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# Nutritional Status among Primary School Children of Mymensingh

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The school age is a dynamic period of growth and development. During this period physical, mental, social development of child takes place. The purpose of the study is to observe the nutritional status among the school aged children and to compare the urban and rural children. It is a descriptive cross sectional study. Data were collected from 600 children of primary school in Mymensingh district for a period of one year from October 2009 to September 2010. Among the primary school children in Mymensingh, Bangladesh 15.1% were wasted, 22.1% were stunted, 2.3% were both stunted and wasted and 60.4% children were within normal limit. Malnutrition was more in rural area in comparison with urban area. In rural area severely underweight, moderately underweight children were 62.1%, 65.6%, and corresponding result in urban area were 37.9%, 34.4% respectively. In rural area severely stunted, moderately stunted children were 100%, 58.6%, and in urban area they were 0%, 41.4% respectively. Again severely wasted and moderately wasted, children were 62.5%, 59.5% in rural area and 37.5%, 40.5% in urban area respectively. Malnutrition among girls were more then the boys.

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**Key words:** Nutritional status, Rural, School children, Urban

## Introduction

Nutritional status is the result of complex interactions between food consumption, overall health status, and care practices. Poor nutritional status is one of the most important health and welfare problems facing Bangladesh. Young children and women of reproductive age are especially vulnerable to nutritional deficits and micronutrient deficiencies<sup>1</sup>. Nutrition related health problems in children are increasingly significant causes of disability and premature death worldwide, while under nutrition continues to be a major health problem in many developing countries<sup>2</sup>.

Bangladesh is one of the most densely populated countries in the world<sup>3</sup>. According to previous census, number of population between 5-9 years is highest and child mortality rate in Bangladesh 14%<sup>4</sup>. Two million children in Bangladesh are suffering from acute malnutrition. The situation is being described as one of the most severe in South Asia<sup>5</sup>. Rates of malnutrition in Bangladesh are among the highest in the world. More than 54% of preschool-age children, equivalent to more than 9.5 million children are stunted, 56% are underweight and more than 17% are wasted<sup>6</sup>. Although all administrative divisions were affected by child malnutrition there were important regional differences in the prevalence's of the three

anthropometric indicators. The prevalence of underweight ranged from 49.8% in Khulna to 64.0% in Sylhet which also showed the highest prevalence of stunting (61.4%) and wasting (20.9%). Despite the high levels, rates of stunting have declined steadily over the past 10 years<sup>7</sup>.

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The net enrolment of primary school has increased to 87% in Bangladesh but completion rates have fallen to a less impressive 54 percent<sup>8</sup>. Many of those that do attend on an empty stomach, making concentration difficult and leading to high drop out rates<sup>9</sup>. School aged children often face high level of illness and malnutrition that decreases their ability to attend their regularly and learn to their full potential<sup>10</sup>. In Bangladesh 90% school children suffers from intestinal parasites, 40% anemic, 25% are underweight, 24% are stunted<sup>11</sup>.

The school age period is nutritionally significant because this is the prime time to built-up body stores of nutrients in preparation for rapid growth of adolescence. Therefore, it becomes very important to know the nutritional status of school going children, the building blocks of the country<sup>12</sup>.

### Methods

A descriptive cross sectional study was conducted among primary schools of Mymensingh district. Ten primary schools of Mymensingh district were selected. Study was done among primary school children (6-10 years) of Mymensingh, Bangladesh from October 2009 to September 2010. Based on 25% predicted prevalence of underweight in school children, 95% confidence interval and  $\pm 5\%$  error, design effect for nutritional survey is 2, Final sample size was estimated 600 cases. School children of 6-10 years of age attending at that time were included and Children beyond this age group and those who are suffering from acute illness were excluded.

There are 1270 primary schools in Mymensingh district. Two stage stratified random sampling method were used. At first we divided the primary schools into two strata as rural and urban. From that 10 primary schools (5 from each stratum) were selected by random table method. Then each school is divided into 5 strata (5 classes). From each stratum 12 children were selected at random. A total of 600 school going children (6-10) years were selected.

Nutritional statuses of all the selected children were assessed by measuring body heights and weights (kg), BMI were calculated. Height, weight and BMI were compared with national center for health statistics (NCHS) standard.

Children were weighed by new miyako bathroom scale without shoes and with the least possible clothes. The measure precision was 0.1kg. Then the mean weight of clothes on bodies that estimated to be 0.3kg was subtracted from measured weights. A measuring tape were put vertically against the wall, the child stood up against the tape directly in Frankfort plane, without shoes, and height was measured with 0.5 centimeter precision. Ages of the children were determined based on their admission records. Parent education and job were asked and was written in questionnaire.

Anthropometric assessments were conducted to identify children with moderate to severe under nutrition. Z score of every cases were done and graded if  $< -3SD$  as severe malnutrition and if between  $-2.99$  to  $-2$  SD termed as a moderate malnutrition. Children of  $> -2$  SD on weight for age, height for age and weight for height considered as normal.

Detailed anthropometry, relevant nutritional history, clinical findings and laboratory records of every case were collected and recorded by interview method using a pre-designed questionnaire. Subsequently, data was analyzed by computer programmed SPSS version 14.0.

### Results

A total of 600 primary school children of different regions of Mymensingh district were interviewed during the study period. Table I shows the age and sex distribution of study population. Among 600 Primary school children 309(51.6%) were boys and 291(48.4%) were girls. Boys and girls ratio were 1.1:1. Table II shows the anthropometric measurements of boys compared with standard. The body weight ranged between 101.75% to 90% of the standard and showed insignificant increase with increase of age. The height ranged between 99 to 103.2% of the standard. Similar to body weight, which showed insignificant increase with the increase of age. The body weight in girls ranged between 101.5% to 93% of the standard and showed slight increase with the increase of age which was insignificant. The height ranged between 98.2% to 103.2% of the standard. Similar to body weight, heights further showed insignificant increase with the increase of age. Table III shows the BMI compared with standard.

### *Original Contribution*

The BMI ranged between 90.9% to 101.2% of the standard in boys and between 90.7% to 96.91% of

the standard in girls. The change of BMI with age was insignificant.

Table I: Age and sex distribution of children

Age in years	Sex				Total	
	Boys		Girls		N	%
	N	%	N	%		
6-7	117	52.2%	108	47.8%	226	37.6%
7-8	67	51.5%	63	48.5%	130	21.6%
8-9	63	50.4%	62	49.6%	125	20.8%
9-10	62	51.7%	58	48.3%	120	20.0%
Total	309	51.6%	291	48.4%	600	100.0%

Table II: Anthropometric measurement of boys and girls and comparison with standard

Age in year	No. of boys	Weight (kg) Mean±SD	Std. wt. (%)	Height (cm) Mean±SD	Std. ht. (%)	No. of Girls	Weight (kg) Mean±SD	Std. wt. (%)	Height (cm) Mean±SD	Std. ht. (%)
6	55	19.04±3.2	90	115.93±7	99	46	18.24±3.2	93	112.72±5.0	98.2
7	63	21.27±3.9	94.53	121.33±5	100.8	62	22.10±4.3	100.4	121.48±7.0	101
8	67	26.19±4.8	100.8	129.10±8	103.2	63	25.63±5.5	96.7	129.24±7.0	103.2
9	63	28.40±5.1	96.5	133.17±8	101.5	62	28.24±5.9	98.5	133.29±7.0	102.3
10	62	32.21±5.5	101.75	137.92±6	102.2	58	32.31±5.7	101.5	137.28±8.0	101.6

Table III: BMI in boys and girls and comparison with standard

Age in year	No.	Mean BMI		Boys Std. (%)	Girls Std. (%)
		Boys	Girls		
6	55	14.0	13.8	90.9	90.7
7	63	14.3	14.8	90.25	95.48
8	67	15.5	15.1	98.7	96.17
9	63	15.9	15.7	98.75	96.91
10	62	16.8	16.0	101.2	94.11

Table IV: Weight for age Z-score (underweight), Height for age Z-score (stunting), weight for height Z-score (wasting)

Grading of underweight	No.	%	Grading of stunting	No.	%	Grading of wasting	No.	%
Severe (-3 SD and Bellow)	29	4.8	Severe (-3 SD and Bellow)	10	1.7	Severe(-3 SD and Bellow)	16	2.7
Moderate (-2.99 SD to -2.00)	125	20.8	Moderate (-2.99 SD to -2.00)	133	22.1	Moderate (-2.99SDto -2.00)	79	13.1
Not underweight (above -1.99 SD)	446	85.4	Not stunted (above -1.99 SD)	457	76.2	Not wasted (above -1.99 SD)	504	84.2
Total	600	100	Total	600	100	Total	600	100

Table IV shows weight for age Z score among 600 children, 29(4.8%) were severely underweight, 125(20.8%) were moderately underweight and 446(85.4%) were within normal limit. It shows height for age Z score, 10(1.7%) of children are severely stunted, 133(22.1%) are moderately stunted and 457(76.2%) are within normal limit. It also shows Weight for age z score shows 16(2.7%) children among 600 were severely wasted, 79(13.1%) were moderately wasted and 504(84.2%) children were within normal limit.

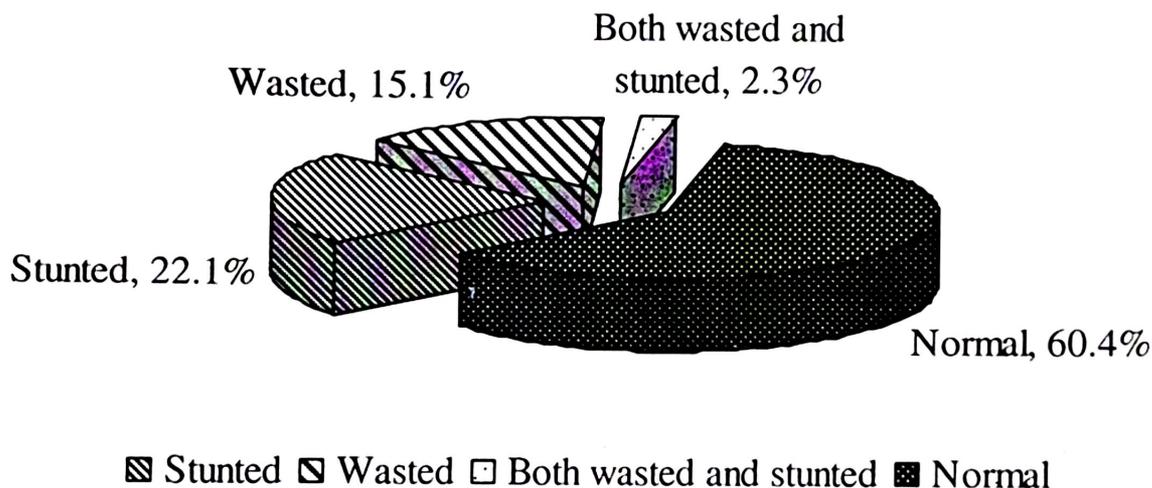


Figure 1: Distribution of overall nutritional status of study population

This pie diagram shows 60.4% children are normal, 22.1% stunted, 15.1% wasted and 2.3% both stunted and wasted.

This study shows in rural area severely underweight, moderately underweight, and normal children 18(62.1%), 82(65.6%), 187(42.1%) and in urban area there were 11(37.9%), 43(34.4), 259(57.9%) respectively. This difference was statistically significant. This study also shows in rural area severely stunted, moderately stunted, and normal children are 10(100%), 78(58.6%), 212(46.5%) and in urban area they are 0%, 55(41.4%), 245(53.5%) respectively.

Table V: Comparison of weight for height between rural and urban children

Grading of wasting	Area		Total
	Rural	Urban	
	N (%)	N (%)	N (%)
Severe (-3 SD and Bellow)	10 (62.5)	6 (37.5)	16 (2.7)
Moderate (-2.99 SD to -2.00)	47 (59.5)	32 (40.5)	79 (13.1)
Not wasted (above -1.99 SD)	243 (48.2)	262 (51.8)	506 (84.2)
Total	300 (50)	300 (50)	600 (100)
P value	0.0035		

Table V shows in rural area severely wasted, moderately wasted, and normal children were 10(62.5%), 47(59.5%), 243(48.2%) and in urban area they were 6(37.5%), 32(40.5), 262(51.8%) respectively. This difference was statistically significant.

Table VI: Comparison of weight for age between boys and girls

Grading of underweight	Sex		Total
	Boys	Girls	
	N (%)	N (%)	N (%)
Severe (-3 SD and Bellow)	12 (41.6)	17 (58.6)	29 (4.8)
Moderate (-2.99 SD to -2.00)	59 (47.2)	66 (52.8)	125 (20.8)
Not underweight (above - 1.99 SD)	238 (53.5)	208 (46.5)	446 (85.4)
Total	309 (51.6)	291 (48.4)	600 (100)
P value	0.1754		-
Level of significance	Not significant (p>0.05)		-

This table VI shows among severely underweight children 12(41.6%) were boys and 17(58.6%) were girls. In moderately underweight children 59(47.2%) were boys and 66(52.8%) were girls. Among normal children 238(53.5%) were boys and 208(48.4%) were girls.

This Study shows among severely stunted children 5(50%) were boys and 5(50%) were girls. In moderately underweight children 63(47.4%) were boys and 70 (52.6%) were girls. Among normal children 241 (52.7%) were boys and 216 (47.3%) were girls. This also shows among severely wasted children 9(56.25%) were boys and 7(43.75%) children were girls. In moderately underweight children 38(48%) were boys and 41(52%) were girls. Among normal children 262(51.7%) were boys and 243(48.3%) were girls.

This study shows relationship between weight for age and BMI. The correlation of wt for age and BMI was significantly influenced where r (coefficient) = 0.758. Increase of ht for age with increase of wt for age.

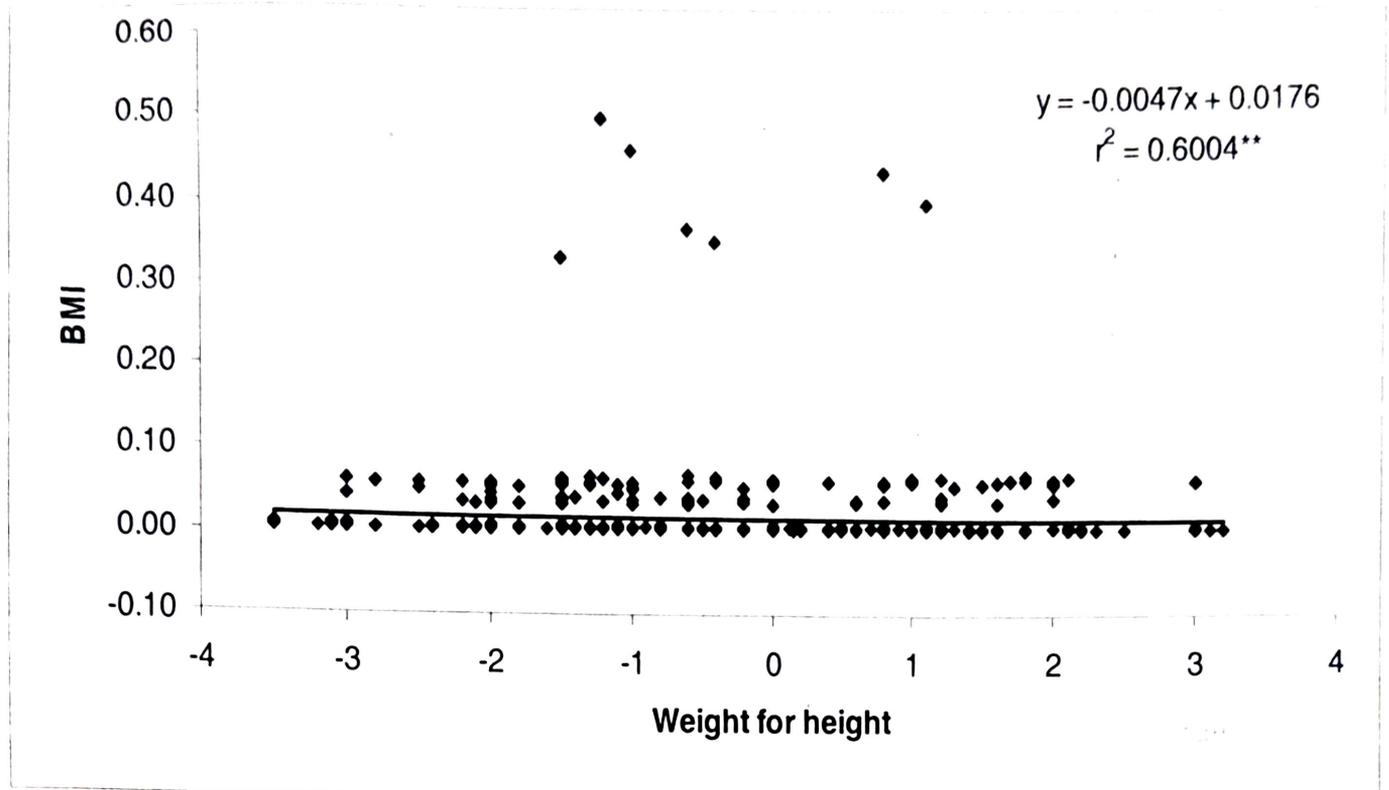


Figure 2: Relation between weight for height and BMI

The correlation of wt for Ht and BMI was significantly influenced where  $r(\text{co-efficient})=0.601$ . Increase of wt for Ht with increase of BMI.

### Discussion

Nutritional status of any community is dependant upon numerous factors among them food security, food safety, social status, gender discrimination, woman's education, housing, healthcare, water and sanitation are more prevalent<sup>13</sup>. This study tries to find out current status of nutrition in school children. It was found from the study that 51.6% of study population was boys and 48.4% were girls with Boys and girls ratio of 1.1:1 (Table I). Khan et al. found 53% were boys, 41% girls<sup>14</sup>; Mohajira et al. showed 54.13% boys and 45.87% girls which is more or less similar to this study<sup>15</sup>.

This study shows comparison of anthropometric measurements of boys with standard. The body weight of the boys ranged between 101.7% and 90% (Table II) of the standards with the increase of age, the body weight shows slight increase but the increase was insignificant. The height ranged between 103% and 99% of the standard. The height of the boys also showed insignificant increase with the increase of age. On observation of Mohajira et al. weight of boy 116% and 92% of the standards,

with the increase of age there is decrease of weight, the height ranged between 110% and 97% of the standard<sup>15</sup>. The height of the boys also showed insignificant decrease with the increase of age.

This study shows comparison of anthropometric measurements of girls with standard. The body weight of girls ranged between 101.5 % to 93% (Table II) of the standard with no significant changes with age. The height of girls ranged between 98.2% to 103.2% of the standard, similar to body weight, heights further shows insignificant changes with age. A study conducted in Dhaka city showed the body weight of the girls ranged between 109% and 91% of the standards. The body height ranged between 107% and 98% of the standard which is more or less similar to this study<sup>15</sup>.

BMI of boys and girls were compared with standard. The BMI ranged between 90.25% to 101.2% of the standard in boys. The BMI ranged between 90.7% to 96.91% of the standard in girls (Table III). There is no significant difference between boys and girls. Shah et al. showed mean

BMI  $18.31 \pm 2.98$  and  $19.26 \pm 3.48$  for boys and girls respectively from high socioeconomic status. Jaswant et al. found no difference between boys and girls that is similar to our study<sup>16</sup>.

Mohajira et al. study showed that 97.6% of children had normal nutritional status. In addition, 2.1% and 0.3% of children had moderate and severe under weight respectively<sup>14</sup>. Manjula et al. showed only 7.6% respondents had weight-for-age status below  $-2$  SD<sup>17</sup>. Kumar et al. observed 51.7% underweight. Study at Nasirnagar showed 25% children are under weight<sup>10</sup>, Marlina et al. showed 23% are underweight<sup>18</sup>. But this study shows that 85.4% were normal and 25.6% were underweight among them 4.8% were severely underweight and 20.8% were moderately underweight (Table IV). This study is almost similar to the Nasirnagar study and Marlina et al. This is because Nasirnagar study were conducted almost same regional and socioeconomic background<sup>10,18</sup>.

Marlina et al. found 17% children are stunted, Kumar et al observed 47.4% stunted<sup>19</sup>. Mohajira et al. shows that only 0.6% was severely stunted and only 4.3% were moderately stunted and 95.1% normal. But this study shows that only 1.7% children were severe stunted and 22.1% were moderately stunted (Table IV)<sup>15,18</sup>. There were 76.2% children had normal level. Our study is closer to the Marlina et al. but not with the Kumar et al. and Mohajira et al which was conducted in selected schools of Dhaka city<sup>15,19</sup>. But this study includes both rural and urban area of Mymensingh district.

On their observation Kumar et al. found 21.2% wasted and Anwar et al. found 32.7% wasted among school children<sup>21</sup>. This study show that 2.7% children were severely wasted and 13.1% were moderately wasted (Table IV) which is closer to Kumar et al.<sup>19</sup>.

Koshi et al. has found the percentage of students with PEM according to the W/A, H/A and W/H criteria were 23%, 17%, 12% respectively<sup>21</sup> Anwar et al. showed that 45.5% underweight, 36.15% stunted, 25% are wasted<sup>20</sup>. Overall total nutritional status of school children in this study revealed that 60.4% were normal and 15.1%, 22.1% were stunted and wasted respectively, 2.3% were both stunted and wasted (Figure 1). Amuta et al. found W/A, H/A and W/H 78.33%, 73.33% and 50.66% respectively<sup>22</sup>.

Most of the malnourished children of this study live in rural area. Among 29 severely underweight children 18(62.1%), lives in rural area and 11(37.9%) lives in urban area. Among 125 moderately underweight 82(65.6%) lives in rural area and 43(34.4%) live in urban area. All 10(100%) severely stunted children live in rural area and none in urban area. Among moderately stunted children 78(58.6%) children live in rural area and 55(41.4%) live in urban area (Table V). Faisalabad study showed 40.9% were stunted in rural area a little bit lower then our study. Anwar et al. showed 32.3% urban and 64.7% rural children are underweight and 33% urban and 40.9% of rural children were stunted<sup>20</sup>.

Girls are more malnourished then boys in this study. Though it is not statistically significant girls are more malnourished in all parameters.

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