

Household Food Insufficiency and Child Nutritional Status in Urban Slum, Dhaka, Bangladesh

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ABSTRACT

Introduction: Malnourished children are about 20% in the developing world. Food insecurity is a key risk factor for child malnutrition. Food insufficiency, an extreme form of household food insecurity, can affect physiological mechanisms that are linked to an individual's nutritional status. Food-insufficient children are also more likely to have poorer health status and to experience a range of negative academic and psychosocial outcomes. **Methods:** We administered a cross-sectional socioeconomic survey to 354 households in research site, including a validated food insufficiency measurement questionnaire, and obtained anthropometric measurements from children aged 12 to 24 months. We used chi-square tests to assess the relationship between household food insufficiency and nutritional status of children. **Results:** Average age of study children was 18 months and standard deviation was (± 3.2 months). The status of household food insufficiency was 56%. The prevalence of underweight, stunting and wasting was 24%, 36% and 8% respectively. The household food insufficiency was significantly ($p < 0.05$) associated with underweight and stunting but not with wasting ($p > 0.05$). **Discussion:** The study results indicate that food insufficiency is associated with stunting and underweight but not with wasting in urban slum of Bangladesh. We also found that child malnutrition is associated with mother's education, father's education, monthly family income and people per room.

Keywords: Food insufficiency, Nutritional indicators, Socioeconomic status

INTRODUCTION

Child undernutrition is highly prevalent in low-income and middle-income countries, resulting in substantial increases in mortality and overall disease burden. Stunting, severe wasting, and intrauterine growth restriction together were responsible for 2.2 million deaths for children younger than 5 years.¹

Food insecurity is a key risk factor for child malnutrition. Food insecurity affects human development and health throughout the lifecycle, but can be particularly harmful during critical or vulnerable stages early and late in life.² Based on the 1996 World Food Summit, food security exists "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".³

There are a number of potential negative consequences of household food insecurity and insufficiency. Food insufficiency can affect physiological mechanisms that are linked to an individual's nutritional status.⁴ Food-insecure children had fair or poor health nearly twice as great and being hospitalized since birth almost a third larger than food-secured children. A dose-response relation appeared between fair/poor health status and severity of food insecurity. Food insecurity is associated with health problems for young, low-income children.⁵

The long-term negative health implications of food insufficiency for children include establishing eating patterns based on foods with inferior nutritional quality,⁶ and these patterns contribute to childhood obesity and may socialize children to use similar behavioral patterns in adulthood.⁷ Food-insufficient children are also more likely to have poorer health status and to experience a range of negative academic and psychosocial outcomes.⁸⁻¹⁰

The root of malnutrition in early childhood is complex with a variety of direct and underlying contributors related to lack of food, including insufficient breastfeeding and inadequate complementary foods; protein and

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nutrient loss from respiratory and gastrointestinal infections; chronic immune stimulation due to persistent parasitic intestinal infections; and inadequate water and sanitation.¹¹

METHODS

The study was conducted in a selected urban slum located in Mirpur area in Dhaka city among 354 households having children aged 12 to 24 months. Households were systematically selected from census results before starting data collection. Households were eligible to participate if they were located within the study area. Demographic and SES information were collected by semi-structured questionnaire through face to face interview.

The Ethical Review Committee of State University of Bangladesh has given the approval for the study.

Household Food Insufficiency Measurement

Household food insufficiency measured by this question: Which of the following describes the amount of food your household has to eat: enough to eat, sometimes not enough to eat, or often not enough to eat?¹² In this study, a household was classified as “food insufficient” if the respondent to the family questionnaire reported that the household either “sometimes” or “often” do not get enough food to eat. This single-item measure, which is widely accepted as a valid measure of food insufficiency, is often used in surveys in which it is not feasible to administer a lengthy questionnaire.^{13,14} A recent validation study showed that a single-item measure of food insufficiency have acceptable sensitivity (83%), specificity (80%) and reliability (70%) when compared with the US Department of Agriculture Household Food Security Scale (18 items; considered to be the gold standard in the USA).¹⁵

Anthropometry

Child's weight were measured by electronic or beam scales, which are precise to 10 g (UNICEF Uni-scale; SECA GmbH & Co., Hamburg, Germany). Locally manufactured, collapsible length boards, which were precise to 1 mm, were used to measure recumbent length for child. Weight and Height was converted to Z-scores – weight-for-age Z-score (WAZ), Height -for-age Z-score (HAZ), weight-for-height Z-score (WHZ) – according to the 2011 WHO child growth standards.¹⁶ We defined underweight, stunting and wasting as a WAZ, HAZ and WHZ that were two standard deviations below the WHO standard, respectively.

Data Analysis

Statistical analysis was performed by using window based computer software devised with Statistical Packages for

Social Sciences (SPSS-17). Assessment of nutritional status by weight for age Z score and height for age Z score was examined using Z score cut off point referred by WHO.¹⁶ We used chi-square tests to assess the relationship between household food insufficiency and nutritional status of children. Probability value <0.05 was considered as level of significance.

RESULTS

We surveyed a total of 354 households. The demographic characteristics and socioeconomic characteristics of the study sample are below (Table 1). Mean age of study children was 18.2 months and standard deviation was ± 3.2 months. Mean age of child's mother was 25 years (SD: 4.6). Mean number of children in a family was 1.9 (SD: 4.6). 87.3% children were continuing breast feeding. About 70% mothers were housewife and their mean level of education was just 5.6 years (SD: 3.7). Nuclear type of family was 65%. Highly improved water and sanitation system was present improved according to WHO standards.¹⁷

Household Food Insufficiency

Of the 354 respondents, 56.2% reported that their households were food insufficient and 43.8 % households were food sufficient.

Nutritional Indicators

About 24% children were underweight and 76% children were normal weight (Figure 1). Approximately 36% children were stunted and 64% children were not stunted (Figure 2). 8% children were wasted and 92% children were not wasted in this study (Figure 3).

Table 1: Selected household characteristics (n=354)

Characteristics	Mean/percentage	SD
Age (month)	18.2	3.2
Mother's age (year)	25.3	4.6
Total children in family	1.9	1.1
Living period in present HH	3.8	5.4
People per room	3.8	1.3
Mean maternal education (years)	5.6	3.7
Mean father education (years)	6.7	
Mother's occupation (house wife)	69.8	
Family type (nuclear)	64.7	-
Monthly family income (BDT)	15800	13090
Monthly family expenditure (BDT)	13600	9475
Breast feeding Brest feeding continue	87.3	-
Hygiene indicators		
Improved water source (%)	100	
Improved sanitation (%)	98.6	-
Food insufficiency		
Food sufficient (%)	43.8	
Food insufficient (%)	56.2	-

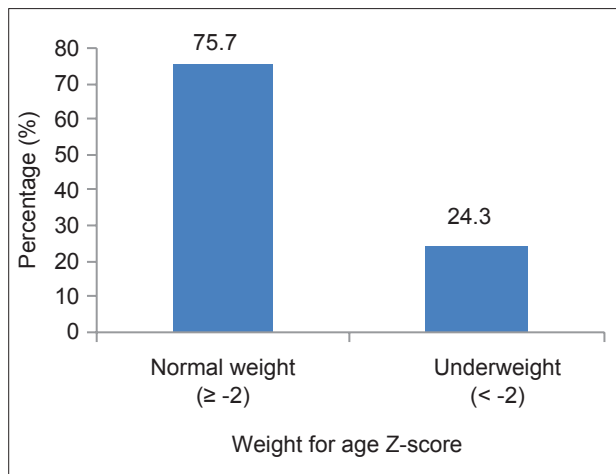


Figure 1: Distribution of respondents by WAZ

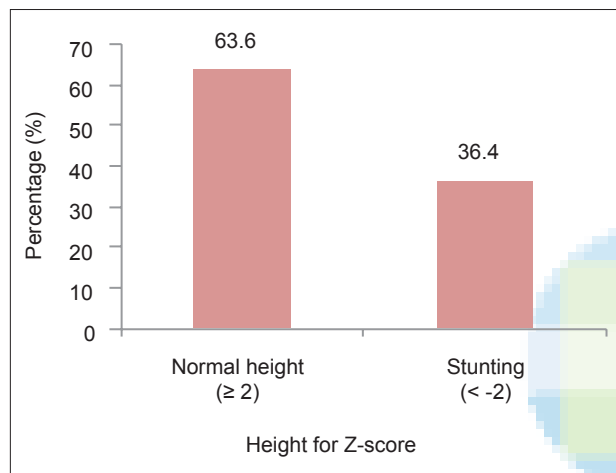


Figure 2: Distribution of respondents by HAZ

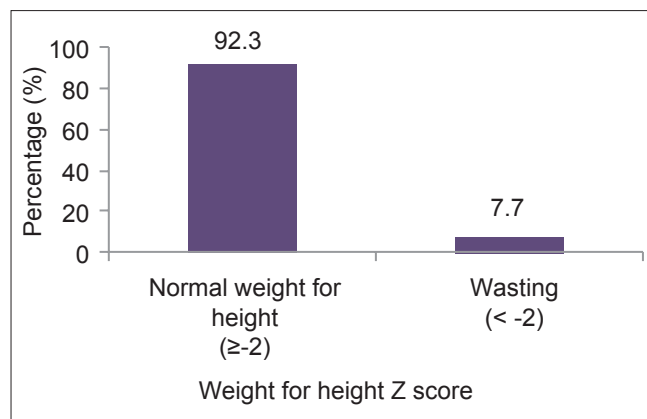


Figure 3: Distribution of respondents by WHZ

Association Between Food Insufficiency and nutritional Indicators

After adjusting for the effects of demographic and socioeconomic characteristics, household food insufficiency was found to be associated ($p < 0.05$) with underweight and stunting but not with wasting ($p > 0.05$) shown in

Table 2. Those who were food insufficient, they were more underweight (30.2%) than those who were in food sufficient (16.8%). In the same way, stunting were more prevalent (44.2%) in food insufficient group than that of (26.5%) food sufficient group (Table 2).

Additionally, mother education, father education, monthly family income and people per room were significant associated ($p < 0.05$) with underweight and stunting (Table 3).

DISCUSSION

The present study results are almost two third people of the slum reported that their households were food-insufficient. High rates of food insecurity and food insufficiency have been reported in Tanzania.¹⁸⁻²⁰ A recent study conducted in rural Ethiopia found that 33% of respondents were food-insecure.²¹ Even in USA a recent survey found that 14.5 percent households were food insecure²² and children were food insecure at times in 10.0 percent of households.

More than one third children were stunted in the present study. On the other hand about one fourth children were underweight and one tenth children were wasted. In a study conducted in eight countries including Bangladesh the prevalence of stunting are 42% aged 24 months to 60 months in the same socioeconomic condition.²³ Another study revealed that 16% of the children were severely stunted and 25% were moderately stunted.²⁴ Among the children under five years of age 3% were severely wasted and 14% were moderately wasted. Furthermore, 11% of the children were severely underweight and 28% were moderately underweight. Our findings on the epidemiology of growth faltering are consistent with the literature. In India, stunting was observed in 53% of children, underweight in 60% and wasting in 28% of children.²⁵ 13.8% were underweight, 30.8% were stunted and 10.0% were wasted.²⁶ These two studies have reported higher prevalence of stunting than wasting within populations.

In this study, we found that household food insufficiency was associated with a statistically significant ($P < 0.05$) of children's HAZ and WAZ after adjusting for sociodemographic factors. Proportions of underweight and stunting were significantly ($P < 0.05$) lower in food-sufficient households. A study in Pakistan²⁷ revealed that households that were food insecure with hunger were also three times more likely than other households to have a stunted child. In black South African farm workers about half of the children were underweight, stunted or wasted when the household were food insecure.²⁸ On the other hand, household food insecurity was associated with

Table 2: Association between household food insufficiency and nutritional indicators (n=354)

Food insufficiency categories	N	% of underweight (WAZ<-2)	p value [^]	% of stunted (HAZ<-2)	p value [^]	% of wasting (WHZ<-2)	p value [^]
Food sufficient	155	16.8	0.004	26.5	0.001	5.8	0.255
Food insufficient	199	30.2		44.2		9.0	

[^]p values reflect results of chi-square test**Table 3: Association between socioeconomic status and nutritional indicators (n=354)**

	N	% of underweight (WAZ<-2)	p value [^]	% of stunted (HAZ<-2)	p value [^]	% of food insufficiency	p value [^]
Mother education							
Up to primary	222	28.8	0.01	45.0	0.0001	64.4	0.0001
Above primary	132	16.7		22.0		42.4	
Father education							
Up to primary	180	30.0	0.01	47.2	0.0001	68.3	0.0001
Above primary	174	18.4		25.3		43.7	
Monthly family income							
≤15000 BDT	246	29.7	0.0001	42.3	0.001	71.1	0.0001
>15000 BDT	108	12.0		23.1		22.2	
People per room							
≤2.5	57	8.8	0.003	17.5	0.001	68.3	0.0001
>2.5	297	27.3		40.1		43.7	

[^]p values reflect results of chi-square tests

obesity among urban children in Korea.²⁹ Household food insecurity was negatively associated with wasting among Brazilian children 0-60 months.³⁰ It is not surprising that household food insufficiency was associated with poorer growth of these Bangladeshi young children in such a resource-poor environment. The association between household food insufficiency and nutritional status of children has not been studied well even in developed countries, much less in developing countries.

In this study we found that sociodemographic profile of food-insufficient households differed considerably from the profile of food-sufficient households. In particular, mother's education, father's education, father's occupation, monthly family income were significantly associated ($p<0.05$) with household food insufficiency. Lack of mother and father's formal schooling, lower family income were also significantly associated ($p<0.05$) with stunting and underweight. Some other studies also show that low socio demographic status i.e., father's education, mothers' education level, family income, toilet facilities, child's age, birth order of children and wealth index were also important determinants of children's nutritional status.^{24,31-33}

The relationship between food insufficiency and nutritional status has implications for improving child health status in Bangladesh. Malnutrition and other associated factors are a common source of considerable morbidity and mortality of children. If food insufficiency is a contributing or causal factor in malnutrition, preventing it might reduce the

stunting or underweight and other associated diseases. We should take necessary steps to ensure food sufficiency of these poor slum households to prevent highly prevalent undernutrition in this population and in similar settings elsewhere in the world. We also need to increase the awareness for the improvement of socio-economic condition of the slum people.

Several limitations of this study must be considered when interpreting these findings. First, although our theoretical perspective suggests the hypothesis that food insufficiency leads to malnutrition, it must be emphasized that the cross-sectional nature of this study do not allow us to state the identified associated factors as definite causally related risk factors. The study was not designed to assess the important role of seasonality in household food insufficiency. We also did not measure the genetics related information and also the access to prenatal and child health services.

Nevertheless, these data are the first in Bangladesh or in south Asia to describe the association between food insufficiency and child nutritional status of the most vulnerable population in a low or middle income country. These findings suggest that secure access to food may have impacts on child nutritional status. These findings also that this single-item measure of household food insufficiency is useful for the survey to screen for child malnutrition in settings where data are not available. Further research is warranted on approaches to expanding this household food insufficiency measure to more effectively capture factors associated with wasting.

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