Z-score distribution was plotting with reference to WHO Standards following steps are followed-

Nutritional survey → Import data from file → Results → Weight for Height/BMI for age/ MUAC for age/ HC for age etc.

GIS: GIS will be used for different kind of mapping in my analysis part and also used for location map of the study. Mean BMI, Mean MUAC, Mean Head Circumference maps are also prepared from this software.

4. The Study Area: Selected Slum Areas of English Bazar Municipality

In Malda district of West Bengal there are two municipalities i.e. the English Bazar Municipality and the municipality of Old Malda. The English Bazar Municipality (EBM) is divided into 25 wards. The extension of English Bazar Municipality is 88°7' E- 88°8' E longitude to 24°58'30" N- 25°2'30"N. In EBM there are many slum areas in which the under-five child nutritional condition is very poor and for that very reason under-five child Mortality is very high. Malnutrition among under-five children is an imperative alarm for the public health authorities in India. The fourth Millennium Development Goal (MDG) was to reduce child mortality which was important for the bettering of child health condition i.e. also related with under-five child nutritional condition. For that very reason it is essential to measure the anthropometric parameters of child which are also related to child nutritional status. The name of the selected slum areas from where randomly samples are collected naming **Mahespur Santalpara, Green Park (1), South Malanchapally, 2 No. Govt. Colony, Green Park(2), Balurchar Nichipara, North Balurchar, Kutubpur Nayagram, Babupara, Khotabari, Buraburitala and Ghorapir & Roypara.**



Map 1: Location Map of Selected Slum Areas of English Bazar Municipality

5. Results and Discussion

5.1 Anthropometric Measurements of Child and Nutritional Condition

Table 1: Summary of nutritional indices among children aged 6–59 months in Selected Slum Areas of English Bazar Municipality

Nutritional Status	Percent			Mean Z-Score	Standard Deviation
	<-3SD	<-2SD	<+2SD		
Underweight	18.8	31.9	-	-1.84	1.22
Stunted	4.2	29.6	-	-1.38	1.15
Wasted	15.2	30.3	3	-1.34	1.49

Source: Calculated from the Field Survey, 2018

Note: >+2SD refers high weight-for-height or overweight status among the children. Underweight = Weight-for-Age; Stunting = Height-for-Age; Wasting = Weight-for-Height; <-2SD = moderately malnourished; <-3SD = severely malnourished

Table 1 shows a summary of nutritional outcomes among the studied children (N=336). As can be seen from the survey data, majority of the children exhibited under-weight growth. More specifically, 29.6% of children under-five age were classified as stunted (<-2SD) and 4.2% were severely stunted

(<-3SD). Nearly 31.9% of children were categorized as underweight (<-2SD) and 18.8% were severely underweight. Finally, 30.3% of children were classified as wasting (<-2SD) and almost 15.2% were categorized as severely wasting.

Table 2: Age- group wise Percentage of Under-weight, Stunting and Wasting Child in E.B.M Selected Slum Areas

Demographic Characteristics	Underweight			Stunting			Wasting		
	<-3SD	<-2SD	Mean Z-Score	<-3SD	<-2SD	Mean Z-Score	<-3SD	<-2SD	Mean Z-Score
Total (0-60)	18.8	31.9	-1.84	4.2	29.6	-1.38	15.2	30.3	-1.34
(0-5)	0	60	-1.46	0	0	-0.06	0	60	-1.73
(6-11)	100	100	-4.91	0	66.7	-1.94	0	0	0
(12-23)	40	40	-2.06	0	0	-1.1	40	40	-2.11
(24-35)	33.3	44.4	-1.83	22.2	22.2	-1.86	33.3	44.4	-1.26
(36-47)	0	0	-1.01	0	0	-1.38	0	0	-0.35
(48-60)	13.9	27.8	-1.87	2.8	47.2	-1.52	13.9	30.6	-1.49

Source: Calculated from the Field Survey, 2018

The above table is showing age- group wise Percentage of Under-weight, Stunting and Wasting Child in E.B.M Selected Slum Areas. 29.6% of children under-five were classified as stunted (<-2SD) and 4.2 % were severely stunted (<-3SD). In the age group of 6-11 months the percentage of stunted child (<-2SD) is 66.7% and in the age group 48-60 months the percentage of stunted child (<-2SD) is 47.2% and severely stunted (<-3SD) is 22.2% (24-35 months) followed by 2.8%

(48-60 months). 30.3% of children under the age of five were classified as wasted (<-2SD) and 15.2 %were severely wasted (<-3SD). In the age group of 0-5 months the percentage of wasted child (<-2SD) is 60% and followed by 44.4% (24-35 months), 40 % (12-23 months) and 30.6 % (48-60 months) and the percentage of severely wasted children (<-3SD) were 40 % (12-23 months) followed by 33.3% (24-35 months), 13.9% (48-60 months).

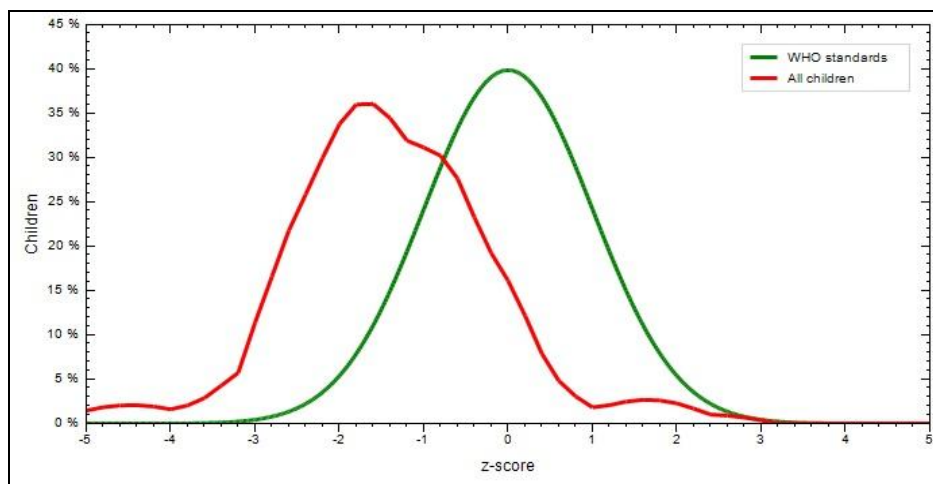


Fig 1: Length/ height for age (Stunting) in the children of English Bazar Municipality Selected Slum Areas

As can be seen from the reported data, the some portion of the children exhibited stunted growth. More specifically, 29.6% of children under the age of five were classified as stunted (<-2SD) and 4.2 %were severely stunted (<-3SD).

This observation was also confirmed by the data provided in Table 1, which indicates that the mean Z-score of height-for-age (M = - 1.38). The WHO standards Z- Scores distribution for length/ height for age are depicted through green colour and

the children have surveyed Z-scores distribution is in red colour. Viewing the both Z-scores distribution it is easily said that the distribution is differ with each other because of high percentage of children (length for age) are in the less than - 2SD and -3SD Condition compared to WHO Standards Condition. So, the percentage of stunted children’s in the EBM Slum area is high compared to WHO Standards.

5.2 Wasting condition of Under-five Child

Low weight-for-height or Wasting or thinness indicates in most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. Wasting can be caused by an extremely low energy intake (e.g., caused by famine), nutrient losses due to infection, or a combinat

ion of low intake and high loss (De Onis, M., 2017).



Plate 1 & 2: During Anthropometric Survey (1. Height Measurement & 2. MUAC Measurement)

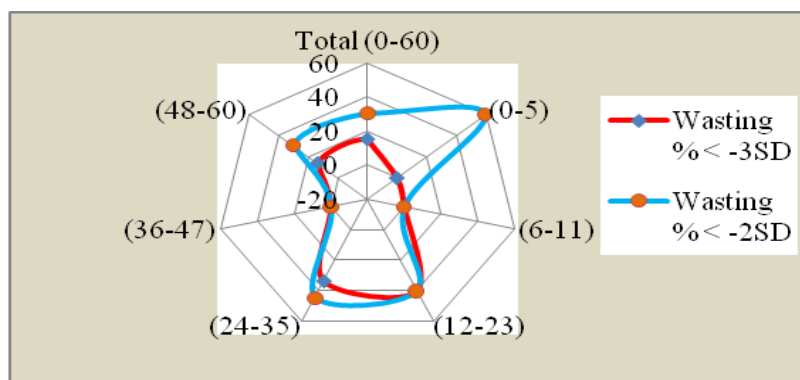


Fig 2: Age- group wise percentage of Stunted Child in English Bazar Municipality Selected Slum Areas

The above diagram is showing Age- group wise percentage of Stunted Child in E.B.M Slum Areas . 30.3% of children under the age of five were classified as **wasted (<-2SD)** and 15.2 % were **severely wasted (<-3SD)**. In the age group of 0-5 months the percentage of wasted child (<-2SD) is

60% and followed by 44.4% (24-35 months), 40 % (12-23 months) and the percentage of severely wasted children (<-3SD) were 40 % (12-23 months) followed by 33.3% (24-35 months), 13.9% (48-60 months).

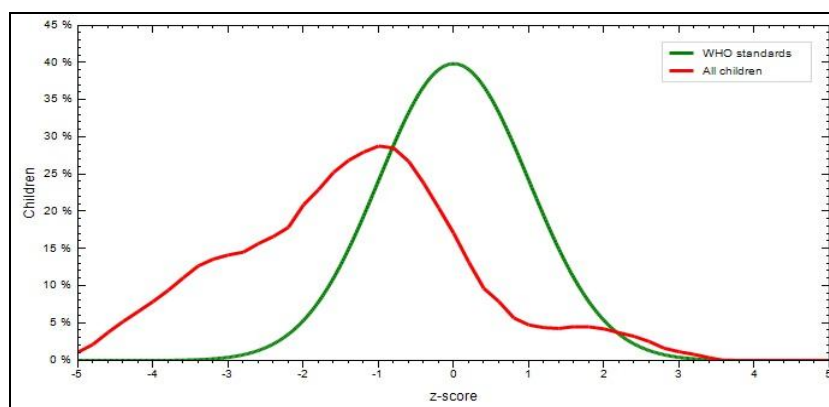


Fig 3: Weight for height (Wasting) in the children of English Bazar Municipality Selected Slum Areas

The WHO standards Z- Scores distribution for Weight for height is depicted through green colour and the children have surveyed Z-scores distribution is in red colour. Viewing the both Z-scores distribution it is easily said that the distribution is differ

with each other because of high percentage of children (Weight for height) are in the less than -2SD and -3SD Condition compared to WHO Standards Condition. So, the percentage of wasted children's in the EBM Slum area is high compared to

WHO Standards. The percentage of severely wasted (<-3SD) children was very high in the English Bazar Municipality Slum Area.

5.3 Underweight Condition of Under-five Child

The prevalence of underweight children under five years of age is defined as the percentage of children aged 0–59 months, whose weights are less than two standard deviations below the median weight for age groups in the international reference population.

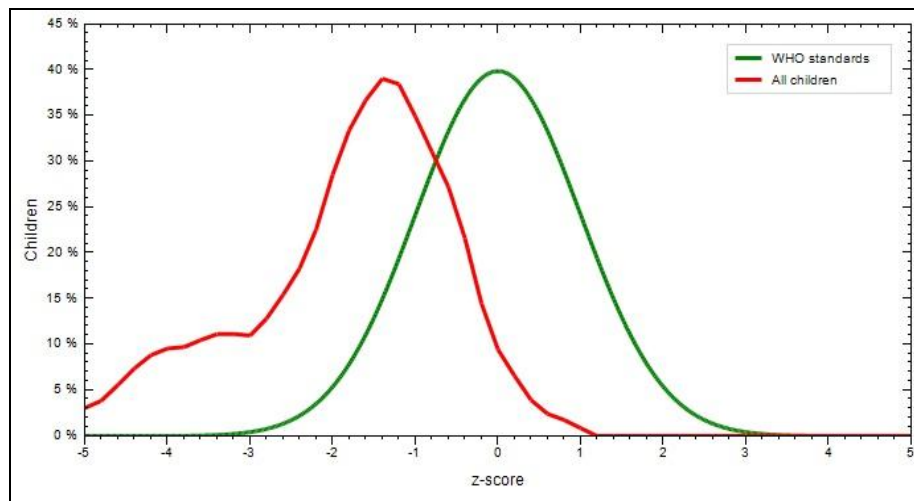
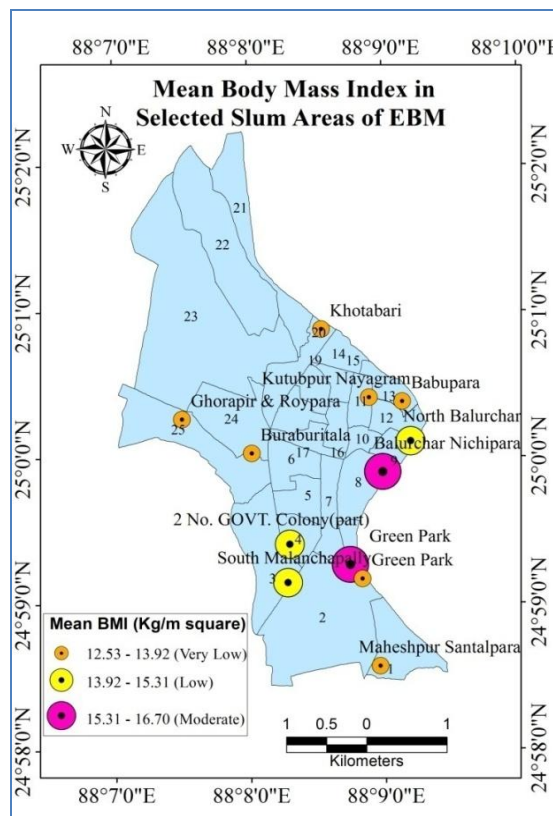


Fig 4: Weight for age (Underweight) in the children of English Bazar Municipality Selected Slum Areas

The WHO standards Z- Scores distribution for Weight for age is depicted through green colour and the children have surveyed Z-scores distribution is in red colour. Viewing the both Z-scores distribution it is easily said that the distribution is differ with each other because of high percentage of children (Weight for age) are in the less than -2SD and -3SD Condition compared to WHO Standards Condition. So, the percentage of

underweight children’s in the EBM Slum area is high compared to WHO Standards. The percentage of underweight (<-2SD) children was very high in the English Bazar Municipality Slum Area. The weight for age plotting distribution of Z-scores was leptokurtic, it shows that the percentage of underweight child is high, so distribution was peaked at <-2SD.

5.4 Body Mass Index (BMI) of Under-five Child and Nutritional Status



Map 2: Mean Body Mass Index (BMI) in Selected Slum Areas of English Bazar Municipality

The map no. 2 depicts selected slum area wise mean Body Mass Index (BMI) of English Bazar Municipality. In Green Park (Ward No. 7) and Balurchar Nichipara (Ward No. 8) have moderate BMI according to WHO standard value of BMI i.e. 15.31- 16.70 kg/m square. The North Balurchar, Green Park (Ward No. 2) and South Malanchapally (Ward No. 3) have low

BMI (13.92-15.31 kg/m square) according to WHO Standards value. Rest of the Slum areas have very low BMI value in the slum areas of Khotabari, Buraburitala, Kutubpur and others rest slum areas of English Bazar Municipality i.e. the slum areas child have severely malnourished condition.

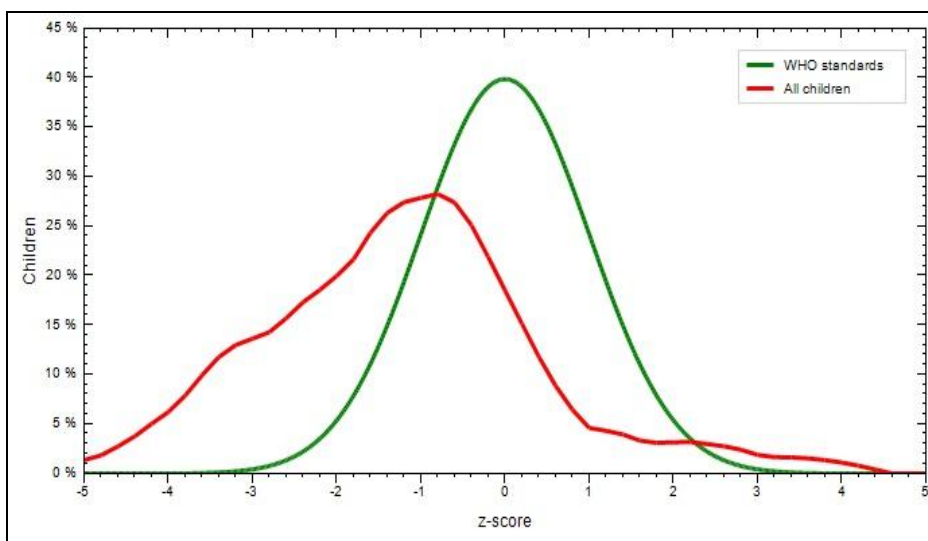


Fig 5: Z-Scores distribution plotting of Body Mass Index (BMI) of English Bazar Municipality Selected Slum Areas

The above diagram is showing the Body Mass Index in the children of English Bazar Slum Area. Nutritional outcomes among the studied children is (N=336). The WHO standards Z-Scores distribution for Body Mass Index is depicted through green colour and the children have surveyed Z-scores distribution is in red colour. Viewing the both Z-scores distribution it is easily said that the distribution is differ with

each other because of high percentage of children (Body Mass Index) are in the less than -2SD and -3SD condition compared to WHO Standards Condition. So, the percentage of BMI of children's in the EBM Slum area is high compared to WHO Standards. The percentage of BMI (<-1SD) children was comparatively high in the English Bazar Municipality Slum Areas.

5.5 Mid Upper Arm Circumferences (MUAC) of U-5 Child

Table 3: Percentage of Child according to MUAC class in Selected Slum Areas of English Bazar Municipality

MUAC Class	MUAC Standard Value (Cm)	Number of Children(N)	Percentage of Children
Severe Acute Malnutrition (SAM)	<11	28	8.33
Moderate Acute Malnutrition(MAM)	11-12.5	108	32.14
At Risk or Mild	12.5-13.5	132	39.261
Well Nourished	>13	68	20.24
Total		336	100

Source: My own construction and calculation according to the own data sources.

The above diagram represents Percentage of Child according to MUAC class in Selected Slum Areas of English Bazar Municipality. 39.26% of children mid upper arm circumference are at mild or risk position; it means the child is at risk for acute malnutrition and should be counseled and followed for growth promotion. 8.33% of children mid upper arm circumference are at severely acute malnutrition stage i.e. child should immediately referred for treatment and 32.14% of children mid upper circumference are at moderate acute malnutrition stage i.e. referred for supplementation and 20.24 % of children MUAC are at well nourished stage i.e. the child is well nourished.

5.6 Head Circumferences of Under-five Child

In the figure 6 malnourished child have because of most of the child (38%) has less then (-2SD) head circumferences i.e. the children are severely malnourished. 30% of children have less than -3SD head circumferences value i.e. the children are moderate malnourished condition. Overall distribution of Z-scores value also analysis that most of the children have condition of malnourished situation compared to WHO standards. In Z-scores distribution less than -2SD value is high i.e. and peaked at this distribution, so it is shaped as *Leptokurtic*.

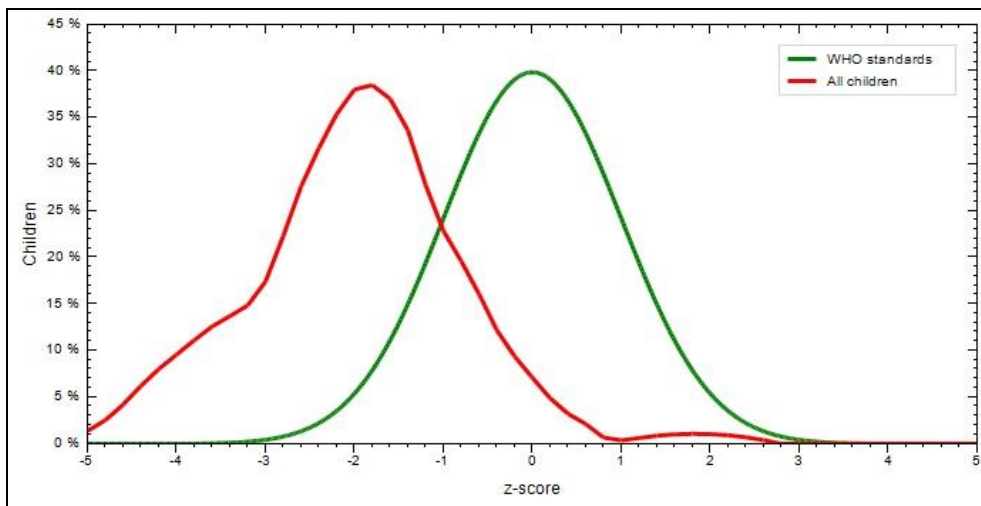
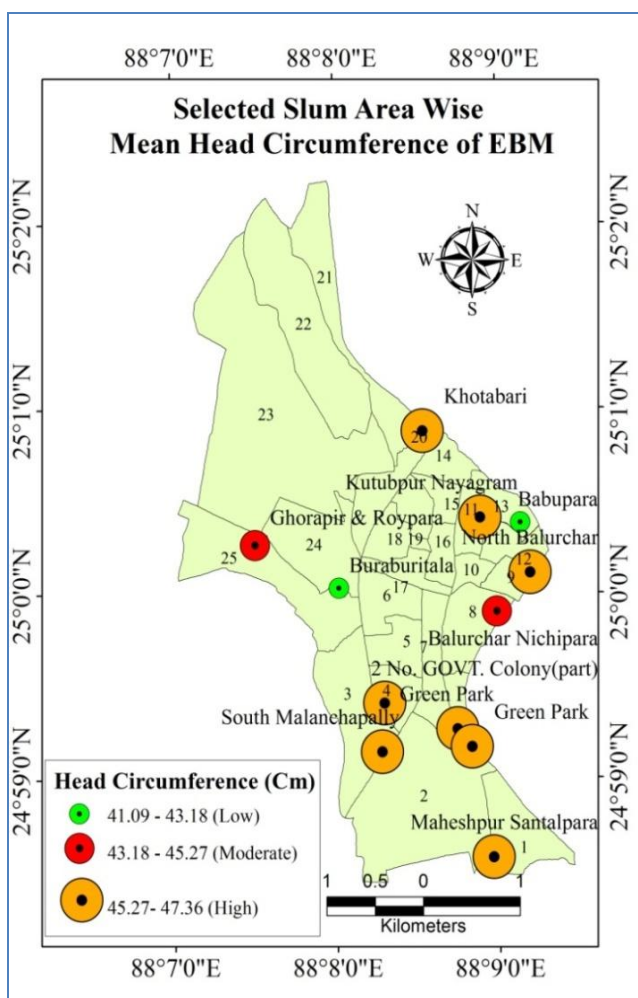


Fig 6: Z-Scores distribution plotting of Head Circumference English Bazar Municipality Selected Slum Areas



Map 3: Selected Slum Area Wise Mean Head Circumference of English Bazar Municipality.

The map no. 3 represents Mean head circumference in selected slum Areas of English Bazar Municipality. The head circumference is low (41.09-43.18 cm) in the slum areas naming Babupara (Ward No. 13) & Buraburitala (Ward No. 24) i.e. in these two slums areas child has severe malnourished condition. Moderate Head Circumference is found in Balurchar Nichipara (Ward No.8) & Ghorapir & Roypara (Ward No. 25). The rest of the slum areas have high Head Circumference but this is also less than compared to WHO Standards value of Head Circumference for age i.e. these slum areas child also

affected by malnourished condition i.e. nutritional status is very poor in the slum areas of EBM.

6. Major Findings

1. The percentage of total under five age group BMI was 30.3% in the less than -2SD distribution and 13.6% in the <-3SD distribution, which indicates low underweight situation i.e. the child are severely,
2. The very severely underweight child percentage is high. With the increase of severity condition the

percentage of child in underweight condition also increased,

3. The percentage of underweight children's in the EBM Slum areas is high according to WHO Standards value.
4. The overall Z-score distribution was very low that means the under-five children of the selected slum areas of English Bazar Municipality were in malnourished condition.

7. Conclusion

The study highlights the consequence of anthropometric measurements and nutritional status related other issues are taken of 336 children. Analysis results revealed underweight (31.9%) as the most common form of malnutrition among children aged under-five, followed by wasted status (30.3%), and stunting (29.6%). Similarly results revealed severely underweight (18.8%) as the most common form of malnutrition among children aged under-five, followed by severely wasted

status (15.2%), and severely stunting (4.2%). The slum areas of English Bazar Municipality children have poor condition of nutritional status due to poor condition of children anthropometric conditions. Thus preventing these conditions and providing ample follow up for child health condition will be imperative steps in preventing malnutrition in this population. Interventions to reduce malnutrition were generally better patronized by the mothers of well nourished children. A strenuous approach to improve awareness among all regarding the importance of nutrition for children is likely to be very useful.

Acknowledgements

First and foremost, I'm extremely thankful to Dr. Pradip Chouhan, Associate Professor, Department of Geography, University of Gour Banga, for kindly guiding the Research work. This Research would not have been possible without his invaluable suggestions and support.

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