Child malnutrition in Bangladesh: an evidence from multiple indicators cluster survey

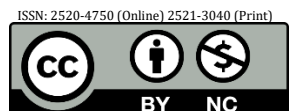**Maymuna Jarin, Krishna Roy Chowdhury, & Rajib Dey**

Abstract

Bangladesh has made significant progress in reducing child malnutrition over the years. However, malnutrition remains a considerable challenge in the country, particularly among children under the age of five years. This study aimed to determine the risk factors involved with child malnutrition (i.e. underweight, stunting and wasting) among children under five in Bangladesh. We examined the potential risk factors of child underweight, stunting and wasting using data based on multiple indicators cluster survey (MICS) conducted in Bangladesh in 2019. The data included 18,696 children (under the age of five years) respectively from 64,400 households. Binary logistic regression models were used to evaluate the potential risk factors associated with malnutrition in children. About 27% of children under age five are stunted (short for their age), 10% are wasted (thin for their height), and 22% are underweight in Bangladesh. The most critical risk factors of child malnutrition in Bangladesh were the mother's education, mother's age at birth, place of residence and wealth quantile.

Keywords: *Malnutrition, MICS, Binary logistic model, Nutrition status, Stunting, Wasting, Underweight.*

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Introduction

Child malnutrition is a critical issue that directly affects the health and well-being of children. Malnourished children are more susceptible to illness, have slower cognitive development, and have a higher mortality risk. Some serious effects of poor nutrition in early childhood are stunting (too short for age), wasting (too thin for height) and being overweight. WHO (2014) reported that about 25% children is stunted due to only lack of nutrition, and consequently, the world has observed more than 2.6 million child deaths every year. In Bangladesh, the prevalence of stunting among children under five years old has been relatively high. According to the Bangladesh Demographic and Health Survey (BDHS) 2017-2018, approximately 36% of children under five were stunted. In Bangladesh, the prevalence of wasting among children under five is also a concern. The BDHS 2017-2018 reported a wasting prevalence of around 14% among children under five. Underweight is a composite measure of both acute and chronic malnutrition. In the BDHS 2017-2018, it was found that around 31% of children under the age of five were underweight. Child malnutrition in Bangladesh is a blend of multiple factors, and the situation may have evolved since 2017-18. Therefore, for the most up-to-date and accurate information, we used data from multiple indicators cluster surveys in 2019

Understanding the extent and causes of child malnutrition in Bangladesh helps identify vulnerable populations and develop effective interventions to save lives and improve children's overall health. The United Nations has set a series of SDGs to address global challenges, including the reduction of child malnutrition. By studying child malnutrition in Bangladesh, policymakers, researchers, and development agencies can monitor progress toward achieving SDG targets and identify areas where additional efforts are needed. Overall, studying child malnutrition in Bangladesh is motivated by the desire to improve the health and well-being of children, achieve sustainable development goals, foster national development, and promote equity and social justice.

Related work section

Child malnutrition is a significant issue in Bangladesh, a developing country in Asia. Extensive literature exists on the determinants of child nutrition status in developing countries, including Bangladesh. The studies based on Chen et al. (1980) and Roy et al. (1983) have highlighted various factors associated with infant and child malnutrition in the country. These factors include low dietary intake, low birth weight, family size, lack of parental education, breastfeeding practices, the incidence of diarrhea, previous birth interval, maternal body mass index (BMI), household economic status, and delayed weaning. Moreover, Bairagi and Chowdhury (1994) have indicated that the sex and birth order of the index child are significant determinants of malnutrition. Socioeconomic factors and diseases have also been found to play a substantial role in child nutrition. Siddique et al. (2011) have demonstrated that malnutrition in Bangladesh is a significant risk factor for childhood mortality. Muaz et al. (2010) has shown higher malnutrition rates in rural and hilly areas compared to urban and metropolitan areas. Gender inequality, stemming from socioeconomic structure, has been identified as a significant differentiating factor in the nutritional status of children. Additionally, Cochrane (1982) has suggested maternal antenatal care-seeking behaviour, and healthcare knowledge are essential determinants of child nutrition status, particularly for infants. The literature reveals that socioeconomic conditions, parental education, healthcare-seeking behaviour, and dietary practices influence child malnutrition in Bangladesh. Understanding these determinants is crucial for developing effective interventions and policies to address child malnutrition and improve the nutritional status of children in Bangladesh.

Methods
Data & Variables
The data for this study were obtained from the Multiple Indicators Cluster Survey (MICS) conducted in 2018-19. The survey was carried out by the Bangladesh Bureau of Statistics (BBS) in collaboration with the United Nations International Children's Emergency Fund (UNICEF). It was conducted between January 19 and June 1, 2019, with the aim of collecting national-level data on key indicators across the eight divisions of the country. A two-stage stratified cluster sampling approach was employed to select the survey sample, utilizing the 2011 census frame for cluster selection. Standardized questionnaires were administered to collect data, ensuring consistency in data collection procedures. The dataset includes comprehensive information from 64,400 households, with questionnaires completed by parents of 23,099 children aged five years and below. To minimize recall bias and avoid duplicating households in the analysis, only the youngest child under the age of five from households with multiple children in that age group was included in the study. Thus, the final sample consisted of 18,696 children under five years of age, whose data from the MICS 2019 were utilized for calculations and analysis.

Response Variable
The indicators stunting, wasting and underweight are used to measure nutritional insufficiency. Stunting measures chronic malnutrition, indicating low height-for-age among children. Wasting is a measure of acute malnutrition, meaning low weight-for-height among children. Underweight is a composite measure of both acute and chronic malnutrition, indicating low weight-for-age among children. Underweight is defined as weight-for-age <-2 standard deviations (SD) of the WHO Child growth standards median. Stunting – height-for-age <-2 SD of the WHO Child growth standards median; Wasting – weight-for-height <-2 SD of the WHO Child growth standards median.

Explanatory variables
To examined the influence of socioeconomic related variables of child malnutrition the following variable are considered- Sex of child, Area, Division, Age in Months, Mother's age at birth, Wealth index quintile, Mother's Education, Ethnicity of household head.

Results
This study was based on the data of 18,696 children under age five who were eligible for height and weight measurements. Complete case analysis for the response variable:

Table 1 Complete case analysis

	Height for age	Weight for age	Weight for height
Complete case	84.77%	84.47%	84.93%
Missing	15.23%	15.53%	15.07%

Complete height-for-age measurements were obtained for 85.77% of eligible children. Similarly, complete weight-for-height measurements were obtained for 84.93% of eligible children and valid weight- for-age measurements were obtained for 84.47% of eligible children. We performed complete case analysis to omit missing values. Finally, 18,696 participants were recruited for the study. Table 2 presents the nutritional status of children aged five years or younger in Bangladesh based on three anthropometric measures. The findings indicate that approximately 27% of children were reported to have stunted growth, indicating a chronic form of malnutrition characterized by low height-for-age. Around 22.1% of children were underweight. Additionally, 10.10% of children were classified as having a "wasting" status, indicating acute malnutrition characterized by low weight-for-height.

Table 2 Distribution of under five children in different categories of malnutrition

	Height for age		Weight for age		Weight for height		
	Normal	Stunting	Normal	Underweight	Normal	Wasting	Total
Total	73%	27%	77.9%	22.1%	89.9%	10.1%	18,696
Sex of child							
Male	72.4%	27.6%	78.1%	21.9%	89.2%	10.8%	9790 (51.61%)
Female	73.6%	26.4%	77.6%	22.4%	90.6%	9.4%	8906 (48.39%)
Area							
Urban	75.8%	24.2%	82.0%	18.0%	90.8%	9.2%	3489 (18.39%)
Rural	72.3%	27.7%	76.9%	23.1%	89.7%	10.3%	15,207 (80.17%)
Division							
Barisal	72.3%	27.7%	77.0%	23.0%	88.9%	11.1%	1732 (9.131%)
Chattogram	73.0%	27.0%	78.2%	21.8%	89.4%	10.6%	3685 (19.43%)
Dhaka	73.3%	26.7%	80.8%	19.2%	91.5%	8.5%	3692 (19.46%)
Khulna	79.2%	20.8%	80.8%	19.2%	90.5%	9.5%	2735 (14.42%)
Mymenshing	67.5%	32.5%	74.5%	25.5%	89.2%	10.8%	1106 (5.831%)
Rajshahi	74.2%	25.8%	77.5%	22.5%	90.3%	9.7%	2075 (10.94%)
Rangpur	72.3%	27.7%	76.9%	23.1%	88.9%	11.1%	2292 (12.08%)
Sylhet	64.1%	35.9%	69.3%	30.7%	88.4%	11.6%	1379 (7.27%)
Children's age (in months)							
0-11	82.4%	17.6%	84.1%	15.9%	90.3%	9.7%	4086 (21.54%)
12-23	70.4%	29.6%	78.1%	21.9%	88.8%	11.2%	4090 (21.56%)
24-35	66.0%	34.0%	74.7%	25.3%	90.5%	9.5%	3771 (19.88%)
36-47	69.9%	30.1%	75.9%	24.1%	90.7%	9.3%	3632 (19.15%)
48-59	76.2%	23.8%	75.4%	24.6%	89.0%	11.0%	3117 (16.43%)
Mother's age at birth (in years)							
<20	71.9%	28.1%	77.1%	22.9%	89.7%	10.3%	11017 (58.08%)
20-34	74.6%	25.4%	79.0%	21.0%	90.2%	9.8%	7641 (40.28%)
35+	65.8%	34.2%	76.3%	23.7%	92.1%	7.9%	38 (0.2%)
Wealth index quintile							
Poorest	63.9%	36.1%	71.3%	28.7%	87.6%	12.4%	4554 (24.01%)
Poorer	70.4%	29.6%	74.7%	25.3%	88.8%	11.2%	4003 (21.1%)
Middle	75.4%	24.6%	78.4%	21.6%	90.2%	9.8%	3613 (19.05%)
Richer	77.8%	22.2%	81.1%	18.9%	91.5%	8.5%	3529 (18.6%)
Richest	81.6%	18.4%	87.6%	12.4%	92.5%	7.5%	2997 (15.8%)
Mother's Education							
Pre-primary or none	61.3%	38.7%	68.3%	31.7%	86.3%	13.7%	1941 (10.23%)
Primary	67.7%	32.3%	73.5%	26.5%	88.5%	11.5%	4496 (23.7%)

Primary Secondary	75.4%	24.6%	79.3%	20.7%	90.3%	9.7%	9351 (49.3%)
Higher secondary	81.2%	18.8%	86.4%	13.6%	93.0%	7.0%	2908 (15.33%)
Ethnicity							
Bengali	73.1%	26.9%	77.8%	22.2%	89.9%	10.1%	18283 (96.38%)
Others	70.0%	30.0%	79.9%	20.1%	90.1%	9.9%	413 (2.177%)

characteristics and the prevalence of child malnutrition. Approximately half of the children (48.39%) were female, and a majority (80.17%) resided in rural areas. About a quarter of the children came from poor families, and 15.33% had mothers with higher education. More than half of the children (56.7%) belonged to households with more than five members, and the majority (96.38%) were from Bengali families. Additionally, 58.08% of the children had mothers aged over 20. The table also presents the prevalence of malnutrition based on child age, maternal education, household wealth status, type of residence, and division. For instance, approximately 34.0% of children in 24-35 months age group were stunted, while 11.2% of children aged 12-23 months were wasted, and 25.3% of children aged 24-35 months were underweight. Among children of uneducated mothers, prevalently stunted, underweight, and wasted rates were 38.7%, 31.7%, and 13.7%, respectively. Children from poorer households had higher rates of stunting (36.1%), wasting (12.4%), and underweight (28.7%). Regarding residence, rural children had rates of 27.7% for stunting, 10.3% for wasting, and 23.1% for underweight. Children from the Sylhet division had rates of 35.9% for stunting, 10.3% for wasting, and 30.7% for underweight. The binary logistic regression model was used to examine the potential candidates of malnutrition under-five children. Female children were six percent less likely to experience stunting, fifteen percent less likely to be wasted, and three percent more likely to be underweight than male children. Children aged 12-23 months, 24-35 months, 36-47 months, and 48-59 months were more likely to be stunted compared to children aged 0-11 months. Similarly, children aged 12-23 months, 24-35 months, 36-47 months, and 48-59 months were likelier to be underweight. Children aged 24-35 months and 12-23 months were less likely to be wasted, while children aged 12-23 months and 48-59 months were more likely to be wasted than children aged 0-5 months.

Children of mothers wirh primary, secondary, or higher levels of education were less likely to be classified as normal children compared to those whose mothers had no education. Similar patterns were observed for wasted and underweight children. Children from households with poorer, middle, richer, and richest economic statuses were less likely to be classified as normal children than those with the poorest economic status. For underweight children, the prevalence was lower among the poorest economic households compared to all other economic statuses. In the case of wasting, children from the poorest economic households had a lower prevalence than those with other economic statuses. Children born to mothers aged 20-35 years were less likely to experience stunting and underweight than those born to mothers younger than 20. Children born to mothers aged 35 years or older were more likely to be underweight and stunted but less likely to be wasted compared to those born to mothers younger than 20 years. Rural children were less likely to be classified as normal than urban children. Similar results were observed for wasted and underweight children. Children from the Chittagong division had higher odds of stunting and underweight compared to those from the Barisal division. Similarly, children from the Sylhet division had a significantly higher risk of stunting and underweight than their counterparts in the Barisal division.

Table 3 Odds ratio (95% CI.) and S. E of different covariates of malnutrition

	Height for age		Weight for age		Weight for height		
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Discussion & Conclusion

The study identified urban residence as a significant factor influencing child malnutrition. It found that women in urban areas were more likely to have formal education compared to those in rural areas. Additionally, urban areas generally have better access to water and sanitation facilities, higher socioeconomic status, and improved child healthcare services, leading to a lower risk of child malnutrition compared to rural areas. Furthermore, the study highlighted the influence of household economic status on child malnutrition. Children from very poor and poor households were at a higher risk of malnutrition than those from households with medium or higher economic status. Economic resources are crucial in reducing food insecurity and enabling adequate care for children, and urban households often have better access to these resources. The education level of the mother was also identified as an essential determinant of child malnutrition. Children of higher-educated mothers had a lower likelihood of malnutrition compared to those of lower-educated mothers. The study also revealed that previous birth intervals and the age of the child (mainly those aged 24-35 months) were significant risk factors for malnutrition. The birth order of children was also found to influence the child's nutritional status.

The study's findings have implications for policy formulation in addressing child malnutrition in Bangladesh. It suggests the need for policies that focus on improving girls' education, particularly beyond the primary level, to enhance mothers' understanding of child nutrition. Additionally, policies targeting rural households, such as social protection programs to increase household resources, could help address the higher risk of malnutrition in rural areas. In summary, the study underscores the impact of urban residence on child malnutrition, with higher levels of malnutrition observed among children living in urban areas compared to rural areas. Factors such as maternal education, household economic status, birth intervals, and child age were significant determinants of child malnutrition. The findings emphasize the importance of targeted policies to improve education, household resources, and social protection to combat child malnutrition in Bangladesh.

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