



RESEARCH PAPER

Factors Influencing Household Food Security and Nutritional Well-being in Primary School Children of Bangladesh

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ABSTRACT

As there was a lack of empirical evidence in the Barishal division food security data, the present study was carried out to investigate the influence of socio-economic factors on food and nutritional security of primary school children in rural and urban areas of Barishal district in Bangladesh. A convenience sampling technique was used to collect 300 respondents for the study. A structured questionnaire was administered through individual interviews with the guardians of the primary school-going children. The results revealed that 64.8% and 74.0% of the respondents were food secure in rural and urban areas, respectively. On the other hand, 2.1% and 1.9% were suffering severe food insecurity in rural and urban areas. According to body mass index (BMI), 42.5% and 42.1% of the sample respondent's children were in the normal weight group, and 40.0% and 50.7% of the sample respondent's children were underweight in urban and rural areas respectively. Food security was significantly associated with education level, family income, housing condition, and academic achievement. On the contrary, the difference between boys and girls, household size, and BMI were negatively associated with food security. Governmental efforts, food security knowledge, and nutrition education may reduce food insecurity and improve household food and nutritional status of the study area.

Keywords: Food security, Nutrition, Socio-demographic factors, Primary School, Children

Introduction

Food is recognized as a basic human right, and lack of or inadequate food consumption has serious implications for general health and well-being, growth, development and cognitive ability among children and labor productivity (Von Grebmer *et al.*, 2016). Maintaining food security at the household level and country level is still a major challenge for Bangladesh (Wheeler & Von Braun, 2013).

According to the FAO (2007) food security “when people at all times have physical and economic access safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. There

are three important interlinked components of food security: availability, access and utilization. Therefore, a household is food secure in a given time period if it has enough food to provide its members all the usual meals in a day for the entire period. Otherwise, the household is food insecure. The capacity to recognize vulnerable households is a prerequisite for ensuring sufficient food security. An individual's exposure to risk factors and their capacity to handle or endure stressful situations determine how vulnerable a person, household, or group of people is. Since children are the most valuable asset of a nation, their welfare and health is the edifice of

sound and sustainable economic development (Zakari *et al.*, 2014). In Bangladesh, child malnutrition is a serious public health issue. Various studies have highlighted the factors involved. Different studies focused on socioeconomic inequality resulting in malnutrition (Babar *et al.*, 2010). Many socioeconomic status indicators assess distinct dimensions of a family's position rather than measuring the same underlying construct (Cassedy *et al.*, 2013). An individual primary school-going child's nutritional level is determined by a number of factors faced directly or indirectly such as their parents' income, occupation, food availability, food consumption pattern, purchasing power of the parents, intra-household food distribution, level of nutritional knowledge, literacy, availability of government schemes and awareness.

Bangladesh's food security situation has improved, particularly in terms of availability. However, more progress is still needed in terms of access and utilization, which are essential for long-term food security. Thus, according to BBS (2018) per capita calorie intake is 2,393 kilocalories (kcal) per day, which was comfortably higher than the estimated minimum requirement of 2,122 kcal per day. People's access to food has improved in addition to its availability, even for those in the lower socioeconomic groups. The Bangladesh Bureau of Statistics (BBS) has claimed in the Household Income and Expenditure Survey - 2022 that the overall poverty rate dropped from 24.3 percent in 2016 to 18.7 percent in 2022, (BSS, 2022). However, the Barisal division of Bangladesh has been marked as economically unstable. Though Bangladesh has made significant progress in tackling undernutrition over the last two decades, there is a chance to find a high prevalence of food-insecure people in this area. To contribute to this point, this study is designed to carry out the factors associated with its prevalence, particularly in this division. As this study was carry out the household and food security status among school-going children, policymakers and researchers can develop new policies to reduce this issue significantly at the root level.

Child Nutrition and Health Profile of Study Area

According to the results of Child Well-being Survey 2016 (CWS 2016) in Urban Areas of Bangladesh, prevalence of stunting (moderate or severe) among urban children age below five of Barishal division was quite high at 25.6 percent. Nearly one in ten (8.2 percent) of urban under-5 children of Barisal division were moderately or severely wasting. Overweight prevalence among under-5 urban children was recorded at 2.0% in Barishal division, against 2.7% the national estimate. Results also showed that 18.7% of urban children aged below five years were either moderately or severely underweight. About 70.8% of children age 6-23 months of Barishal division was fed the minimum required number of times. Less than half (45.3%) had received minimum acceptable diet. Above the finding indicates the malnutrition and poor food diversity problems of children in barishal district. Considering the above facts, this study was conducted to find the impact of socio-economic factors on nutritional status of primary school children in rural and urban areas of Barishal; and compare the food security level in rural and urban areas of Barishal. The aim of the study was to investigate the

Household Food Security and Nutritional Well-being of Bangladesh factors associated with household food and nutritional security among the school going children of Bangladesh.

Materials and methods

Description of the Study Area

The survey was conducted in the district of Barishal, Southern part of Bangladesh beside the river of Kirtankhala. The Barishal district lies between longitude 90.367' 00'' and 90.22'00'' and latitude 22. 42' 00'' and 22.700' 00''. It has a total population of over 9.100 million inhabitants and a total land mass of 13.225 km² (BBS, 2022). Different large and small rivers passed through this district like Tentulia, Bishkhali, kaliganga, haringhata, Burisshwar, agunmukha, galachipa, etc. Average literacy rate is 55.09%; male 56.47%, female 55.63%. Their main source of income is agriculture 54.72%, non-agricultural labourer 4.97%, commerce 15.42%, and others.

Study Design

A cross-sectional study was carried out to investigate and describe the nutritional status of primary school children, their household food security level between rural and urban areas, and the nutritional knowledge of participating children. A total of ten primary schools were randomly selected by a lottery method from rural and urban areas of the Barishal district. Then, from each selected school, students were selected by convenience sampling method due to budget constraints. The inclusion criteria were students from class 1 to class 5 who were attending the school during the study period.

Study Population

Based on statistical relevance, a sample size of 400 was targeted and collected, as the minimum requirement was 383 respondent (95% CI and 50% school-going population proportion), 5 from the urban school and 5 from the rural school in category-I: class 1, category- II: class 2 and category-III: class 3, category- IV: class 4, category- V: class 5 and their household. The method of sampling used in this study was convenience sampling due to budget constraints. Although requiring considerably less effort, one limitation of this method was that it may not be a full representation of the entire population. A total of 300 data were retained after data wrangling, which was the final study sample.

Study Materials

For data collection, a well-organized survey questionnaire was used as the main material. The questionnaire was used in local languages (Bangla) and consisted of different items on demographic information, basic information of the children, class activity, child nutrition status, food availability, food accessibility, food utilization. Data was collected from all level of household including illiterate, literate, higher educated etc. The demographic information consists of gender, age, location, educational level, profession, and family income. The basic information of the children section was designed to evaluate age, sex, studying class, class attendance, result, co-curricular activity etc. Other sections were also designed to assess children's height, weight, MUAC, BMI.

Data Collection

The survey was conducted using one-on-one structured interviews to administer the questionnaire. The survey gathered qualitative data pertaining to the nutritional status

of primary children, socio economic condition of their parents and food security level at their household. Food insecurity in households was assessed using a scale that included most food and never experiencing it, occasionally experiencing it, frequently experiencing it, and always experiencing it, indicating chronic hunger. The scale also took sustainability, accessibility, and utilization into account. A few numbers of households were absent and some cases household head or housewife refused to interview and finally, a few number of questionnaire found to incomplete information. Thus, out of 330 target households, 300 completed questionnaires were taken for analysis.

Measurement

The six-item short form of questions were: (i) elderly people often or sometimes relied on a few kinds of low-cost food or imbalanced meal because they were running out of money to buy food; (ii) the elderly were not eating enough because they just couldn't afford enough food; (iii) they cut the size of meals because there was not enough money for food; (iv) they were skipping meal once or twice in most of the days; (v) they were hungry but they couldn't afford more food; and (vi) elderly were not eating for whole day. Each question had four response options: never, rarely, sometimes and often, which were coded in order of increasing frequency from 0-3. An elderly was classified as food insecure if the household head or elderly reported experiencing any of the six conditions within the recall period (i.e. if the answer to any of the questions was rarely, sometimes or often), otherwise he or she was classified as food secure.

BMI and MUAC measurement

Body mass index (BMI) was calculated using the following formula:

$$\text{Body mass index} = \frac{\text{Weight (kg)}}{(\text{Height (m)})^2}$$

It was categorized according to WHO: BMI is classified in four categories, there are underweight (<18.5), Normal weight (18.5-24.9), Overweight (25-29.9) and Obese (30-34.9). Mid Upper Arm Circumference (MUAC) was measured with standard MUAC tape.

Table 1: Socio economic characteristic of the respondents

Characteristics	Rural			Urban		
	Frequency	%	P value	Frequency	%	P value
Age	N=140		0.17	N=160		0.22
20-29	75	53.58		71	44.38	
30-39	59	42.14		82	51.25	
40-49	3	2.14		4	2.50	
50-59	3	2.14		3	1.88	
Marital status	N=140		0.10	N=160		0.11
Married	137	97.85		157	98.12	
Divorced	2	1.43		2	1.25	
Widow	1	0.72		1	0.63	
Occupation	N=140		0.24	N=160		0.19
House wife	139	99.29		154	95.00	
Job holder	1	0.72		4	2.50	
Business	0	0.00		2	1.25	
Education	N=140		0.02*	N=160		0.04*
Illiterate	3	2.15		3	1.87	
Under primary	42	30.00		27	16.87	

Ethical Considerations

First, the researcher gave the respondents the clearest explanation of the research's purpose and gave them the assurance that their participation was entirely voluntary and unaffected by threats or other forms of coercion. Data were collected anonymously and consent was taken.

Statistical analysis

Percentage, mean and standard deviation (SD) were calculated for all quantitative parameters. To ascertain whether there was a significant relationship between two nominal (categorical) variables, the chi-square test was used. After that, a model regression was carried out to find out the associated factors. A P-value of 5% is considered to be statistically significant. The statistical package SPSS 16 is used for data analysis.

Results and discussion

Socio economic characteristic of the respondents

There was variation in age of respondents of the present study. In rural area 53.58% of the respondents were in the age group of 20-29 years. In urban area 44.35% of the respondents were in the same age group (Table 1). In rural area 42.14% and in urban area 51.25% of respondents were in the age group of 30-39 years, while 2.14% and 2.50% of respondents were in the age group of 40-49 years in rural and urban areas respectively. Furthermore, in rural area 2.14% and in urban area 1.88% of the respondents were in the age group of 50-59 years. It was evident from Table 1 that there was small variation in marital status of the respondents of the present study. In rural area 97.85% of respondents were married. On the other hand, in urban area 98.12% of respondents were married. In rural area 1.43% of respondents were divorcee and 0.72% of respondents were widow. In the urban area 1.25% and 0.63% of respondents were divorcee and widow, respectively. This implies that the majority of the respondents had an additional responsibilities to their spouses and children.

Primary	65	46.43	50	31.25
Up to secondary	22	15.71	34	21.25
Up to higher secondary	5	3.57	21	13.12
graduate and above	3	2.14	25	15.64
Religion	N=140	0.44	N=160	0.52
Muslim	134	95.71	152	95
Hindu	6	4.29	8	5
Christian				
Buddhist				
Gender	N=140	0.06	N=160	0.07
Male	0	0	1	0.63
Female	140	100	159	99.37
Household size	N=140	5.22	N=160	4.47
3-5	88	62.86	138	86.25
6-8	48	34.28	17	10.62
9-11	4	2.85	2	1.25
12-14			3	1.88
	N=140	15,882	0.02*	26,798
Family income				
Ultra poor (> 9,615tk)	11	7.86	19	11.87
Poor (< 9,615tk)	121	86.43	81	50.62
Middle (< 37,323tk)	8	5.71	49	30.63
Rich (< 86,612tk)			11	6.88

*significant at 5% level.

In the present study, 99.29% and 95.00% of respondents were housewives in rural and urban areas, respectively (Table 1). On the other hand, 0.72% of respondents were service holder in the rural area. While the percentage of the service holder and businesswomen were 2.50% and 1.25% in urban areas, respectively.

Table 1 indicates that, around 2.15% and 1.87% of respondents were illiterate, about 30.0% and 16.87% of respondents were to the education level under primary, nearly 46.43% and 31.25% of the selected respondents were completed primary education, about 15.71% and 21.25% were educated up to secondary, and just about 3.57% and 13.12% belong to the level up to higher secondary. In addition, around 2.14% and 15.64% of respondents were graduate and above, in rural and urban areas, respectively. This showed that the majority of respondents were literate which might enhance the food security status literate while might enhance the food security status adoption of improved family care practices. The results indicate that, in the rural area 95.71% of respondents were Muslim. In urban area 95.00% of respondents were Muslim. On the other hand, 4.29% and 5.00% of the respondents were Hindu in rural and urban areas, respectively.

Household size refers to the total number of individuals, regardless of sex, living together and sharing meals under the administration of a single family head. Household size was found to be varied in the study area with the total number of members within a household as low as 3 persons to as high as 14 persons. It can be

seen from Table 1 that, average family size of respondents was 5.22 and 4.47 in rural and urban areas, respectively.

Monthly income of the family is an important factor that influences the food security of the family. It was evident from Table 1 that, there was variation in monthly family income of the respondents of the present study. In rural area, the average monthly income of the respondents was 15,882 BDT. On the other hand, 26,798 BDT was the average monthly income in urban areas. The result showed that maximum 86.43% and 50.62% of the respondents fell within the range of 9,615tk- 30,000 BDT in rural and urban areas, respectively, which was categorized in poor. On the other hand, 5.71% and 30.63% of the respondents were in the Middle-income category in rural and urban areas, respectively. In addition, in the urban area 6.88% of the respondents were rich (< 86,612 BDT).

Source of household income

Table 2 represents the primary source of household income in the rural area was farming (41.43%). On the other hand, in urban areas very few (5.00%) households were engaged with farming (Table 2). Sometimes household food production plays an important role in food security. But maximum 43.12% of the households in urban area lead their lives through services, whereas in rural area 14.29% of respondents lead their lives through services. In addition, 19.29% and 30% of households were engaged with business in rural and urban areas, respectively.

Table 2: Source of household income & categories of house of the respondents

Category	Rural		Urban	
	Frequency	%	Frequency	%
	N=140		N=160	
Farming	58	41.43	8	5.00
Service	20	14.29	69	43.12
Business	27	19.29	48	30
Others	13	9.29	11	6.87
Farming + Service	4	2.86	9	5.63
Farming + Business	10	7.13	13	8.13
farming + Others	8	5.71	2	1.25
Building house	24	17.14	107	66.88
Non- building house	85	60.71	46	28.75
Semi-tilled house	31	22.15	7	4.37

Categories of house

Table 2 showed that 60.71% of respondents were living in the non-building house with their families in rural areas. In contrary, 66.88% of respondents were live in building house in urban areas. On the other hand, 22.15% and 4.37% of respondents were living in the semi-tilled house in rural and urban areas, respectively. In addition, 28.75% of respondents were living in the non-building house in rural and urban areas, respectively.

Basic information of the children

Table 3 showed that, in rural area 46.10% of the respondent's children were in the age group of 10-11 years old. On the other hand, in urban area 23.75% of respondent's children were in the same age group. In rural area 2.14% and in urban 1.87% of selected respondent's children were in the age group of 4-5 years, again 17.85% and 45.63% of respondent's children were in the age group of 6-7 years in rural and urban areas,

Table 3: Basic Information of the children

Characteristics	Rural			Urban		
	Frequency	%	<i>P</i> value	Frequency	%	<i>P</i> value
Age	N=140		0.38	N=160		0.30
4-5	3	2.14		3	1.87	
6-7	25	17.85		73	45.63	
8-9	44	31.43		42	26.25	
10-11	65	46.10		38	23.75	
12-13	3	2.15		4	2.50	
Gender	N=140		0.16	N=160		0.17
Boys	65	46.43		75	46.87	
Girls	75	53.57		85	53.13	
Class			0.22			0.29
1	28	20		28	20	
2	28	20		28	20	
3	28	20		28	20	
4	28	20		28	20	
5	28	20		28	20	
Father's occupation						
Service holder	20	14.29		22	13.75	

respectively. Furthermore, in rural 31.43% and in urban 26.25% of respondent's children were in the age group of 8-9 years. This result indicates that, in rural area the maximum children had taken from in the age group of 10-11years, whereas in urban area maximum children had taken from in the age group of 6-7 years. Almost 54% of the children were girl in both areas. In contrary, 46.42% and 46.87% of the children were boy in rural and urban areas, respectively.

There was variation in father's occupation of selected children of the present study. In rural area, 41.42% of children's fathers were farmer. Furthermore, 14.29% and 11.43% of children's fathers were service holder and government employee, respectively. On the other hand, in urban area 33.12% of children's fathers were engage in different income generating activity (IGA). Moreover, 30% and 20.63% of children's fathers were private employee and government employee, respectively.

Govt. employee	16	11.43		33	20.63	
Private employee	9	6.43	0.09	48	30.00	0.07
Others IGA	37	26.43		53	33.12	
Grower/Farmer	58	41.42		4	2.5	

Academic achievement of the children

In the present study, the percentage of class attendance of selected children was lower in rural area compared to urban area. Urban areas children performed better academic result than rural areas. Nearly 30% and 38.12% of the students performed very good result in rural and urban areas, respectively. On the other hand, 51.43% and 53.75% of the students performed standard result, and 17.86% and 8.13% of the students performed poor result in rural and urban areas respectively (Table 4). The

percentage of co-curricular activity was lower in urban compared to rural area. Rural children performed better co-curricular activity than urban children. 39.29% and 36.88% of the students performed very good co-curricular activity in rural and urban areas respectively (Table 4). Again 50.71% and 45.62% of students performed standard co-curricular activity in rural and urban areas, respectively. Furthermore, 10% and 17.50% of the students performed poor co-curricular activity in rural and urban areas, respectively.

Table 4: Academic achievement of children

Characteristics	Rural			Urban		
	Frequency	%	P value	Frequency	%	P value
Class attendance						
Very good	80	57.14	0.03*	99	61.87	0.01*
Standard	47	33.57		47	29.38	
Poor	13	9.29		14	8.75	
Class result						
Very good	43	30.71		61	38.12	
Standard	72	51.43	0.02*	86	53.75	0.03*
Poor	25	17.86		13	8.13	
Co-curricular activity						
Very good	55	39.29	0.05*	59	36.88	0.04*
Standard	71	50.71		73	45.62	
Poor	14	10.00		28	17.50	

Nutritional security of children

In this study, children's nutrition security was decided by body mass index (BMI) and mid-upper arm circumference (MUAC). In the present study area, 40.00% and 50.71% of sample respondent's children were underweight in urban and rural areas, respectively. On the other hand, 42.50% and 42.14% of sample respondent's children were in the normal weight group, 15.00% and 5.71% in the overweight group and 2.5% and 1.42% in the obese group in urban and rural areas, respectively (Table 5). Here MUAC was classified into

four categories these are Normal (>13.5), Risk (12.5-13.4), under nutrition (11.5-12.4) and severe malnutrition (<11.5). Results present in Table 5 indicate that 32.50% and 35.72% of the children were in the risk group, around 44.37% and 41.42% of children belonged to the normal category, 6.87% and 13.57% of the selected children were under nutrition in urban and rural areas, respectively. In addition, very low percentage (0.62% and 2.14%) of children belonged to the severe malnutrition in urban and rural area, respectively.

Table 5: Nutritional security of children

Characteristics	Urban		Rural	
	Frequency	%	Frequency	%
BMI				
	N=160		N=140	
Underweight (<18.5)	64	40.00	71	50.71
Normal weight (18.5-24.9)	68	42.50	59	42.14
Overweight (25-29.9)	24	15.00	8	5.71
Obese (30-34.9)	4	2.50	2	1.42
MUAC (cm)				
Normal (>13.5)	71	44.37	58	41.42
Risk (12.5-13.4)	52	32.50	50	35.72
Under nutrition (11.5-12.4)	11	6.87	19	13.57
Severe malnutrition (<11.5)	1	0.62	3	2.14

Food security status

The Present study revealed that 64.8% and 74.0% of the respondents were food secure in rural and urban respectively. 21.0% and 15.1% were food insecure; 12.1% and 9.10% were moderate food insecure, 2.10% and 1.90% were severe food insecure in rural and urban respectively. A food secures household experiences none of the food

Household Food Security and Nutritional Well-being of Bangladesh security conditions. A moderately food secure household sacrifices more frequently by eating a monotonous diet but does not experience any of the three most severe conditions. A severe food-insecure household has started cutting back on meal size, running out of food and going to bed.

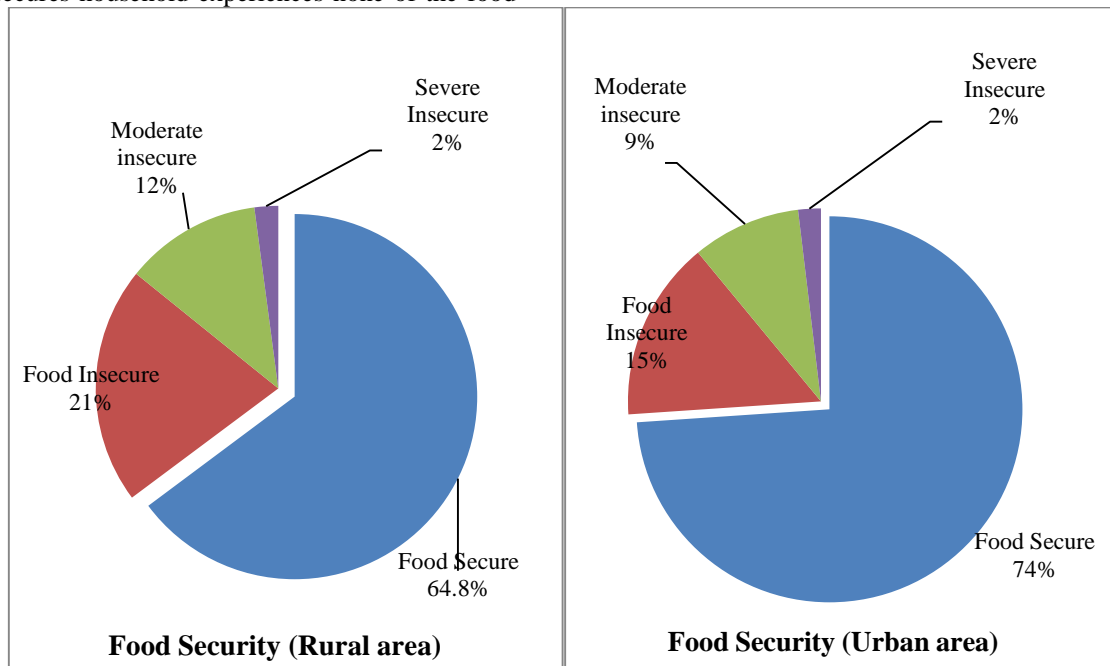


Figure 1: Food security status of rural and urban areas

Based on HFIAS, Jakaria *et al.* (2015) found that only 12.50% households were food secure, 17.50% households were mildly food insecure, 19.17% households were moderately food insecure and 50.83% households were severely food insecure in the slums of Rajshahi City Corporation in Bangladesh. Mannaf and Uddin (2012) found that, 20 (33.33%) households were found to be food in secured while the rest 40 (66.67%) households were food secured households among the maize growing rural households of Bogra district. Similar result observed by Okwoche and Benjamin (2012) with 67.5% food secure and 32.5% food insecure in Nigerian rural farmers, and Iorlamen *et al.* (2013), 67.3% food secure and 32.7% food insecure. Abu and Soom (2016) found that majority of the rural households (53.3%) and urban (62.2%) households. Only 46.7% and 37.8% of the rural and urban households were food insecure. The results of this study are in congruent with the findings of Babatunde *et al.* (2007) with 62.8% food insecure and 37.2% food secure in farming households in Nigeria, Arene and Anyaeji (2010) with 60% food

insecure and 40% food secure in Enugu State of Nigeria and Kuwenyi *et al.* (2014) which came up with result that had 51.7% food insecure and 48.3% food secure households in rural households in Swaziland. Yadegari *et al.* (2017) 30.9% and 69.1% had food insecurity and complete food security, respectively in Italian pregnant women. Payab *et al.* (2012) estimated that the prevalence of food insecurity among families of primary school students in Shahrerei to be 50.2% in 2010. Another study reported the prevalence of food insecurity as 32.4% and food security as 76.6% among women in Bangladesh (Rahman *et al.*, 2013).

Factors associated with food security

The result of logistic regression showed that the model was suitable for explaining the determinants of the food security status of farm household. Socio-economic status, including education, household income, housing condition were positively associated with food security while, household size, difference between boys and girls, and BMI were negatively associated with food security.

Table 6: Estimates of the logistic regression of factors associated with food security level

Variable	Coefficient	Odds ratio	Level of Significance
Household size	-0.480	1.614	0.047*
Education	0.002	0.999	0.030*
Family income	0.002	1.014	0.036*
Housing condition	0.002	1.002	0.020*
Difference between boys and girls	-0.470	1.671	0.025*
Academic achievement	0.712	2.011	0.001**
BMI	-0.314	0.730	0.028*

Note: ** significant at 1% level, * significant at 5% level.

In the present study, household size was negatively associated with food security level. Hence, the increase

in household size would lead to a decrease in the food security status of the household. This result was

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expected because the increase in the member of household means more people are eating from the same resources, hence, the household members may not be able to take enough food when compared to a situation with smaller household size, thus increasing the probability of the household to be food insecure. The Similar result observed by Babatunde *et al.* (2007), Seid (2007) and Oluyole *et al.* (2009). Another study found that higher family size was strongly associated with food insecurity in rural Bangladesh (Quddus and Bauer, 2014). On the other hand, Yadegari *et al.* (2017) found no significant correlation was obtained between food security and family size of the participants. The result implies that families with small household size are more food secure than those with large household size. This was because the increase in members of the household added more responsibilities to household heads especially when many of the family members depend totally on the household head.

In the present study, the education level was positive and significant at 5 % level with food security. A general trend of decrease in food insecurity as the education level of household was increasing observed by Faridi & Wadood (2010), Quddus and Bauer (2014) in rural Bangladesh. Rahman *et al.* (2012) found that education affects food security status of a household through two distinct routes: through its positive effect on income, it raises food accessibility, and through the improvement of knowledge about the requirements of various types of food. Njoku (1991) observed that formal education has a positive impact on food security. This was because education enhances understanding and adoption of improved technology which will rapidly increase food production and increase the probability of a household being food secure. This study also agreed with the findings of Ribar and Hamrick (2003) which revealed that an increase in the number of years in educational attainment will increase the probability of households being food secure. Moreover, poor education level leads to reduced nutrition literacy and affects all stages of basket table process (purchase, preparation, cooking, and consumption), and this causes household food insecurity. The socioeconomic status of the household was the most important determinant of food insecurity. Present study found that the income of households has a positive coefficient which was significant at 5 percent level. The income was expected to boost the household's food production and also access to more quantity and quality food. This indicates that the higher the household income, the higher the probability that the household would be food secure. This could be expected because increased income, other things being equal, means increasing access to food. The finding was supported by the research results of Babatunde *et al.* (2007) and Seid (2007). Low income was strongly associated with food insecurity in rural Bangladesh (Quddus and Bauer, 2014). Household income was an important determinant of numerous health outcomes as it can represent access to resources and recreational and physical activity opportunities for families, and was also a key factor in food security (Bhawra *et al.*, 2017). Another study reported a significant correlation between income and food insecurity. Food insecurity and family income are closely related such that poor families are 3 times more

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prone to have food insecurity compared to others (Nord and Hopwood, 2008). In this study, it was found that housing condition has a positive coefficient that was significant at 5% level. Quality of housing and food security level are closely related in Bangladesh, established by earlier works (Narayan *et al.*, 2007). Specifically, households which are living in non-building houses were the poorest segment of the population. Households living in houses which non-building, food insecurity are the most prevalent. On the other extreme, building houses seem to be the most food secure. These two observations showed that household infrastructure was a strong indicator of wealth and consequentially (Faridi & Wadood, 2010). It was found that, difference between boys and girls was negatively associated with household food security. Many countries in Asia pervasively and unambiguously practice boy preference. For instance, in India, son preference has been found to be practiced in many different facets of life including healthcare, feeding patterns with girls more likely to be malnourished (Pande, 2003). Son preference reflected in fertility behavior has also been found in Vietnam (Haughton & Haughton, 1995); and in Bangladesh as reflected in parental care, feeding patterns, intra-family food distribution and treatment of illness (D'Souza & Chen, 1980). Boys were found to have an advantage in the allocation of nutrients in the Philippines (Senauer *et al.* 1988) and in the distribution of food resources in India (Behrman, 1988a) and Nepal (Gittelsohn *et al.* 1997). However, Chaudhury (1988) findings in Bangladesh were mixed for different outcomes. The results suggest that food security was positively associated with better academic achievement in children, while food insecurity and poor nutrition are linked to lower academic performance and negative outcomes. The present findings about the association between food security and academic achievement for students are consistent with existing literature. Alaimo *et al.* (2001) found that children aged 6–11 years in the USA experiencing food insufficiency in the household had decreased scores in both reading and arithmetic, and were also more likely to repeat a grade. Another study by Jyoti *et al.* (2005) observed that food insecurity led to consistently delayed reading abilities during the course of schooling, as well as poor reading and arithmetic performance. Both preschool-aged children and college students who are facing food insecurity have shown a detrimental correlation with academic performance when it comes to food insecurity, suggesting food insecurity and academic achievement have a persistently unfavorable relationship across the life trajectory (Farahbakhsh *et al.*, 2017). In this study, BMI was negatively associated with food security. Numerous authors have reported that food insecure individuals often consume a diet that contributes to the development of overweight and obesity (WHO 2012; Gooding *et al.* 2011; Brown 2008; Wilde & Peterman, 2006; Adams *et al.* 2003) due to the fact that more affordable food options have a higher energy density (kilojoule content) and a low nutrient density, while foods such as fruit and vegetables with a higher nutrient density are often more expensive (Oldewage-Theron & Egal 2010; Temple *et al.* 2006). Results from this study confirm these findings.

Conclusion

Based on the empirical evidence emanating from the analysis, it can be concluded that household food security increases with the increase in household monthly income. Food security analysis showed that household food security decreases with the increase in household size. The study reveals that the demographic and socioeconomic factors influenced the food and nutritional security of rural and urban areas of Barishal district. The condition of children of urban area was far better than rural's children in food and nutrition security level, because of average household socioeconomic status of urban area such as income level, parent's education, housing condition etc. was much better than rural households. This study shows condition of food and nutritional security of primary school going children in rural and urban areas. This can help the policy makers to take initiative to improve food and nutritional condition of primary school going children.

References

- Abu, G. A., & Soom, A. (2016). Analysis of Factors Affecting Food Security in Rural and Urban Farming Households of Benue State, Nigeria. *International Journal of Food and Agricultural Economics*, 4(1), 55-68.
- Adams, E. J., Grummer-Strawn, L., & Chavez, G. (2003). Food Insecurity is Associated with Increased Risk of Obesity in Californian Women. *Journal of Nutrition*, 133(4), 1070 - 1074.
- Alaimo, K., Olson, C. M., & Frongillo, E. A. (2001). Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*, 108, 44-53.
- Arene, C. J., & Anyaeji, R. C. (2010). Determinants of food security among households in Nsukka metropolis of Enugu State of Nigeria. *Pakistan Journal of Social Sciences (PJSS)*, 30(1), 9-16.
- Babatunde, R. O., Omotosho, O. A., & Sholotan, O. S. (2007). Socio-Economic Characteristics and Food Security Status of Farming Households in Kwara State, NorthCentral, Nigeria. *Pakistan Journal of Nutrition*, 6(1), 49- 58.
- BBS 2018: Bangladesh Bureau of Statistics Region Census page 145 (PDF). Bangladesh Bureau of Statistics. Retrieved 2019-05-18.
- BBS 2022: Bangladesh Bureau of Statistics Region Census page 51 (PDF). Bangladesh Bureau of Statistics. Retrieved November 2023.
- Behrman, J. (1988a). Intra-household allocation of nutrients in rural India: are boys favored? Do parents exhibit inequality aversion? *Oxford Economic papers*, 40(1), 32-54.
- Bhawra, J., Cooke, M. J., Guo, Y., & Wilk, P. (2017). The association of household food security, household characteristics and school environment with obesity status among off-reserve First Nations and Métis children and youth in Canada: results from the 2012 Aboriginal Peoples Survey. *Health Promotion Household Food Security and Nutritional Well-being of Bangladesh and Chronic Disease Prevention in Canada, Research, Policy and Practice*, 137(3), 77-86.
- Blumberg, S. J., Bialostosky, K., Hamilton, W. L., & Briefel, R. R. (1999). The effectiveness of a short form of the household food security scale. *American Journal of Public Health*, 89, 1231-34.
- Brown, L. (2008). Food: Will There be Enough? In Mazur, L (ed): *A Pivotal Moment: Population Justice and the Environmental Challenge*. California: Island Press.
- Cassedy, A., Drotar D., Ittenbach, R., Hottinger, S., Wray, J., Wernovsky, G., Newburger, J. W., Mahony, L., Cohen, M. I., & Marino, B. S. (2013). The impact of socio-economic status on health related quality of life for children and adolescents with heart disease. *Health Qual Life Outcomes*, 11, 99.
- Chaudhury, R. (1988). Adequacy of child dietary intake relative to that of other family members. *The United Nations University Press Food and Nutrition Bulletin*, 10(2), 511-520.
- CWS, 2016: Child Well-Being Survey 2016, Divisional Reports. Bangladesh Bureau of Statistics and UNICEF Bangladesh, Dhaka, Bangladesh
- D'Souza, S., & Chen, L. (1980). Sex Differentials in Mortality in Rural Bangladesh. *Population and Development Review*, 6(2), 257-270.
- FAO 2007: Food and Agricultural Organization. The state of food security in the world, 4th edition available from <http://centreonhunger.org>
- Farahbakhsh, J., Hanbazaza, M., Ball, G. et al. (2017). Food insecure student clients of a university-based food bank have compromised health, dietary intake and academic quality. *Nutr Diet*, 74, 67-73.
- Faridi, R., Wadood, S. N. (2010). An Econometric Assessment of Household Food Security in Bangladesh. *The Bangladesh Development Studies*, 33(3), 97-111.
- Gittelsohn, J., Meera, T., & Landman, L. (1997). Cultural factors, caloric intake and micronutrient sufficiency in rural Nepali Households. *Soc. Sci. Med*, 44, 1739-1749.
- Gooding, H. C., Walls, C. E., & Richmond, T. K. (2011). Food Insecurity and Increased BMI in Young Women. *Obesity*, 21(10), 233 - 239.
- Iorlaman, T. R., Abu, G. A., & Lawal, W. L. (2013). Comparative analysis on socio-economic factors between food secure and food insecure households among urban households in Benue State, Nigeria. *Journal of Agricultural Science*. 4(2), 63-68.
- Jakaria, M., Hossain, M. E., & Noman, A. N. K. (2015). Socio-economic Features and Food Security Status of the Urban Slum Dwellers in Rajshahi City Corporation. *Rabindra Journal*, 32(01), 157-166.
- Jyoti, D. F., Frongillo, E. A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *J Nutr*, 135, 2831-2839.

- Kuwenyi, S., Kabuya, F. I., & Masuku, M. B. (2014). Determinants of rural households' food security in Shiselweni Region, Swaziland: implications for agricultural policy. *Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 7(11), 44-50.
- Mannaf, M., & Uddin, M. T. (2012). Socioeconomic Factors Influencing Food Security Status of Maize Growing Households in Selected areas of Bogra District. *Bangladesh J. Agric. Econ.*, 25(1&2), 177-187.
- Narayan, A., Yoshida, N., & Zaman, H. (2007). Trends and Patterns of Poverty in Bangladesh in Recent Years.
- Njoku, C. (1991). Factors Influencing the Adoption of Improved Oil Palm Production Technology by Small Holders in Imo State, Nigeria. In Olukosi, J.O; Ogunbible, A.O.
- Nord, M., & Hopwood, H. (2008). A comparison of household food security in Canada and the United States: USDA. *Economic Res Service* 244-256.
- Okwoche, V. A., & Benjamin, C. A. (2012). Analysis of food security situation among Nigerian rural farmers. *International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering*, 6(12), 1-5.
- Oldewage-Theron, W.H., & Egal, A. A. (2010). Nutrition Knowledge and Nutritional Status of School Children in QwaQwa. *South African Journal of Clinical Nutrition*, 23(3), 149 - 154.
- Oluyole, K. A., Oni, O. A., Omonona, B. T., & Adenagak, O. (2009). Food Security among Cocoa Farming Households of Ondo State, Nigeria. *ARPJN Journal of Agricultural and Biological Science*, 4(5), 7-13.
- Pande, R. (2003). Selective gender differences in childhood nutrition and immunization in rural India: the role of siblings. *Demography*, 40(3), 395-418.
- Payab, M., Dorosty Motlagh, A., Eshraghian, M., & Siassi, F. (2012). The association between food insecurity, socio-economic factors and dietary intake in mothers having primary school children living in Ray 2010. *Iran J Nutrition Sci Food Technol*, 7(1), 570-585.
- Quddus, M. A., & Bauer, S. (2014). Food security and morbidity of elderly in disadvantaged rural Bangladesh. *J. Bangladesh Agril. Univ*, 12(1), 95-104.
- Rahman, A., & Karim, R. (2013). Prevalence of food insecurity among women in rural area of north Household Food Security and Nutritional Well-being of Bangladesh west Bangladesh. *Pakistan J Nutrition*, 12(4), 329-333. doi: 10.3923/pjn.2013.3 29.333
- Rahman, R. I., Begum, A., & Bhuyan, H. R. (2012). Household Food Insecurity in Bangladesh: Concepts, Estimates and determinants. *Research Monograph* 22. Dhaka: BIDS.
- Ribar, D. C., & Hamrick, K. S. (2003). Dynamics of Poverty and Food Insufficiency: Food Assistance and Nutrition Research Report No. 36 FANRR Washington, DC: USDA.
- Seid, F. F. (2007). Food Insecurity and Its Determinants in Amhara Region. M.S. thesis, Department of Economics, Addis Ababa University, Ethiopia.
- Senauer, B., Garcia, M., & Jacinto, E. (1988). Determinants of the intrahousehold allocation of food in the rural Philippines. *American Journal of Agricultural Economics*, 70(1), 170-180.
- Temple, N. J., Steyn, N. P., Myburgh, N. G., & Nel, J. H. (2006). Food Items Consumed by Students Attending Schools in Different Socioeconomic Areas in Cape Town, South Africa. *Nutrition*, 22, 252 - 258.
- Von Grebmer, K., J. Bernstein, D. Nabarro, N. Prasai, S. Amin, Y. Yohannes, A. Sonntag et al. 2016. *2016 Global Hunger Index: Getting to Zero Hunger*. Bonn, Washington, DC, and Dublin: Welthungerhilfe, International Food Policy Research Institute, and Concern Worldwide.
- Wheeler, Tim, and Joachim Von Braun. "Climate change impacts on global food security." *Science* 341.6145 (2013): 508-513.
- WHO. (2012). *Food Security*. Available at: http://www.who.int/trade/glossary/story_028/en/.
- Wilde, P. E., Peterman, J. N. (2006). Individual Weight Change is Associated with Household Food Security Status. *Journal of Nutrition*, 136(5), 1395 -1400. Available at: <http://jn.nutrition.org/content/136/5/1395.full.pdf+html>.
- Yadegari, L., Dolatian, M., Mahmoodi, Z., Shahsavari, S., & Sharifi, N. (2017). The Relationship between Socioeconomic Factors and Food Security in Pregnant Women. *Shiraz E-Med J*, 18(1), e41483. doi: 10.17795/semj41483.
- Zakari, S., Ying, L., & Song, B. (2014). Factors Influencing Household Food Security in West Africa: The Case of Southern Niger. *Sustainability*, 6, 1191-1202; doi: 10.3390/su6031191.