Prevalence and Determinants of Child Health and Nutritional Status in Selected Areas of Cumilla District in Bangladesh

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Abstract

Child malnutrition is a great public health issue and for that reason adequate nutrition is identified as one of the pillars of public health. This present study aimed to explore the extent of child malnutrition as well as factors associated with undernutrition and Low Birth Weight (LBW) in Cumilla. A cross sectional study was conducted in selected areas of Cumilla district in April,2019. In total 355 households were included in the study following inclusion criteria and 299 under five children was assessed for anthropometry. SPSS (version 25) and WHO Anthro (version 3.3.2) was used for analytical purpose. Prevalence of LBW was 18.6% and mean (SD) birth weight was 2.54 (0.78) kg. Important covariates for LBW were uneducated mother (AOR = 1.32, $p < 0.001$), household food security (AOR = 0.81, $p < 0.001$) and intake of iron tablet during pregnancy (AOR = 0.56, $p < 0.05$). Prevalence of stunting, wasting, underweight, and overweight was 39.6%, 18.9%, 31.2%, and 7.5% respectively. Around 16% children were concurrently stunted and wasted, 18% were both stunted and underweight and 14% were both wasted and underweight. Odds of being malnourished was higher among premature babies (stunting: AOR = 1.24, $p < 0.05$; wasting: AOR = 1.66, $p < 0.05$; underweight: AOR = 1.37, $p < 0.001$). More than 83% children were exclusively breastfed; median duration of breastfeeding was 19.6 months and vaccination coverage were 87.9%. Both undernutrition and overnutrition prevalence among under-five children in Cumilla is quite high. Health information strategies targeting young child feeding practices may be effective to minimize undernutrition quickly.

Keywords: Malnutrition, Low birth weight, Children, Cumilla.

Introduction:

The nutritional status of the child is determined by a complex interaction of multiple factors i.e., dietary practice, maternal health, care practice, and other enabling environments including household socioeconomic condition[1]. Child nutritional status is very important in community nutrition since it is a proxy indicator for assessing population health status. The term "malnutrition" implies not only undernutrition but also overnutrition[2]. Malnutrition in earlier life adversely affects the growth and development of children and is an important risk factor for many communicable and non-communicable diseases[3]. Thus, it plays a vital role in determining health and disease conditions in later life[4]. Childhood malnutrition also accounts for 3.5 million children's death globally[5].

Now-a- days child malnutrition is also a major public health issue worldwide. In 2020, around 149 million children around the world are stunted, 40 million are overweight and 49 million are wasted[6]. However, undernutrition is highly prevalent in Asia and Africa[7]. Although undernutrition is considered a great public health concern in low- and middle-income countries[2], substantial increase in the prevalence of overnutrition is also observed as a result of nutrition transition and lifestyle changes[8,9].

Malnutrition rates have seen a marked decline in Bangladesh throughout the 1990s but remained high at the turn of the decade. Among under-five children, the level of stunting has declined from 43% in 2007 to 31% in 2017[10]. The latest nationally representative Multiple Indicator Cluster Survey, Bangladesh (MICS) 2019 estimated 28% of under-five children as stunted, 22.6% and 9.8% of children as underweight and wasted respectively. While 2.4% of children were identified as overweight[11].

Like malnutrition, Low Birth Weight (LBW) is also a principal cause of childhood morbidity and mortality[12]. Despite substantial improvement, around 20.5 million infants are born with LBW (defined by WHO as <2500 gram) globally[6]. In Bangladesh, LBW prevalence has declined from 36% in 2003 to 22% in 2015[13]. Moreover, a reduction in the prevalence of LBW is crucial for achieving Sustainable Development Goals (SDG).

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Our study aimed to determine the extent of malnutrition among under-five children as well as to find out the association of different socio-economic and demographic characteristics with various aspects of child health. The present study also focused on exploring the prevalence statistics of LBW, IYCF practice as well as child caring practice during illness.

Methods

Study design and participants: A cross-sectional study was conducted in April 2019 among the six villages of Cumilla district, a south-eastern district of Bangladesh. The study area was Kalir Bazar, Ujirpur, Joshpur, Goenkhali, Joypur, and Janglia. Randomly selected 355 households were surveyed. The data were collected by personal interview or by having each complete a questionnaire. From each household, one adult female was asked about child-related questions as well as the socio-demographic condition and dietary practices. The total population assessed for anthropometry was 1815 where 299 children were aged less than 5 years.

Data collection: Validated structured questionnaire was used for data collection purposes. We used a weight scale, height scale, and MUAC tape to collect anthropometric information. Child's birth weights were obtained by their mother's statement.

Anthropometric data processing: Height-for-age z score (HAZ), weight-for-age z score (WAZ), and weight-for-height z score (WHZ) were calculated to examine the nutritional status of under-five children. Values of HAZ, WAZ, and WHZ were calculated using World Health Organization (WHO) 2006 growth standard[14].Stunting, underweight, and wasting were defined as those values less than -2 SD of the median reference values[15,16].

Data analysis: Z scores were calculated using WHO Anthro software (version 3.3.2)[17]. The z scores were then transformed into SPSS spreadsheet (version 25) for further analysis. Both descriptive and inferential statistics (e.g., independent sample t-test) were computed. A Chi-square test was used to estimate the association between selected independent and dependent variables. We also fitted a bivariate logistic regression model to estimate the effect of different factors on nutritional status and child birth weight. Three different logistic regression models were considered for three dependent variables (stunting, underweight, and wasting). Statistical significance was evaluated with two-sided tests with a significance threshold of 0.05.

Results

Sample characteristics: Table 1 lists the characteristics of the study subjects. Nearly one-third of mothers were between 18-24 years old. Almost all of them were housewives (97.8%), and a few of them were tailors. Almost two-thirds of them (63.6%) had completed secondary school and almost 86% had moderate income. In terms of children, nearly two-thirds (63.7) were born with normal weight. The highest number of children lies in the age group of 48–59 months (40.47%). The majority of children were exclusively breastfed and fully vaccinated.

Table 1. Characteristics of study participants

Maternal characteristics	**n (%)**
Age in years	
18-24	97 (32.4)
25-34	139 (46.3)
≥ 35	63 (21.3)
Occupation	
Housewife	297(97. 8)
other	3 (2. 2)
Education	
Primary or below	109 (36.4)
Secondary or higher	190 (63.6)
Gross household income	
Moderate	257 (85.8)
Poor	42 (14.2)
Child characteristics	**n (%)**
Gender (male)	155 (51.8)
Age in months	
0-5	4 (1.3)
6-11	16 (5.35)
12-23	53 (17.73)
24-35	51 (17.06)
36-47	54 (18.06)
48-59	121 (40.47)
Nutrition history	
Exclusive breastfeeding (yes)	261 (87.1)
Getting full vaccination (yes)	262 (87.9)
Normal birth weight (≥2500 gram)	191 (63.7)

Socio-demographic and socioeconomic characteristics of households: The average household size of the study population was 5.1 . Of all families, 1.7% were headed by women and 74% of householders' age was between 36-55 years. The highest number of male householders were engaged in cultivation (26.5 %). Small scale businesses (15 %), government or private sector service holders, or employees were the main occupations of the householders. A remarkable number of household heads (23.9%) were non-residence. The mean income and expenditure of the householders were 22,023 and 17,087 taka per month respectively and per capita income was 4,307 taka per month. The proportion of food and non-food expenditure provides an important indication of the strength of the economy of the general people. The share of food expenditure was 43 % whereas that of non-expenditure was almost 57 %. Among the non-food component, the highest proportion of cost was for medical (12.89 %).

Prevalence and associated risk factors of LBW: The mean (SD) birth weight of under 5 children was recorded as 2.54 (0.78) kg. LBW was found at 18.6% and prevalence was higher among girls (33.33% vs 21.9%). Birth weight above 2500 grams was the least among the girls. More than one-third of LBW babies took birth before 37 weeks of the gestational period. LBW was the least among mothers who took iron tablets during pregnancy and achieved desired body weight.

Table 2. Effect of sociodemographic and obstetric factors on birth weight (N=299)

	Birth weight (%)		
Sociodemographic characteristics	**Low**	**Normal**	**Macrosomia**
Mother's education			
Educated	29	68.3	2.3
Uneducated	33	63	3.3
Food security			
Secure	21.6	75.4	3
Insecure	22.6	75.2	2.3
Women empowerment			
Empowered	30.4	67	2.6
Not empowered	26.7	71.7	1.7
Obstetric factors			
Gestational week			
$<37^{th}$	35.5	62.4	1.7
37^{th}	23.7	75	1.3
$>37^{th}$	27.9	68	3.6
Place of delivery			
Own house	36.6	61.6	1.7
Hospital	22.4	74.5	3.7
Maternal weight gain			
12.5 kg	6.1	81.8	12.1
< 12.5 kg	38.7	59.9	1.7
Don't know	27.2	71.6	1.2
Intake of iron tablet			
Yes	27.2	69.8	3
No	46.4	53.6	
Presence of anemia			
Yes	35.3	63.5	1.2
No	27.8	69.4	2.8
Number of pregnancies			
2 times	28.1	68.5	3.4
> 2 times	31.6	67.1	1.3

From Table 2, it is also clear that the prevalence of LBW was higher in the case of repeated pregnancy. Children of uneducated mothers were more prone to be born with low weight. Children from food-insecure households had a higher rate of being LBW (22.6% vs.21.6%). However, the education level of the mother, place of delivery as well as maternal weight gain, all had a significant association with birth weight ($p < 0.05$ in chi-square test). Correspondingly, mothers, who achieved desired body weight gave birth to more babies with normal weight compared to those who fail to gain desired body weight (81.8% vs. 59.9%).

The results of the multivariable logistic regression model fitted to identify the contribution of associated factors with LBW are summarized in Table 3. We found a significant relationship ($p < 0.05$) between LBW rate and various demographic as well as obstetric factors such as iron tablet intake during pregnancy. This multivariate analysis also reveals that the odds of being LBW decreases as the number of antenatal visit increases but not significantly.

Nutritional status of under-five children: A total of 299 under 5 children (male 155, female 144) were found in selected 355 households. Around 40% of children were identified as stunted. While the prevalence of wasting, underweight, and overweight was 18.9%, 31.2%, and 7.5% respectively. Mean (SD) age, height, and weight were 37.28 (16.29) months, 87.64 (17.90) centimeter, and 12.23 (4.04) kg respectively whereas mean anthropometry (weight, height, and MUAC) was greater among boys as compared to girls but not significantly. The stunting rate was very high than other forms of malnutrition. All forms of malnutrition were relatively higher among female children except overweight. Only overweight prevalence was much higher among male children (9.7 % vs. 8.1%).

Table 3. The binary logistic regression showing factors associated with LBW

Variable	Level	AOR	P-value
Education level of mother	Uneducated	1.32	< 0.0001
	Educated	1	
Household food security	Secure	0.81	< 0.0001
	Insecure	1	
Intake of iron tablet during pregnancy	Yes	0.56	0.01
	No	1	

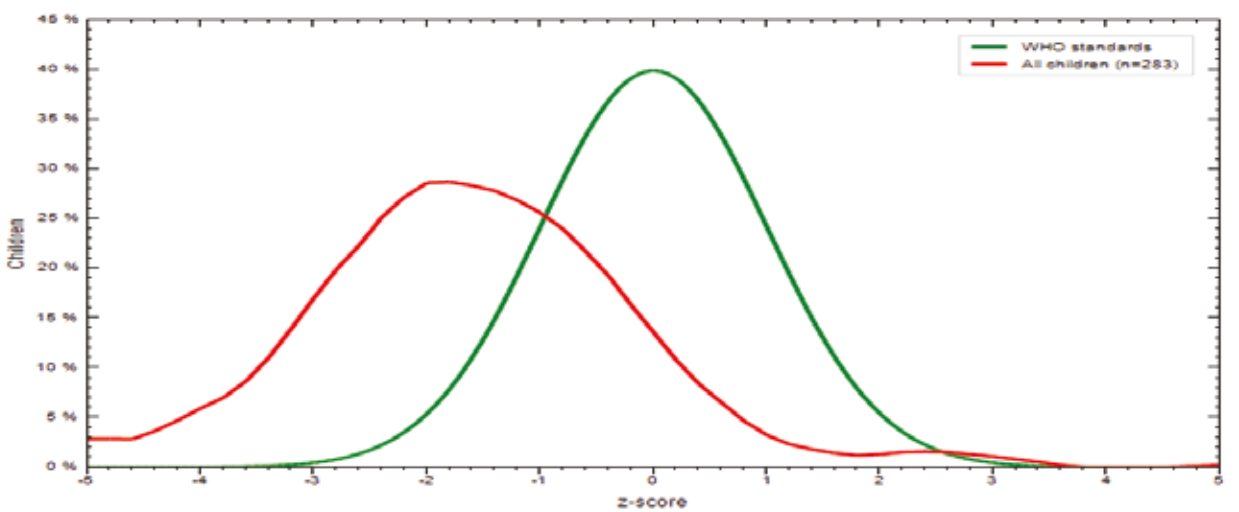

Figure 1. Height for age z score: Mean z score was -1.65 (SD 1.52); 14.8% children were severely stunted (<-3SD) and 24.8% were moderately stunted (-3 < z score < - 2).

Cross classification of undernutrition: The level of childhood undernutrition (stunting, wasting, and underweight) was also examined at different levels, and the findings are listed in Table 4. All the indices used for measuring childhood malnutrition were high among low-birth-weight children. The level of childhood malnutrition also increased with the increases in household wealth aequisition (monthly income) and household food security. Additionally, the rate of stunting and wasting was much higher among children of uneducated mothers than educated mothers. Except for wasting, the other two indices were higher among those children who were exclusively breastfed for up to 6 months. Stunting was significantly associated ($p < 0.05$) with the child's birth weight, household food security, education level of the mother, gestational week and exclusively breastfeeding status. These factors were also significantly associated with wasting and being underweight as well.

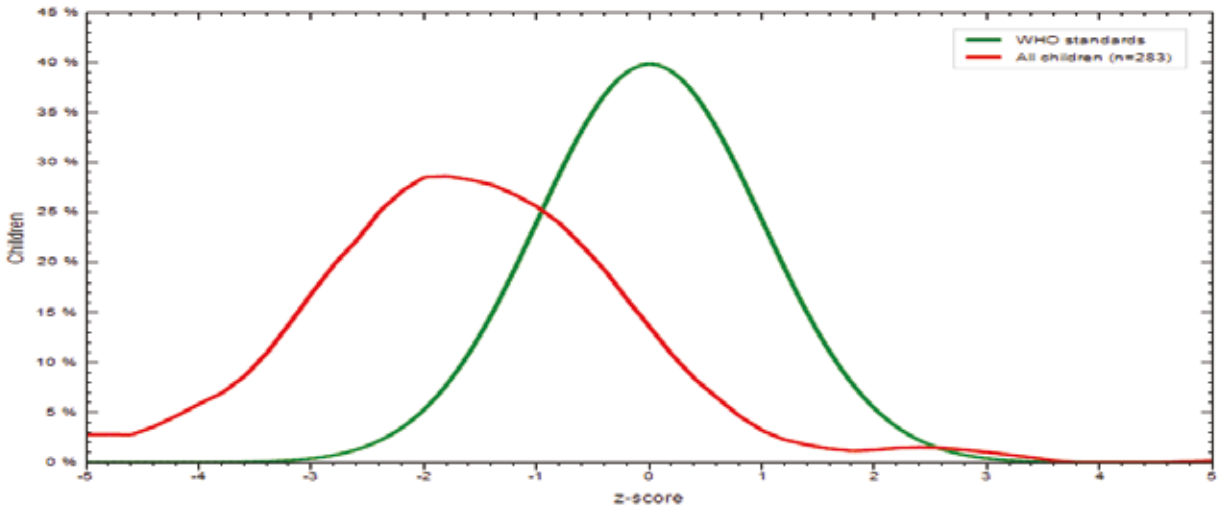

Figure 2. Weight-for-age z score: Mean z score was -1.34 (SD 1.43); z score was less than -3SD for 10.5% children and 31.2% children were less than -2SD

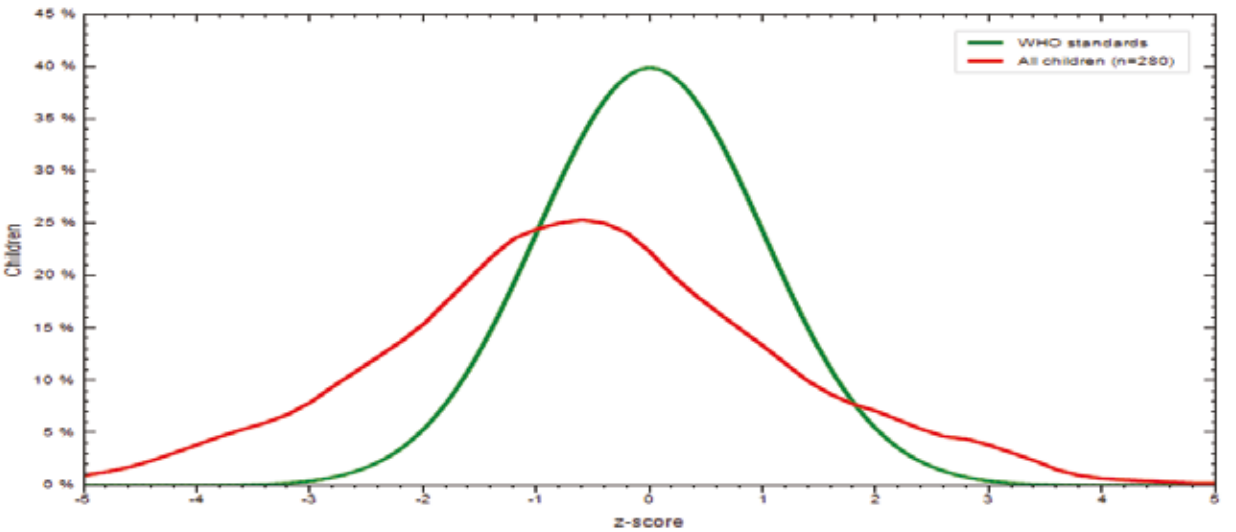

Figure 3. Weight-for-height z score: Mean z score was -0.58 (SD 1.67); z score was less than -2SD for 18.9% children whereas 7.5% children were above +2SD

Table 4. Cross classification of undernutrition by socio-demographic characteristics, maternal issues, and various health practice (N=299)

		Stunting (%)		Wasting (%)		Underweight (%)	
		Stunted	**Not stunted**	**Wasted**	**Not wasted**	**Underweight**	**Not underweight**
Gender	Male	37	63	17.4	82.6	26	74
	Female	42.3	57.7	20.6	79.4	36.9	63.1
Age in months	6-11	25	75	12.5	87.5	31.3	68.7
	12-23	52.9	47.1	14	86	23.1	76.9
	24-35	46.8	53.2	27.7	72.3	45.1	54.9
	36-47	39.2	60.3	9.8	90.2	40.7	59.3
	48-59	32.2	67.7	23	77	25.2	74.3
Birth weight	LBW	29.6	70.4	13.7	86.3	10.6	89.4
	Not LBW	31.8	68.2	21.2	78.8	5.4	94.6
Food security	Secure	34.8	65.2	18	82	28.6	71.4
	Insecure	42	48	18.8	81.2	33.3	66.7
Gestational week	$<37^{th}$	67.5	32.5	28.5	71.5	52.4	47.6
	$\geq 37^{th}$	32	68	17.2	82.8	25.4	74.6
Education level of mother	Educated	30.5	69.5	15.4	84.6	25.8	74.2
	Uneducated	45.2	54.8	16.1	83.9	22.6	77.4
Exclusively breastfed	Yes	31.2	68.8	15.9	84.1	26.1	73.9
	No	37.3	62.7	13.6	86.4	30	70
Continuation of breastfeeding	<24 months	33.9	66.1	15.7	84.3	26.2	73.8
	≥ 24 months	30.5	69.5	15.2	84.8	25.7	74.3

Figure 4 elucidates the overlapping form of childhood stunting, wasting, and underweight. We identified the combined prevalence of stunting and wasting among 15.8% of children while 18 % of children were both stunted and underweight and 14 % were both wasted and underweight. Only 6 % of children were concurrently stunted, wasted and underweight.

Determinants of child undernutrition: Three different multivariable logistic regression model was fitted for the three different measures of undernutrition (stunting, wasting, and underweight). We noted that the odds of stunting was 24% higher among premature babies (AOR = 1.24, $p = 0.01$) as compared to term babies (Table 5). Main covariate for wasting was gestational week (AOR = 1.66, $p < 0.01$) and also for underweight (AOR = 1.37, $p < 0.0001$).

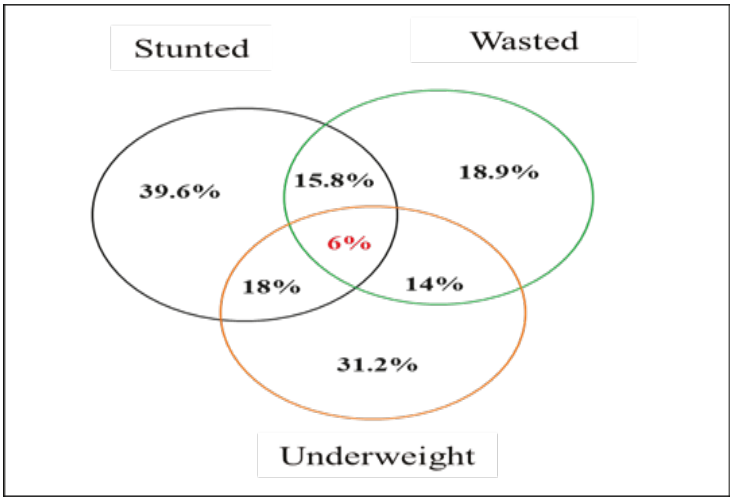

Figure 4: Overlapping form of stunting, wasting and underweight

Table 5: Determinants of stunting, wasting, and underweight

Variable	Level	Stunting		Wasting		Underweight	
		AOR	P value	AOR	P value	AOR	*p*-value
Gestational week	<37 th week	1.24	0.01	1.66	0.004	1.37	<0.0001
	≥37 th week	1		1		1	

Note. AOR=Adjusted Odds Ration

Breastfeeding status of children: Around 83% of children was exclusively breastfed. The median duration of breastfeeding was 19.6 months. Moreover, the study also found that there was no discrimination between males and females regarding exclusive breastfeeding. Mother's education level plays a vital role, educated mothers were much more concerned compared to uneducated mothers. More than 87% of educated mothers practiced exclusive breastfeeding while only 38.7% of uneducated mothers do exclusive breastfeeding. Family income and household food security also influence exclusive breastfeeding status. The breastfeeding rate was higher among affluent families. Premature (85.7%) and LBW (79.8) babies were less likely to be exclusively breastfed.

Childhood illness and treatment: Among children with diarrhea, 50.5 % received an ORS packet, and 33.2 % received both an ORS packet and medicine. In 92.4% of cases, mothers continued breastfeeding. Educated mothers (51.5%) were more concerned about treating their children with ORS packets; the rate of treating children with ORS packets and medicine was also much higher among affluent families. Nearly 47% of educated mothers gave ORS after each stool passed. In families where women have decision-making power, frequency was much higher (42%). Maximum mothers who have education (77.7%) and who have decision-making power in child health (78.2%) gave normal food during diarrhea. A remarkable number of mothers from food-insecure households (32.4 %) restricted some special items during diarrhea.

Discussion

Nutrition is crucial for the immunological status of the child. Undernourished children are more vulnerable to infection due to poor immune competence which increases their risk of dying[4].On the other hand, frequent episodes of diarrhoeal disease, poor health-seeking behavior, and immunization practices

are the leading causes of undernutrition among children under 5 years of age.

Whilst improving substantially, undernutrition prevalence is still high in Bangladesh. In line with undernutrition, a significant increment in childhood overweight is also visible. The estimated prevalence of childhood malnutrition in our study was higher than those of national estimates except for overweight (10-11). Therefore, wasting and being underweight were more prevalent among younger children (less than 23 months). For both measures, malnutrition hits the highest point at age 24-35 months. Our result showed that the rate of stunting increased gradually after the child was aged 6 months. Late weaning, suboptimal breastfeeding, and poor complementary feeding practice may be the underlying factors responsible for this. The present study also observed that female children were more undernourished than male children. While boys are at most risk of being WaSt (M: F prevalence ratio 1.57. Undernutrition was negatively associated with the household income and education level of the mother. The result is parallel to other similar studies[18].

Low Birth Weight (LBW) is also an important public health concern in Bangladesh. Our present study reveals that the LBW rate is 18.6% in Cumilla which is almost half of the national prevalence (12-13). Our estimation may not accurate since we measure birth weight by mother estimation and this was not the main focus of our study.

Limitations

Although this study was conducted very carefully, there are still some limitations. First of all, since the study was based on cross-sectional data, exploring the association between selected factors and the prevalence of malnutrition cannot establish the casual association. Second, the sample was less than the required size calculated by the standard formula of WHO. Third, recall bias may have occurred in the case of some responses. In addition, since the survey was conducted by the authors of this report themselves, it is unavoidable that in this study, a certain degree of subjectivity can be found.

Conclusion

The study emphasized measuring the overall nutritional status of children. Our study found that malnutrition is still a problem in rural Bangladesh including Cumilla. A joint effort by the government, non-governmental organizations, and community involvement is necessary to overcome the malnutrition problem among children. Additionally, health information strategies should be centered on young children feeding practices to reduce childhood undernutrition.

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