Nutritional status of Children in Slums of Kolkata Municipal Corporation

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Abstract: *Children are the future of any nation. Children who live in slum environments are more vulnerable to malnutrition. The present study highlights the prevalence of malnutrition among slum dwelling children aged up to 5 years and its association with demographic and socio-economic factors. For this study primary survey was conducted from December, 2019 to January, 2020 in some selected slums of Kolkata Municipal Corporation. A total of 253 children were studied, anthropometric measurements such as height, weight etc. were taken following WHO guideline. Socio- economic and demographic information was collected using structured questionnaire. The study reveals that, prevalence of malnutrition in terms of stunting, underweight, and wasting are prevalent in slums and it is ly associated with socio-demographic factors identified, such as, age, birth weight, birth order, educational profile of parents, economic status of family, working status of mother and nutritional status of mother.*

Key words: *Child Malnutrition, Slum, Stunting, Underweight, Wasting*

Introduction

Children are the future of our country. UNICEF in its report 'The state of world's children' (2019:15) stated that, globally at least 1 in 3 children under 5 years of age is not growing well due to malnutrition . According to the report, number of annual child death under five years of age was 8.82 lakhs in India in the year of 2018, which was also highest in the world. 69 per cent of child death under five years of age was because of malnutrition. (UNICEF 2019: 191).

As per the National Family Health Survey (NFHS) – 4 (2015-16: 293), conducted by Ministry of Health and Family Welfare, 38 percent of children's of India under age five years are stunted (short for their age); 21 percent are wasted (thin for their height); 36 percent are under weight, thin for their age.

Rapid physical growth and brain development occurs during early childhood. So, lack of proper nutrition during these early years can affect lifelong health as well as educational attainment, economic outcomes etc. especially for children who belong to the poor and marginalized families.

Union Govt. report, 'Slums in India – A statistical compendium' (2015: 32), says that every fifth urban child in India in the age-group of <6 years stays in slums. Slums are generally characterized by high rate of urban poverty, poor standard of living, lack of availability of basic services etc. Ghosh and Shah (2004: 682) highlighted in their study that nutritional status of slum dwelling children is poorer than the rural average. So this study was conducted to highlight what type of nutritional status exists among children living in slum environment of Kolkata Municipal Corporation.

Objectives

The main objective of this study is to assess the prevalence of stunting, underweight and wasting among slum dwelling children in Kolkata Municipal Corporation. This study also highlights different socio economic and demographic factors which are associated with stunting, underweight and wasting.

Study area

Kolkata is situated on the eastern bank of river Hooghly. Kolkata (Erstwhile Calcutta) is now the capital of the state of West Bengal, India. Kolkata is geographically located at 88º 30' EL and 22º 33' NL. The city is under the jurisdiction of the Kolkata municipal corporation (KMC), has an area of 185 square km. (71 square mile). The area under Kolkata Municipal Corporation

(KMC) consists of 144 wards that are grouped into 16 boroughs. As per Census 2011, population of this city is 4.4 million and population density is 24252 persons per square km.

Selected slums for the study

As per 'District Census Handbook' (2011:73), population of Kolkata was 4496694 and slum population was 1409721, which mean 31.35 per cent population of Kolkata lived in slums. For the purpose of sampling only registered slums under the jurisdiction of Kolkata Municipal Corporation were considered. As per KMC '*bustee*' department report (2009), there were 1236 registered '*bustees*' (slum) in Kolkata. For this study only 10 slums are selected purposively (Table-1).

Methodology

Sample frame and sampling unit : Children who were residents of selected slums of Kolkata Municipal Corporation constituted sample frame. Children selected by following the sample selection criteria mentioned below, formed the sampling units.

Sample selection criteria

Inclusion criteria

- Children below <5years of age group, resident at one of the selected slums of Kolkata Municipal Corporation was included for this study.
- Both girls and boys both were studied.
- Consent of the guardians of the children were taken for their physical examination and anthropometric measurements.

Exclusion criteria

- Children aged above 5years of age, were excluded from study.
- Children who were ill or who were afraid and cried seeing the the investigator, and whose guardians' did not give permissions for survey were excluded.

Data collection : The study is based mainly on primary data. Some secondary data are also collected from the department of '*bustee*' services, Kolkata Municipal Corporation. To collect the primary data, first 10 slum pockets were selected purposively from different parts of Kolkata municipal corporation (Figure-1). Then 20 hutments from each slum pockets were surveyed with pre-determined interview schedule from December, 2019 to January, 2020. Slum hutments having at least one child below <5 years of age were taken into

consideration and children who possess the above mentioned inclusion criteria were considered as sample, Thus from a total of 200 households 253 children were surveyed by the researchers.

Anthropometric Assessment: Anthropometric measurements such as height, weight are valuable indicators of nutritional status. In order to analyze the nutritional status of children, height and weights are measured. Portable weighing machine with 0.5 kg accuracy was used to measure weight of the sample. The height measurement was recorded on all subjects included in the study with the use of by anthropmeter with accuracy nearest 0.1cm. For infants who could not stand, length was measured by making child laid on flat surface. Length was measured to the nearest accuracy 0.1cm.

Ethical approval : Objectives of the study were explained to parents of children in slum areas and anthropometric measurements of children were done only after obtaining oral consent from their parents or guardians.

Analysis of data: *WHO anthro software (v. 3.2.2)* was used to analyze anthropometric data of children. Graphs were constructed also using the software. To test the association among variables with anthropometric indicators *chi square* test was done.

Limitations of the study: Malnutrition is associated with numerous physical and socio-economic factors. This study aims to highlight the nutritional status as well as to find out its association with a few socio-economic factors. As this is a vast field work based study, so due to lack of time and money, the study is not able to highlight all the causes behind child malnutrition in the slums chosen. Moreover the study was conducted considering age group up to five years of age. The status of child nutrition among 6-14 years of age was not highlighted in this study.

Anthropometric Indicators of Nutritional Status: Concept and definition: According to WHO Child Growth Standards (2006), Stunting, underweight and wasting are the three most frequently used anthropometric indicators of nutritional status in children. They are defined as-

1. **Stunting (low height-for-age):** Stunting is used to describe children who are too short for their age. Stunting indicates lack of adequate nutrition for long time. Higher rate of stunting indicates poor socioeconomic conditions of population while a decrease in the national stunting rate indicates socio-economic improvement of any country. Children whose height-for-age is

below minus two standard deviations (-2 SD) from the median of the reference population are considered as stunted. Minus three standard deviations (-3 SD) are considered to be severely stunted.

2. **Underweight (low weight-for-age):** Weight-for-age is taken into account for both acute and chronic malnutrition. Children whose weight-for-age is below minus 2 SD from the median of the reference population are termed as underweight and below minus 3 SD are considered to be severely underweight.
3. **Wasting (low weight-for-height):** Wasting describes a child who is too thin in respect of their height. Wasting or thinness indicates recent weight loss, which caused due to acute starvation or severe disease. The weight-for-height measures body mass in respect of body length. Children who are below minus 2SD from the median of the reference population are considered as wasted and below minus 3SD are considered as severely wasted.

Major Findings: The study was conducted considering 253 children among which 53.75 percent (136/253) was male and 46.24 percent (117/253) was female (Table 2). Among the sample selected for this study 47.82 per cent children belong to 37 to 60 months age group, 39.52 percent was from 13 to 36 months age group and only 12.64 per cent child were infant as they fall within 0 to 12 months age group. Among 253 Children 97.6 percent (247/253) was delivered in Government or Private Hospitals and 98.8 percent (250/253) was vaccinated regularly.
57.70 percent (146/253) of the selected children were Hindu, 39.92 percent (101/253) were Muslim and only 2.37 percent (6/253) belonged to other religious communities like Christian, Jain and Buddhist.

Prevalence of malnutrition: Prevalence of malnutrition in terms of stunting, underweight and wasting is observed in the study area. As the socio-economic condition is poor in slums, so, nutritional status of children is also not satisfactory.

Height for age (stunting): Stunting is considered the most reliable measure of under nutrition, as it indicates frequent episodes or long periods of inadequate food intake, calorie and/or protein deficiency or persistent or recurrent ill health. The prevalence of stunting in the study area (30.03 percent) (76/253) is below from the national (38 percent) average (NFHS-4 2015-16 :293) and state (33 per-cent) average (NFHS-4 2015-16: 20) but higher than district (24.2 percent)

average (NFHS-4 2015-16: 3). Similar findings were observed by Mandal et al. (2014:162) in their study among <14 years aged children in a slum area of Kolkata. They observed 31.7 percent children were stunted. It was observed in this study, that girls were more stunted 36.75 percent (43/117) as compared to boys having 24.26 percent (33/136). Prevalence of moderate stunting was 24.50 percent (62/253). Moderate stunting was also highest among girls with 30.76 per cent (36/117) than boys 19.11 percent (26/136) (Table-3). Prevalence of severe stunting was 5.53 percent (14/253) , which is 5.98 percent (7/117) among girls as compared to 5.14 percent (7/136) among boys.

It was also observed in this study that prevalence of stunting was 28.76 percent (42/146) among Hindu, 32.67 percent (33/101) among Muslim and 16.66 percent (1/6) among children from other religious communities.

Weight for age (under weight): The prevalence of low weight for age, i.e. underweight was 15.41percent (39/253) which is below from both the national (36 percent) average (NFHS-4 2015-16: 293) and state (32 percent) average (NFHS-4 2015-16: 20). In this study, it was observed that girls are more underweight with 19.65 percent (23/117) as compared to 11.76 percent (16/136) among boys. Prevalence of moderate acute malnutrition, based on weight for age Z score (under weight) was 10.27 percent (26/253). Rate of Moderate underweight was 8.82 percent (12/136) among boys and 11.96 percent (14/117) among girls. Prevalence of severe acute malnutrition was 5.13 percent (13/253). The prevalence of severe malnutrition using weight for age Z score was higher among girls with 7.69 percent (9/117) as compared to boys with 2.94 percent (4/136).

Prevalence of underweight was 15.06 percent (22/146) among Hindu, 14.85 per cent (15/101) among Muslim and 33.33 percent (2/6) among children from other religious communities.

Weight for Height (Wasting): The prevalence of wasting was 9.88 percent (25/253) which is also below from national (21 percent) average (NFHS-4 2015-16 : 293) and state (20 percent) average (NFHS-4 2015-16: 20). It was seen that in general boys and girls both are wasted similarly. The prevalence of severe wasting is 2.20 percent (3/136) among boys and 2.56 percent (3/117) among girls. It was observed that prevalence of wasting are almost similar among children from Hindu and Muslim communities. 9.58 percent (14/146) of Hindu and 9.90 percent (10/101) of Muslim were wasted. 16.66 percent (1/6) children from other religions was observed as wasted.

Association of various socio-economic factors with nutritional status:

Anthropometric indicators of child malnutrition i.e., stunting, underweight and wasting are associated with many physical, demographic, and socio-economic factors. For this study few common socio-economic factors were selected to judge whether they are associated with child malnutrition or not. Results of this study mentioned in Table-4.

Gender wise discrepancy in prevalence of underweight and wasting were not found as there was no significant difference in the prevalence among boys and girls. Despite the strong preference for sons in India, girls and boys are about equally likely to be underweight (NFHS -3 2005-06: 272). Similar result was observed by Khan et al. (2018:1174) in slums of Jagdalpur city. But it was observed in this study that stunting is significantly related (p=0.0307) to gender. Females are more stunted than males.

Age was found significantly associated with stunting (p=0.0018) and underweight (p=0.0305). Stunting and underweight was highest among 37-60 months of age group but wasting was highest in 13-36 months of age group. Sethy etal. (2017:2182) also observed in their study that prevalence of underweight was higher among age group of 36-60 months while prevalence of wasting was higher among age group of 37-48 months. Sengupta etal. (2010: 3) observed that prevalence of underweight, stunted and wasted was highest among 48-59 months age group and the infants were least affected.

The association of religion with stunting (p=0.6198), underweight (p=0.4685), and wasting (p=0.8503) was not found significant. Children from all religious communities were affected by different forms of malnutrition.

Children of higher birth orders are much more likely to be underweight than children of lower birth orders (NFHS -3 2005-06: 272). The present study also reveals that stunting, underweight and wasting was significantly associated with birth order of the child. As birth order increases, prevalence of stunting, underweight and wasting were also found to be increasing. Similar to the findings of the present study, Chaudhury and Agrawal (2019: 6); Panigrahi and Das (2014: 3) observed in their study that as birth order increases, prevalence of underweight and stunting were also found to be increasing. Children of birth order of 3 or more also have three times higher chances of wasting than children of first order. Single or first order child get proper care and attention of children while children with higher birth order might get less attention and care, which reflects in their nutritional status also.

Birth Weight is also significantly associated to child's nutritional status. Children born with normal weight at birth (above 2.5 Kg.) had less chances of being underweight, stunted and wasted.
Educational status of parents are significantly associated ($p=<0.05$) with stunting, underweight and wasting. Results supported by similar studies. Chaudhury and Agrawal (2019: 6) stated that Children of uneducated or less educated parents were more malnourished as compared to those having educated parents.

Monthly income influence the living condition of the family as well as their food and nutritional status. So children belongs to very poor families have greater chances of malnutrition. Here the association between monthly income and stunting, underweight and wasting found statistically significant.

The result of this study reveals that prevalence of stunting, underweight and wasting was more common among children whose mothers are working compared to those whose mothers are house wives. This result supported by similar studies done by Sahoo et al. (2017: 184). They observed that acute malnutrition is more common in working mothers as compare to homemakers.
Mothers nutritional status is highly co related with nutritional status of their children. Tigga and Sen (2016: 6) also observed mother's anthropometry strongly influences child's anthropometry.

The anthropometric parameters were graphically represented (Fig-2) to compare gender-wise situation with the WHO standards. Graphs shows that the Proportion of stunting and underweight among girls was more as compared to boys. Graphs of all three anthropometric parameters have a leftward shift in case of means compared to WHO Z score curve. In the graph of Z scores of height for age (stunted) positive skewness was seen more clearly.

Suggestions for development

To improve the condition of child nutrition in the study areas following steps are suggested- Child with severe malnutrition needs immediate attention. Proper food and regular monitoring required for them. Workers of Integrated Child Development Services (ICDS) centers must give special attention to those children's. Home visits of health experts are suggested for severely malnourished.

Consciousness of parents about the nutritional status of their child is very important. They must be informed and proper counseling to them about nutritious diet, health and hygiene is suggested.

It was observed during field work that though pregnant women get care and proper diet but they are neglected most of the time after delivery. But while breast feeding the child, mothers malnutrition also affect the child. So awareness campaign and counseling about mothers nutrition is suggested.

Child who are not breastfeed, sometimes does not get proper supplementary nutrition. Due to poor socio-economic condition and lack of awareness home made remedies applied as supplementary food which is not nutritious at all. So proper awareness of mother about supplementary nutritious foods is required. As most of the mother and children registered to Integrated Child Development Services (ICDS) centers so they can play vital role about these.

Conclusion

From the above study it was observed that prevalence of malnutrition in different forms like stunting, underweight and wasting was present moderately in the study area. Compared to other indicators, rate of stunting is comparatively high. Stunting and underweight both are comparatively high in higher age group (37 to 60 months) than the infants, which indicates lack of supplementary nutrition among children. There are also severe malnutrition exists in different forms among children. Overlapping of different malnutrition indicators among children was also observed. Though there are high rate of vaccination and institutional deliveries observed but the nutritional status among children is not satisfactory. There are several schemes for child development run by the Government but not all of them are fruitful. For example Government of India has introduced " *Poshan Avijan*"- a program to improve child nutrition, but the performance of West Bengal is lowest among states. On the other hand Government of West Bengal and UNICEF jointly set up a five step agenda in 2019 to fight against malnutrition, but this also not implemented yet. So allocation of proper funds, continuous monitoring and co-operation between Central and State Government is required for the success of different schemes. Moreover to improve child nutrition, not only nutritious food and immunization but also proper health education, awareness among parents about health and hygiene, giving importance to women education and healthy living environment is required. Not only Government initiatives but also people's participation and awareness can lead to the peak of success which makes our future generations healthy.

Table: 1-Selected Slums of KMC for study

Sl. No	Bustee name/address	Borough No	Ward No	Approx. area (sq.mt.)	Total dwellers	No of household surveyed	No of children taken as sample*
A	85, Belgachia road	1	3	31975	6377	20	25
B	20\1, Khagendra Chatterjee road	1	6	49497	7023	20	23
C	1-6, Sasthitala road	3	29	110404	11498	20	21
D	15\h\6\1, 8\a, 8\c 7\7 , Chamru Singh Lane	3	29	21160	5502	20	27
E	13,15,Baithak Khana Road	5	37	75340.49	10301	20	22
F	8, Pagladanga road	7	57	91117.9	38155	20	30
G	3,42 ,21a 2\4c Mayur Bhanj Road, Mominpur	9	78	211152.5	23977	20	21
H	Uttar Panchannagram, Basanti Kulti Road	12	108	147764	8906	20	23
I	J105, j158\1, j124 Paharpur Road	15	133	518700	24238	20	25
J	T315, T340, T346\3, Panch Para, Baro Bagan Bustee, Metiaburuj	15	138	88000	8180	20	36

*Source: Survey report of Department of bustee services, KMC, 2009, * primary survey by researchers (December, 2019 to January, 2020)*

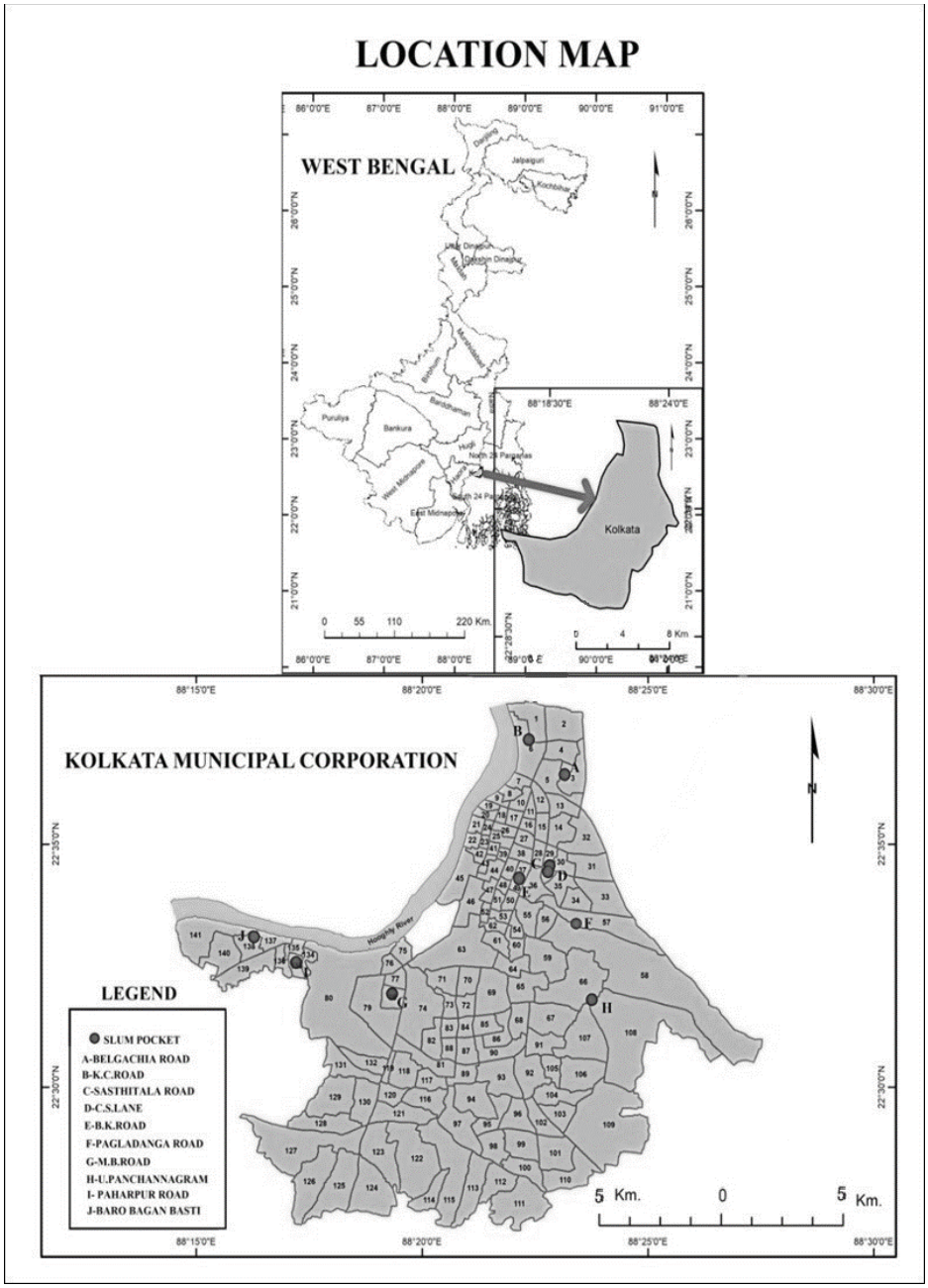

LOCATION MAP
WEST BENGAL
Kolkata
KOLKATA MUNICIPAL CORPORATION
Hooghly River
LEGEND
SLUM POCKET
A-BELGACHIA ROAD
B-K.C.ROAD
C-SASTHITALA ROAD
D-C.S.LANE
E-B.K.ROAD
F-PAGLADANGA ROAD
G-M.B.ROAD
H-U.PANCHANNAGRAM
I- PAHARPUR ROAD
J-BARO BAGAN BASTI
5 Km. 0 5 Km.

Fig. 1- Location of the study area

Table:2- Age and sex wise distribution of Children selected for study

Age (in months)	Male	Female	Total Children
<12	17 (53.12)	15(46.87)	32 (12.64)
13-36	50 (50)	50 (50)	100 (39.52)
37-60	69 (32.23)	52 (42.97)	121 (47.82)
Total	136 (53.75)	117 (46.24)	253 (100)

#*figs in parenthesis are percentages*

Source: Primary survey by researchers (December, 2019 to January, 2020)

Table 3 - Prevalence of malnutrition among sample children

Age (Months)	Height/Length for Age (Stunted)			Weight for age (Underweight)			Height/Length for weight (Wasted)		
	SAM	MAM	Normal	SAM	MAM	Normal	SAM	MAM	Normal
<12	2 (6.25)	3 (9.37)	27 (84.37)	1 (3.12)	1 (3.12)	30 (93.75)	0 (0)	3 (9.37)	29 (90.62)
13-36	5 (5)	17 (17)	78 (78)	6 (6)	5 (5)	89 (89)	5 (5)	6 (6)	89 (89)
37-60	7 (5.78)	42 (34.71)	72 (59.50)	6 (4.95)	20 (16.52)	95 (78.51)	1 (0.82)	10 (8.26)	110 (90.90)
Total	76(30.03)			39(15.41)			25(9.88)		

#*figs in parenthesis are percentages, SAM##Severe acute malnutrition, MAM###Moderate acute malnutrition*

Source: Primary survey by researchers (December, 2019 to January, 2020)

Table 4 - Percentage of distribution of malnourished children according to various socio-demographic parameters

Variables		Different Indicators of Malnutrition					
		Stunted	Chi square (P value)	Underweight	Chi square (P value)	Wasted	Chi square (P value)
Gender	Male (N=136)	33(24.26)	4.66 (.0307)*	16(11.76)	3.00 (.0829)^{NS}	13(9.55)	0.03 (0.8529)^{NS}
	Female (N=117)	43(36.75)		23(19.65)		12(10.25)	
Age (in months)	0-12 (N=32)	5(15.62)	12.53 (.0018)**	2(6.25)	6.97 (.0305)*	3(9.37)	0.23 (.8893)^{NS}
	13-36 (N=100)	22(22)		11(11)		11(11)	
	37-60 (N=121)	49(40.49)		26(21.48)		11(9.09)	
Religion	Hinduism (N=146)	42 (28.76)	0.95 (.6198)^{NS}	22 (15.06)	1.51 (.4685)^{NS}	14 (9.58)	0.32 (.8503)^{NS}
	Islam (N=101)	33 (32.67)		15 (14.85)		10 (9.90)	
	Others (N=06)	1 (16.66)		2 (33.33)		1 (16.66)	
Birth Orders	1 (N=188)	39 (20.74)	30.21 (.0001)**	14 (7.44)	40.92 (.0001)**	12(6.38)	10.53 (.0051)**
	2-3 (N=41)	24 (58.53)		19 (46.34)		9 (21.95)	
	4 and above (N=24)	13 (54.16)		6 (25)		4(16.66)	
Birth Weight	Below 2.5 Kg. (N=98)	47(47.95)	24.44 (.0001)**	28(28.57)	21.23 (.0001)**	16(16.32)	7.46 (.0063)**
	Above 2.5 Kg. (N=155)	29(18.70)		11(7.09)		9(5.81)	
Education of Mother	Illiterate (N= 41)	10 (24.39)	21.42 (0.0008)**	9 (21.95)	13.45 (.0037)**	6(14.63)	10.04 (.0181)*
	Primary (up to V) (N=86)	39 (45.34)		21 (24.41)		14(16.27)	

	Secondary (6-10) (N=88)	25(28.40)		7 (7.95)		4(4.54)	
	Higher (N=38)	2(5.26)		2(5.26)		1(2.63)	
Education of father	Illiterate (N=37)	18 (48.64)	13.59 (.0035)**	11 (29.72)	14.69 (.0020)**	8 (21.62)	8.44 (.0376)*
	Primary (up to V) (N=90)	30 (33.33)		19 (21.11)		10 (11.11)	
	Secondary (6-10) (N=94)	25 (26.54)		7(7.44)		5 (5.31)	
	Higher (N=32)	3 (9.37)		2(6.25)		2(6.25)	
Monthly Income (in Rupees)	Below 5000 (N=69)	38 (55.07)	29.35 (0.0001)**	22 (31.88)	20.80 (.0003)**	14 (20.28)	12.15 (.0022)**
	5001-10000 (N=126)	29 (23.01)		14(11.11)		9 (7.14)	
	10001 and above (N=58)	9 (15.51)		3(5.17)		2 (3.14)	
Whether mother is working	Yes (N=132)	51 (38.63)	9.70 (.0018)**	28 (21.21)	7.11 (.0076)**	19 (14.39)	6.31 (.0119)*
	No (N=121)	25 (20.66)		11(9.09)		6(4.95)	
BMI of Mothers	Under weight (N=85)	38 (44.70)	13.10 (.0014)**	24 (28.23)	18.11 (.0001)**	14(16.47)	9.77 (.0075)**

	Normal (N=98)	22 (22.44)		12 (12.24)		10 (10.20)	
	Over weight (N=70)	16 (22.85)		3 (4.28)		1 (1.42)	

*# fig in parenthesis are percentages, NS: Non significant, *Significant at 5per cent, **Significant at 1per cent*

Source: Computed by researchers from Primary data

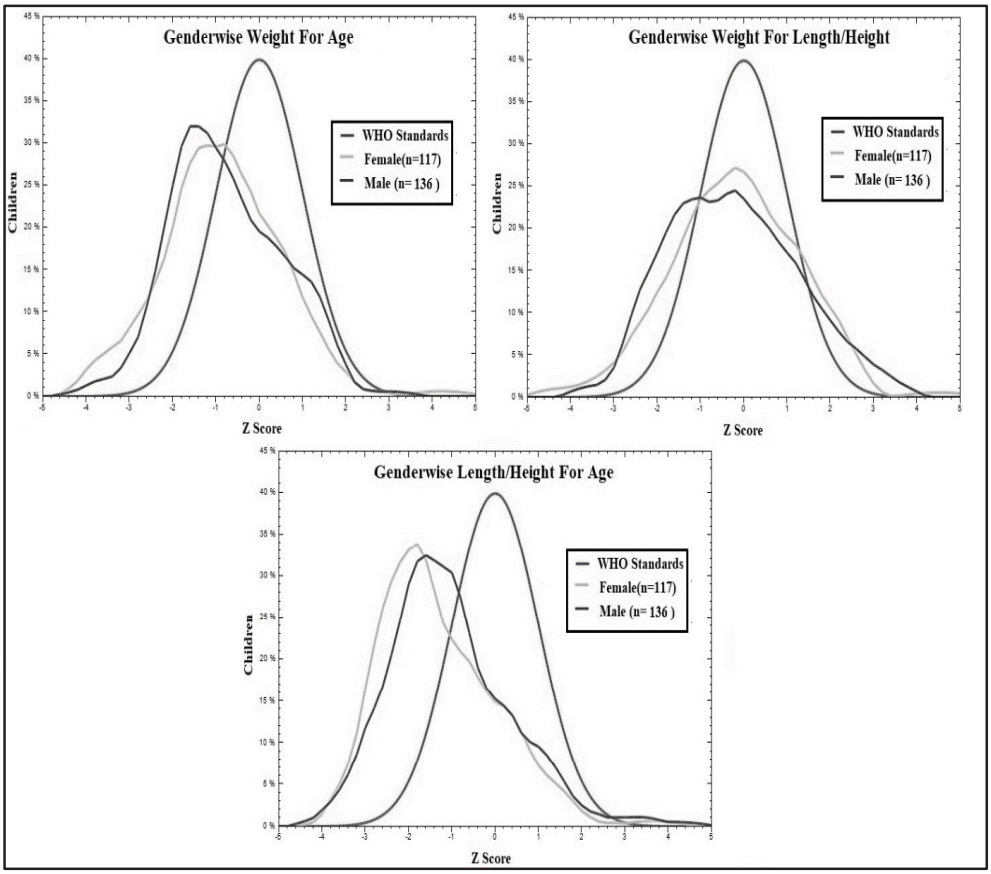


Fig.2 – Gender wise comparison of different anthropometric indicators with WHO standards

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