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Exploring the Prevalence and Determinants of Malnutrition Among Children Under 5 Years in Bangladesh: A Comprehensive Analysis of the 2017 Survey Data

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ABSTRACT

In Bangladesh, children aged 0-59 months are the subjects of this empirical study that looks into the prevalence of malnutrition and identifies contributing factors. Stunting, wasting, and underweight are a few indications used to evaluate the nutritional health of the kids. The association between sociodemographic variables and nutritional status is examined using a logistic regression model with sampling weight adjustments. The 2017 Multiple Indicator Cluster Survey (MICS), a nationally representative survey financed by UNICEF in Bangladesh, provided the data used in the study.

The prevalence of stunting, wasting, and underweight is determined to be 36.6%, 8.6%, and 21.6% respectively among the 20,127 samples used in the study. Stunting and underweight are found to be more common in children between the ages of 24 and 35 months and 36 to 47 months, respectively, than they are in infants younger than 6 months. Wasting is observed to be less common in the 36–47-month age range and more common in children aged 12-23 months.

According to the report, the Sylhet division has a higher prevalence of stunted and underweight children than other districts. Furthermore, the likelihood of being stunted, wasted, and underweight is reduced in female children, moms with higher levels of education, wealthy families, and prenatal patients. Children who live in metropolitan regions and come from affluent families, on the other hand, tend to be underweight more.

The study suggests that effective nutritional intervention measures be put into practice, as well as changes in household socioeconomic circumstances, maternal literacy, prenatal care availability, and maternal body mass index. The most vulnerable populations, including children from the most disadvantaged socioeconomic origins, those who live in cities, the Sylhet division, infants with lower birth weights, and mothers without a formal education, require urgent attention. These findings underscore the need for focused efforts to combat malnutrition in Bangladesh and offer insightful information for decision-makers.

Keywords: Malnutrition, Stunting, Wasting, Underweight, Children, Bangladesh.

Introduction

Background of the study

Malnutrition is one of the main public health problems in the world. It currently faces and causes more than 41% of the deaths of children between the ages of 6 and 24 months in developing countries each year, and these deaths number approximately 2.3 million [1]. Malnutrition is a very widespread disease, which generally manifests itself as an insufficient intake of energy, protein, or micronutrients [3]. Malnutrition is one of the leading causes of death for children under 5 years of age and one of the most common causes of reduced health and life expectancy in children, resulting in decreased learning ability, ineffectiveness, and inability to acquire skills. Malnutrition accounts for almost half of Asia and Africa's Death of children under five years of age. The three important indicators used to estimate malnutrition are alarming stunting (abnormally low height-for-age), Wasting **(**abnormally low weight-for-height loss), and underweight (abnormally low weight-for-age). According to a 2014 UNICEF report, the incidence of underweight, stunting, and wasting in the world is 15%, 25%, and 8%, respectively. Accomplish an under-5 mortality rate as low as 25 per 1,000 live births by 2030 is one of the destinations of the Maintainable Improvement Objective (SDG) 3, which may well be contribute by assessing lack of healthy sustenance in low and middle-income nations [2-6].

About one-third of deaths among children below five years of age were attributed to under nutrition and it can lead children to be at greater risk of death and severe illness due to common childhood infections, such as pneumonia, diarrhea, malaria, human immunodeficiency virus, or AIDS and measles [3]. World Health Organization (WHO) in 2001 reported that 54% of all childhood mortality was attributable, directly or indirectly, to malnutrition [5].

Not only is it a major cause of death and morbidity in children, it also leads to physical and mental disorders in children [7]. The physical and health effects of chronic malnutrition in children include delayed physical development, decreased IQ, low cognitive ability, decreased economic productivity, decreased fertility, poor academic performance and poor academic performance, more problems behavior, insufficient social skills and ease of learning Infectious diseases [8-9].

Globally, Malnutrition affects 2 billion people in the world.45% of deaths of children under five years of age are attributable to under nutrition. Malnutrition is an underlying cause of death of 2.6 million children each year- a third of child deaths globally. Around 160 million children under five years of age worldwide are affected by stunting [12].

The prevalence of worldwide stunting decreased from 39.3% to 20.8% under-5 years from 1990 to 2020. The high prevalence of precarious decreases due to malnutrition in the mid-1980s largely reduced by 2020, which is demonstrated in Bangladesh's significant accomplishments in the fight against child malnutrition in the last few decades. For example, the prevalence of stunted children in Bangladesh was 51% in 2004, 43.2% in 2007, 41% in 2011, and 36.2% in 2014[18-19].

In Bangladesh, more than half the populace endures from malnutrition. Severe intense lack of healthy sustenance influences 450,000 children, whereas near to 2 million children have direct intense ailing health. Frailty influences 52% of children beneath five a long time of age. 41% of children beneath five a long time of age are hindered. 16% of children beneath five a long time of age squandered. 36% of children beneath five a long time of age are underweight. A quarter of ladies are underweight and around 15% have brief stature, which increments the chance of troublesome childbirth and low-birth-weight newborn children. Half of all ladies endure from iron deficiency, generally wholesome in root [15-18].

Bangladesh is 'on course' to meet the target for stunting, but 30.8% of children under 5 years of age are still affected, which is higher than the average for the Asia region (21.8%). Bangladesh has made some progress towards achieving the target for wasting but 8.4% of children less than 5 years of age are still affected, which is lower than the average for the Asia region (9.1%) [17].

Socio-demographic status is considered to be the main factor for child malnutrition. One study showed that the gender, place of residence, and the level of education of the mother of children under 5 years of age are closely related to developmental delay. Sex, age, the economic situation of the family appeared to be the main cause of stunting. In East Asian countries, mothers with a lower body mass index are at higher risk of giving birth to wasted children. The study also found that birth weight is also highly correlated with wasting; children with low birth weight are prone to losing weight. In Southeast Asia, wasting is highly correlated with gender, age of the child, and low maternal BMI. A study has shown that children born with low birth weight (<2.5 kg) and children born in rural areas, the birth age of mothers are related to stunting, wasting, and slightly underweight [18].

In response to the Sustainable Development goals, WHO has launched a comprehensive implementation plan framework for maternal, infant, and young child nutrition in. The World Food Program (WFP) has adopted different types of programs in Bangladesh, such as the treatment of moderate acute malnutrition, the prevention of acute malnutrition, the prevention and treatment of stunting, and the prevention of defects micronutrients [18].

The Bangladesh Comprehensive Nutrition Program was piloted by the Food and Agriculture Organization of the United Nations (FAO) from 1995 to 2001, resulting in a 30% reduction in underweight infants. BRAC is also implementing health, nutrition, and population plans, as well as maternal, newborn, and child health plans to ensure the health and safety of mothers and babies in Bangladesh. These plans help reduce the high incidence of malnutrition in Bangladesh [4-6].

Malnutrition is an evolving public health problem that requires constant evaluation. The purpose of this study is to assess the prevalence of various forms of malnutrition under 5 years of age and analyze the relationship between child malnutrition and socio-demographic factors Identify the vulnerable groups most likely to become children Bangladesh is stunted, wasting, and underweight [18].

Objective of the study:

The study's goal is to define malnutrition by analyzing numerous indicators and determining its prevalence. It also aims to look at the relationships between certain demographic, socioeconomic, environmental, and health-related factors and child malnutrition.

Methods and Methodology

Data overview

Multiple Indicator Cluster Survey (MICS) 2017, this study used a UNICEF-funded survey (2017b) in Bangladesh. The data contains information on public health indicators for 8 geographic regions of Bangladesh. MICS 2017 applied a two-stage stratified sampling process. These areas were considered the main sampling strata, and various census enumeration areas (EA) were deliberately sampled using the relative probability of measurements within each stratum. After publishing the household units in the selected EAs, a system sample of 20 household units was drawn from each EA.

Outcome variables

The response variables selected for the study are four anthropometric indicators based on child growth of children (WHO, 2015), stunting (height-for-age), wasting (weight-for-height), under-weight (weight-for-age) [11].

Independent variable

A set of socio-demographic variables was independently selected. Variables: the child's age (<6, 6-11, 12-23, 24-35, 36-47,48-59 months); the gender of the child (male, female); the place of the residence (urban, rural); the geographical division (Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet) Mother's education (without education, the middle school, the high school and above), the wealth index (poorest, poor, middle wealthy, wealthiest), fetal care (yes, no), size of deliver (one, two three+) , Age of respondent at 1st birth(early age or <19 years,19 years or more), BMI of the mothers(underweight, normal, overweight, obesity), Mothers of breasting(never breastfed, 1-12 months, 13-24 months and >24 months).

Statistical analysis

Bivariate analysis with cross tables and ANOVA/ chi-square tests the main association between socio-demographic factors and nutritional status was evaluated. The categorical variables that are significant by the chi-square test (p value <0.05) and the continuous variables that are significant by the analysis of variance are selected for the logistic regression models (Scott, Hosmer, & Lemeshow, 1991; Jessen & Menard, 1996; Gortmaker, Hosmer, & Lemeshow, 1994). Logistic re-gressions models were fitted to examine the strength of the relationship between these factors.

Results

A total of 20127 under 5 children in Bangladesh were sampled in this study. Among them, 30.6%, 8.6% and 21.6%, suffered from stunting, wasting and underweight respectively. The prevalence of these nutritional statuses for different socio-demographic factors is given in Table 1. Age in months, place of residence, geographical division, mother's education, wealth index, size of child at birth, mother's age, total number of children, and place of delivery, BMI of mother's, month of respondent at first birth, month of breastfeeding were significantly associated (P-value<0.05) with both stunting and underweight (Table 1).

The prevalence of stunting was lowest among 6-11 months old children and highest among 36–47 months children. Wasting was lowest in 6-11 months old children; highest in 12–23 months old children. 6-11 months old children were mostly underweight. Children's age had a significant association with stunting and underweight. All considered variables were significantly associated with wasting (Table 1).

The sex of children had not associations with the nutrition condition. There were differences in malnutrition in the 8 geographical divisions of the country. Mother's education appeared to have an impact on children's nutritional status (Table 1).

Table 1: Cross- classification of types of malnutrition by Socio-demographic factor

Background Characteristics	Stunting		Wasting		Underweight	
	Stunted	Not stunted	Wasted	Not wasted	Underweight	Not underweight
Age (in months)						
<6	184(19.8%)	744(80.2%)	88(9.7%)	823(90.3%)	161(17.0%)	787(83.0%)
6-11	158(20.4%)	615(79.6%)	54(7.0%)	720(93.0%)	117(15.0%)	663(85.0%)
12-23	557(35.5%)	1011(64.5%)	129(8.2%)	1447(91.8%)	311(19.4%)	1294(80.6%)
24-35	528(38.5%)	843(61.5%)	117(8.6%)	1248(91.4%)	362(25.2%)	1072(74.8%)
36-47	386(32.7%)	793(67.3%)	102(8.7%)	1076(91.3%)	296(24.3%)	921(75.7%)
48-59	313(27.6%)	822(72.4%)	109(9.6%)	1024(90.4%)	298(25.8%)	856(74.2%)
	χ^2 =154.09 *P-value < 0.001*		χ^2 = 5.717 *P-value= 0.335*		χ^2 =154.09 *P-value < 0.001*	
Sex						
Male	1132(30.9%)	2527(69.1%)	343(9.4%)	3302(90.6%)	814(21%)	2940(78.3%)
Female	994(30.2%)	2301(69.8%)	256(7.8%)	3036(92.2%)	731(21.6%)	2653(78.4%)
	χ^2 =0.49 *P-value = 0.486*		χ^2 = 5.852 *P-value= 0.016*		χ^2 =0.007 *P-value = 0.933*	
Place of Residence						
Urban	623(25.6%)	1808(74.4%)	206(8.5%)	2210(91.5%)	472(18.9%)	2026(81.1%)
Rural	1503(33.2%)	3020(66.8%)	393(8.7%)	4128(91.3%)	1073(23.1%)	3567(76.9%)
	χ^2 = 43.06 *P-value = 0.001*		χ^2 =0.55 P-value= 0.814		χ^2 = 17.13 *P-value < 0.001*	
Received Prenatal						
Yes	13(48.1%)	14(51.9%)	03(10.7%)	25(89.3%)	06(21.4%)	22(78.2%)
No	2002(30.9%)	4487(69.1%)	558(8.6%)	5916(91.4%)	1451(21.8%)	210(78.2%)
	χ^2 =3.77 *P*-value = 0.052		χ^2 =0.155 *P*-value= 0.16		χ^2= 0.002 *P*-value = 0.964	
Geographic all Division						
Barishal	230(31.0%)	512(69.0%)	63(8.5%)	674(91.5%)	160(21.2%)	595(78.8%)
Chattogram	342(31.0%)	762(69.0%)	89(8.0%)	1019(92.0%)	226(19.7%)	920(80.3%)
Dhaka	242(24.0%)	768(76.0%)	96(9.6%)	906(90.4%)	186(17.9%)	855(82.1%)
Khulna	194(25.0%)	582(75.0%)	59(7.6%)	716(92.4%)	144(18.2%)	647(81.8%)
Mymensing	286(35.3%)	524(64.7%)	76(9.4%)	732(90.6%)	210(25.2%)	622(74.8%)
Rajshahi	220(29.1%)	535(70.9%)	59(7.8%)	694(92.2%)	174(22.1%)	613(77.9%)
Rangpur	242(29.1%)	589(70.9%)	65(7.8%)	764(92.2%)	168(20.0%)	674(80.0%)
Sylhet	370(40.0%)	556(60.0%)	92(9.9%)	833(90.1%)	277(29.3%)	667(70.7%)
	χ^2 = 80.84 *P-value <0.001*		χ^2 = 6.576 P-value= 0.474		χ^2 = 57.72 *P-value <0.001*	

Background Characteristics	Stunting		Wasting		underweight	
	stunted	Not stunted	Wasted	Not Wasted	Underweight	Not underweight
BMI of the moth						
Underweight	409(40.5%)	602(59.5%)	141(14.0%)	868(86.0%)	331(32.0%)	702(68.0%)
Normal	1288(31.9%)	2754(68.1%)	333(8.3%)	3698(91.7%)	908(21.9%)	3234(78.1%)
Overweight	354(23.3%)	1167(76.7%)	109(7.2%)	1408(92.4%)	258(16.5%)	1307(83.5%)
Obesity	70(19.35)	2092(80.7%)	15(4.1%)	347(95.9%)	43(11.4%)	335(88.6%)
		χ^2 = 109.39 *P-value <0.001*		*χ^2 = 50.43* *P-value= 0.000*		*χ^2 = 114.19* *P-value < 0.00*
Month of Breastfeeding						
Never breastfed	01(11.1%)	08 (88.9%)	01(11.1%)	08(88.9%)	0(0.0%)	09(100%)
1-12months	423(21.5%)	1541(78.5%)	165(8.5%)	1786(91.5%)	324(16.2%)	1675(83.8%)
13-24months	663(37.0 %)	1129(63.0%)	138(7.7%)	1661(92.3%)	366(19.8%)	1483(80.2%)
>24 months	341(39.2%)	529(60.8%)	83(9.6%)	779(90.4%)	262(29.0%)	643(71.0%)
		χ^2 = 141.17 *P-value <0.001*		*χ^2 = 3.033* *P-value=0.387*		*χ^2 = 65.594* *P-value = 0.000*
Age of respondent at first birth						
Early age	1328(33.6%)	2625(66.4%)	357(9.1%)	3583(90.9%)	965(23.8%)	3090(76.2%)
Older Age	798(26.6%)	2203(73.4%)	242(8.1%)	2755(91.9%)	580(18.8%)	2503(81.2%)
		χ^2 = 39.42 *P-value < 0.001*		*χ^2= 2.098* *P-value= 0.147*		*χ^2 = 0.001* *P-value < 0.001*
Mother's education						
No education	214(43.9%)	273(56.1%)	60(12.3%)	426(87.7%)	176(35.6%)	319(64.4%)
Primary	746(382%)	1208(61.8%)	180(9.2%)	1770(90.8%)	532(26.6%)	1467(73.4%)
Secondary	989(29.7%)	2342(70.3%)	283(8.5%)	3037(91.5%)	707(20.7%)	2711(79.3%)
Higher secondary	177(15.0%)	1005(85.0%)	76(6.4%)	1105(93.6%)	130(10.6%)	1096(89.4%)
		χ^2 = 230.97 *P-value <0.001*		*χ^2 =16.655* *P-value= 0.001*		*χ^2 = 175.56* *P-value < 0.001*
Wealth Index quintiles						
Poorest	611(40.5%)	96(59.5%)	154(10.2%)	1353(89.8%)	438(28.5%)	1097(71.5%)
Poorer	513(37.6%)	853(62.4%)	121(8.9%)	1239(91.1%)	365(26.2%)	1029(73.8%)
Middle	381(29.8%)	896(70.2%)	110(8.6%)	1166(91.4%)	268(20.4%)	1043(79.6%)
Richer	383(27.1%)	1030(72.9%)	116(8.2%)	1294(91.8%)	295(20.4%)	1152(79.6%)
Richest	238(17.1%)	1153(82.9%)	98(7.1%)	1286(92.9%)	179(12.3%)	1272(87.7%)
		χ^2 = 229.08 *P-value <0.001*		*χ^2 = 9.45* *P-value= 0.051*		*χ^2 = 136.491* *P-value < 0.001*
Size of child at birth						
Large	663(35.9%)	1185(64.1%)	172(9.3%)	1670(90.7%)	492(26.0%)	1403(74.0%)
Average	717(29.3%)	1727(70.7%)	191(7.8%)	2245(92.2%)	512(20.4%)	1993(79.6%)
Small	746(28.0%)	1916(72.0%)	236(8.9%)	2423(91.1%)	541(19.8%)	2197(80.2%)
		χ^2 = 34.397 *P-value <0.001*		*χ^2 = 3.296* *P-value= 0.192*		*χ^2= 28.724* *P-value < 0.001*

*P value calculated using Pearson Sq. Test, keeping P value ≤ 0.5 as significant

Table 2: Logistic regression analysis for undernutrition among age under 5 years old children

Background Characteristics	Stunting		Wasting		Underweight	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Age (in months)			1.00		1.00	
<6 (r)	1.00	0.754	0.70	0.049	0.86	0.264
6-11	1.039		(0.43-0.99)		(0.67-1.12)	
	(0.82-1.31)	0.000	0.83	0.210	1.17	0.132
12-23	2.228		(0.62-1.11)		(0.95-1.45)	
	(1.84-2.69)	0.000	0.87	0.374	1.65	0.000
24-35	2.533		(0.66-1.17)		(1.34-2.03)	
	(2.09-3.08)	0.000	0.88	0.430	1.57	0.000
36-47	1.968		(0.66-1.19)		(1.27-1.95)	
	(1.61-2.41)	0.000	0.99	0.976	1.70	0.000
48-59	1.540		(0.74-1.34)		(1.37-2.11)	
	(1.26-1.89)					
Sex						
Male(r)	1.00		1.00		1.00	
	0.96	0.000	0.81	0.000	0.99	0.000
Female	(0.87-1.07)		(0.69-0.96)		(0.89-1.11)	
Place of residence						
Urban(r)	1.00		1.00		1.00	
Rural	1.44	0.000	1.02	0.814	1.29	0.00
	(1.25-1.61)		(0.86-1.22)		(1.14-1.146)	
Geographical Division						
Barisal(r)	1.00		1.00		1.00	
Chattogram	0.99	0.993	0.93	0.693	0.91	0.435
	(0.82-1.22)		(0.67-1.31)		(0.73-1.15)	
Dhaka	0.70	0.001	1.13	0.461	0.81	0.078
	(0.57-0.87)		(0.81-1.59)		(0.64-1.02)	
Khulna	0.74	0.009	0.88	0.505	0.83	0.140
	(0.59-0.93)		(0.61-1.28)		(0.64-1.06)	
Mymenshing	1.22	0.072	1.11	0.556	1.26	0.057
	(0.98-1.50)		(0.78-1.57)		(0.99-1.59)	
Rajshahi	0.92	0.433	0.91	0.616	1.06	0.662
	(0.73-1.14)		(0.63-1.32)		(0.83-1.35)	
Rangpur	0.92	0.418	0.91	0.610	0.93	0.540
	(0.74-1.14)		(0.64-1.31)		(0.73-1.18)	
Sylhet	1.49	0.000	1.18	0.331	1.54	0.000
	(1.21-1.82)		(0.84-1.64)		(1.24-1.93)	
Mother's education						
No education(r)	1.00		1.00		1.00	
Primary	0.79	0.020	0.72	0.040	0.68	0.000
	(0.64-0.96)		(0.53-0.96)		(0.53-0.81)	
Secondary	0.54	0.000	0.66	0.006	0.47	0.000
	(0.44-0.65)		(0.49-0.89)		(0.39-0.58)	
Higher secondary or above	0.23	0.000	0.49	0.000	0.22	0.000
	(0.18-0.29)		(0.34-0.69)		(0.17-0.28)	

Background Characteristics	Stunting		Wasting		Underweight	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Wealth Index						
Poorest (r)	1.00		1.00		1.00	
Poorer	0.88 (0.76-1.03)	0.101	0.86 (0.67-1.10)	0.230	0.89 (0.76-1.04)	0.000
Middle	0.62 (0.53-0.73)	0.000	0.83 (0.64-1.07)	0.152	0.64 (0.54-0.77)	0.000
Richer	0.55 (0.47-0.64)	0.000	0.79 (0.61-1.01)	0.064	0.64 (0.54-0.76)	0.000
Richest	0.30 (0.26-0.36)	0.000	0.67 (0.51-0.87)	0.003	0.35 (0.29-0.43)	0.000
Received Antenatal care						
Yes(r)	1.00		1.00		1.00	
No	2.08 (0.98- 4.43)	0.058	1.27 (0.38- 4.23)	0.69	0.98 (0.39-02.42)	0.964
Number of living children						
One(r)	1.00		1.00		1.00	
Two	1.07 0.94-1.20	0.300	0.87 0.72-1.07	0.183	1.04 0.91-1.19	0.539
Three+	1.44 1.27-1.63	0.000	1.06 0.86-1.30	0.595	1.42 1.24-1.64	0.000
BMI of the mothers						
Underweight(r)	1.00		1.00		1.00	
Normal	0.69 (0.59-0.79)	0.000	0.55 (0.45-0.68)	0.000	0.59 (0.51-0.69)	0.000
Overweight	0.47 (0.38-0.53)	0.000	0.48 (0.37-0.62)	0.000	0.42 (0.35-0.51)	0.000
Obesity	0.35 (0.26-0.47)	0.000	0.267 (0.15-0.46)	0.000	0.27 (0.19-0.38)	0.000
Months of Breastfeeding						
Never breastfed(r)	1.00		1.00	0.776		
1-12months	2.19 (0.27-17.60)	0.459	0.74 (0.09-5.94)	0.701		
13-24 months	4.69 (0.59-37.65)	0.145	0.67 (0.08-5.35)	0.881		
> 24 months	5.16 (0.64-41.42)	0.123	0.85 (0.11-6.89)			
Age of respondent at 1st birth						
Early (<19 years)(r)	1.00		1.00		1.00	
19 years or more	0.72 (0.65-0.79)	0.000	0.88 (0.74-1.05)	0.000	0.74 (0.66-0.83)	0.00

The estimated parameters of sampling adjusted logistic regression that show the influence on individual nutritional status (stunting, wasting and underweight) on under 5 children in Bangladesh are presented in Table 2. The logistic regression model showed that age, sex, geographical division, mother's education, wealth index, BMI of mother's, month of respondent at first birth and size of child at birth were significantly associated with stunting. The variables sex, mother education, BMI of the mothers and age of respondent at 1st birth were significantly associated with wasting (Table 2). Age in month, sex, mother's education, size of child at birth, place of residence, wealth index, BMI of mother's and number of children were significantly associated with underweight status (Table 2). Odds of being stunted at age groups 6–11, 12–23, 24–35, 36–47, and 48–59 months were 1.03, 2.23, 2.53, 1.97, and 1.54 times higher as compared to age group <6 months. The odds of stunting were 4% lower of female children as compared to males. The children residing in Dhaka were 0.7 times more likely to being stunted as compared to the children from Barisal division. Odds of being stunted were 1.22 and 1.49 times higher for children living in Mymensingh and Sylhet division as compared to children from Barisal division. But children with the Sylhet division were highly associated (OR = 1.49, p-value<0.001) of being stunted. Children with primary, secondary, and higher educated mothers were 21%, 46%, and 77% lower odds of stunting as compared to children whose mothers had no education. In comparison to the poorest households, the odds of a children being stunted was lower in middle (OR = 0.62, p-value = 0.001), richer (OR = 0.55, p-value<0.001), and richest (OR = 0.30, p-value<0.001) households. The children whose mother had not receive prenatal care were 2.08 times more likely to being stunted as compared to their counterparts (OR = 2.08, p-value= 0.058). With the increase of child-size at birth, the odds ratio for stunting decreases. Female children had 19% lower odds of being wasting as compared to males. The odds of wasting were 12% lower in children from Khulna (OR = 0.88, P-value = 0.0.50) as compared to children from Barisal. Children from households of richest wealth index wealth had 33% lower odds of wasting as compared to the children from poorest households (OR=0.67, p-value=0.003), and 21% lower odds of wasting with richer wealth (OR= 0.79, p-value = 0.064). Other key socio-demographic factors for wasting were BMI of mothers normal (OR = 0.55, p-value<0.001), Overweight (OR =0.48, p-value<0.001), Age of respondent at 1st birth (OR = 0.88, p-value<0.001). The odds of being underweight in age 12–23, 24–35, 36–47, and 48–59 months were 1.17, 1.65, 1.62, and 1.57 times higher as compared to children age<6 months. The odds of being underweight was 1% lower of female children as compared to males. For the underweight case, the odds were 1.54 times higher in children living in Sylhet (OR = 1.54, p-value<0.001) as compared to children from Barishal. Odds of being underweight for children whose mother had primary (OR = 0.68, p-value<0.001), secondary (OR = 0.47, p-value< 0.001), and higher (OR = 0.22, p-value<0.001) educated were lower as compared to uneducated mother. The other important significant variables to underweight were wealth index, size of child at birth, BMI of the mothers, age of respondent at 1st birth, sex, place of residence and the number of children. The odds of being underweight were 1.29 times more likely for rural place of residence as compared to urban are. Children whose mother did not receive prenatal care were more likely to have stunted. Children with a smaller size at birth seemed to have stunted and underweight. The BMI of the mothers, mother's education and age of mother's respondent at 1st child birth were seemed to have impacted stunting, wasting, and underweight.

Discussions

In spite of the outstanding achievements of Bangladesh in consistently reducing the malnutrition rates among children through the last few decades through various intervention programs taken by the Government and the development partners, the findings of this study showed that there remains a scope of further improvement in Bangladesh with 30.6% Stunted, 21.6% wasted and around 8.6% underweight children under the age of five in 2017. In this study, age, sex, geographical division, mother's education, wealth index, receiving prenatal care, size of child at birth, mothers of breastfeeding, age of respondent at 1st birth, BMI of mothers and the number of children were significantly associated with child under nutrition status; whereas, age, place of residence, geographical division, and wealth index (richer and richest) significantly associated with childhood underweight. Childhood stunting and underweight dynamically ascended with an increase in age up to the age of 24–35 months. A comparable pattern had been accounted for in various past examinations in developing nations (Victora, De Onis, Hallal, Blössner, & Shrimpton, 2010; Gunaratna, 2016; Marriott, White, Hadden, Davies, & Wallingford, 2012; Adekanmbi, Kayode, & Uthman, 2013). The pattern is clarified when the immune protective impacts of breast milk diminish, children are exposed to contaminated complementary foods and the spread of infectious disease which expands the supplement prerequisites (Kerr, Berti, & Chirwa, 2007; Shrimpton et al., 2001). The prevalence of stunted was increasing from<6 months to 36–47 months and most of the underweight people were ages 24–35 months. These results were consistent with the previous study (Das and Gulshan,2017). The prevalence of overweight was higher in ages<6 months. Feeding higher volumes into the formula in the early earliest stages was related to more noteworthy body weight and overweight in later infancy (Taveras et al., 2009). Sex is considered a risk factor of malnutrition in different studies (Fakir & Khan, 2015; Hien & Kam, 2008). The findings of this study were consistent with the previous studies. Epidemiological proof suggested that biologically boys are to be more vulnerable to morbidity as compared to girls (Hansen Pupp, Hellström-Westas, & Elsmén, 2004; Kilbride & Daily, 1998). In developing countries, rural–urban inequality in child malnutrition remained unchanged over the last decades due to economic hardship, inadequate health facilities, and insufficient education (Das & Gulshan, 2017; Fotso, 2007; Srinivasan, Zanello, & Shankar, 2013). In the present setting of Bangladesh, fast food restaurants and super shops are gaining popularity in the urban areas, filling in as spots for a recreational family gathering (Islam & Ullah, 2010; Nasir & Karakaya, 2014).

Furthermore, with extended urban relocation towards already overcrowded cities, expanded housing and foundations have thickened the open spaces and consequently it reduces the spaces of physical activity (Melby et al., 2017; Reardon et al., 2015; Neupane, Prakash, & Doku, 2016) resulting in higher indoor recreational activities and increased sitting time increased (Goryakin and Suhrcke, 2014).
Being male gender was identified as a risk factor of malnutrition in several studies [20–24] and our study also found that prevalence of malnutrition in male children is slightly higher as compared to the same in females. However, stunting and underweight were not significantly associated with sex.

The prevalence of under nutrition was higher in Sylhet. This could occur due to lower educational status and economic solvency in the Sylhet division compared to the capital, Dhaka (Kabir et al., 2012; Tareque, Begum, & Saito, 2014). The chance of undernourishment increased as the education level increases. Children with illiterate mothers were more likely to be undernourished as compared to their counterparts, consistent with previous findings (Nahar et al., 2010); Urke, Bull, & Mittelmark, 2011). Educated mothers are expected to be more aware of the health, hygiene, and sanitation of their children and consequently can take better health care of the children (Abuya, Ciera, & Kimani-Murage, 2012, Negash, Whiting, Henry, Belachew, & Hailemariam, 2015). The wealth index was negatively associated with undernourishment. However, the odds of being wasting were only significant with the richest family, which corroborates with the literature (Navalpotro et al., 2012). Women from wealthy families have a greater intake of nutrients and remained above underweight status, whereas poor families are unlikely to manage the cost and remain undernourished (Das et al., 2018). Furthermore, the wealthier families tend to consume more processed food, regularly, getting popular in urban Bangladesh, compared to poorer counterparts, which is a change in the traditional dietary intake and gives rise to weight in general (Morgan & Sonnino, 2010; Rahman, 2014). Children whose mother had received prenatal care were expected to have lower odds of malnourished as compared to whose mother had not received prenatal care (Veena et al., 2016; Hamel et al., 2015). The current analysis reached similar conclusions. Poor care of women in pregnancy and childbirth could pose a long-term risk to the health of the child, as well as increasing immediate risks for both the mother and child (Hamel et al., 2015). The odds of being malnourished were higher among children whose size at birth was small as compared to children whose size was large at birth. Previous studies have found that children with low birth weight were a 20% risk of being stunting (Black et al., 2013). Children with low birth weight have a higher chance of being malnourished (Rahman et al., 2016). The low birth weight is associated with a smaller amount of fundamental development supplements; nutrient A, zinc, and iron (Gluckman and Pinal, 2003). Thus, low birth weight babies were more malnourished as compared to high birth weight babies. and in our study also, Mother's BMI is found to have negative association with child malnutrition; this reminds us to not to forget the importance of mother's nutritional status while making policies for lowering or reducing child malnutrition. Because good nutritional status is essential for a mother not only for breastfeeding but also for recovery from physical and possibly emotional stress during pregnancy and after labor in order to cope with raising and caring children.

Wealth index is, as expected [26-29]; negatively associated with malnutrition and odd of being malnourished is substantially high among the poorer groups. This undoubtedly points at the unmet need of policies for poorer groups of people in Bangladesh.

The study also indicated that both the mother's education is significantly associated with nutritional status of their children. Children from illiterate mother or mother with primary education were fifteen to thirty percent more likely to remain stunted or underweight in comparison with their counterparts. This finding was coherent with previous studies held in Bangladesh and other countries [30-35]. This is understandable because educated mothers have greater knowledge regarding the health and nutrition of their children.

Limitation of the Study

This study has some limitations. First, due to the cross-sectional nature of the data, it is impossible to infer a causal relationship between the factors and under nutrition. Second, there are no potential confounders in the survey, such as diet, exercise, and nutritional intake. Finally, qualitative information from mothers can better explain the Bangladeshi context to understand the most vulnerable group of people.

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Conclusion

The nutritional status of children under five years of age is not only a sensitive indicator of the health and nutrition of a country, but can also be considered as a measure of quality of life and development, because it represents the overall intensity of development affected by poverty, low socioeconomic status and prevalence of chronic diseases Influence [37]. Continued research on malnutrition is essential because it reproduces the cumulative results of socioeconomic, health and nutritional deficiencies and can change over time.

The results of this study confirm that some quiet spaces in Bangladesh can improve the nutritional status of children. In order to reduce the burden of child malnutrition, it is absolutely necessary for the government, non-governmental organizations and all sectors of society to work together in a fair manner to improve the nutritional status of children. In addition to ongoing programs to improve children's health, the government may wish to design specific nutrition intervention strategies to better understand target groups to reduce child malnutrition. In addition to confirming that parents have easier access to health information and health education plans, it is also necessary to carry out regular reviews, follow-ups and evaluations, with special attention to vulnerable groups, such as the poorest children or children from urban areas. A healthy mother can give birth to healthy children, so to improve the nutritional status of the child; the early intervention plan should focus not only on the child, but also on the mother. Last but not least, in addition to ongoing plans and efforts by the Bangladeshi government and other development partners, the author also suggests that health and nutrition education should also be an essential part of the entire educational process.

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