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# Assessment of Food Security Status and the Determinants of Food Security in Selected Households from Coastal Area of Noakhali, Bangladesh

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## Abstract

**Background:** Household food insecurity means that people either do not have access or unable to purchase food. In either case, they had to suffer from hunger and poverty. Food security is an important determinant to fulfill sustainable development goals. This study aims at determining the food security status and determinants of food insecurity in selected households from the coastal belt region of the Noakhali district, Bangladesh.

**Methods:** A purposive sampling technique was employed for this cross-sectional study to select households. They were interviewed using a structured questionnaire in order to determine socioeconomic status and nutritional knowledge. Household Food Insecurity Access Scale was used to determine food insecurity.

**Results:** Our study findings indicated that the majority of households (90.33%) were food secure. The study also revealed that the respondent's level of education, level of nutritional knowledge, and level of monthly income are vital variables that have a significant correlation with food security in their households. However, the respondent's age, gender did not have any significant correlation with food security. Having poor nutritional knowledge (OR=1.604, 95% CI=1.1,87.4) and lower-income level (OR= 7.636, 95% CI=1.14-51.18) have significantly increased the risk of food insecurity. **Conclusion:** Although food security status is satisfactory, policies should be set up to support nutrition education as well as micronutrient intake to achieve nutritional security.

**Keywords:** Food Security, Coastal Area, Nutritional Knowledge, Malnutrition.

## Introduction

Food insecurity is a condition that occurs when people are deprived of secure access to a sufficient amount of safe and nutritious food in order to sustain

healthy growth and development and to maintain an active and healthy life <sup>(1)</sup>. The least difficult situation of food insecurity is primarily anxiety about getting enough food for consumption or having no money to buy more. Adults who think they are food insecure may attempt to prevent hunger by cutting meals, skipping meals, or even going one or more days without food <sup>(2,3)</sup>. Food security can be affected mainly by low income per capita, low and unequal income distribution, social discrimination, population growth, climate-induced insecurity: climate change, deforestation, flood, declining soil fertility, political instability, high maternal and infant mortality,

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etc., (4).

Bangladesh has graduated from low-middle income country status to middle-income countries in 2015. Since then Bangladesh has maintained steady economic growth over the last few years and achieved significant development gains, particularly in the areas of universal primary education, gender parity in elementary education as well as child and maternal mortality. Poverty and extreme poverty have declined sharply, settling at 31.5 and 17.6 percent, respectively, in 2010, with further declines to the present day (5). Because food security has been an ongoing concern in Bangladesh since its emergence as an independent nation, the governance structure for managing food security is relatively well advanced. However, despite progress and improved food availability due to increased development, 40 million people remain food insecure, and 11 million suffer from acute hunger (6).

Sustainable Development Goal (SDG) 2 of the United Nations, as part of a new international guideline, proposes that governments should aim to improve food security and nutrition as a response to the global sustainability challenge (7). Goal 2 aims to eradicate all forms of hunger and malnutrition by 2030, by ensuring access to adequate and nutritious food for all people, particularly children, throughout the year. This includes encouraging sustainable farming practices such as supporting small scale farmers and ensuring equal access to the land, modern technology, and markets. It also calls for international cooperation in confirming infrastructure and technology investment in order to improve agricultural productivity (8).

Bangladesh's government is committed to eradicating food insecurity and malnutrition. In this context, there is neither any lack of goals and commitments nor any shortage of programs and policies. The Bangladesh Second Country Investment Plan-2016-2020 (CIP2) is integral to the multisectoral approach needed to tackle hunger and malnutrition and to achieve the Sustainable Development Goals (SDGs). CIP2's overall objective is to achieve improved food security and nutrition for all at all times by making nutrition-sensitive and sustainable food systems, which will cost an estimated US\$ 9.25 billion (9). Bangladesh's coastal zone has an area of 47,211 km<sup>2</sup>, which faces the Bay of Bengal or is close to the Sea. It is vulnerable to violent storms and tropical cyclones originating in the Indian Ocean and tracking from Bengal Bay (10). The

effects of climate change have severe consequences for the coastal population's subsistence patterns and their overall health status (11). Noakhali coast is located along the northeastern coast of the Bay of Bengal in the central coastal zone of Bangladesh. This study aims at determining the food security status and determinants of food insecurity in selected households from the coastal belt region of the Noakhali district, Bangladesh.

## Methodology

### 1. Study design and participants

This study is a cross-sectional study. A multistage sampling technique was used to select the respondents. The sample size was calculated using the following formula (12):

$$\text{Sample size} = \frac{Z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$

Here,  $Z_{1-\frac{\alpha}{2}}$  = Standard normal variate (at 5% type I error ( $P < 0.05$ )) is 1.96,

$p$  = Expected proportion in the population is 0.25 (25.0%) according to the recent report of the World Food Programme on the state of food security in Bangladesh (6),

$d$  = Absolute error or precision, which is set to 0.1.

According to formula, this study should have at least 37 subjects. Ninety-three households were selected for this study. A purposive sampling technique was employed for this cross-sectional study to select the 93 households from four randomly selected Upazilas: Noakhali Sadar and Hatiya. They were interviewed using a structured pretested questionnaire by following all necessary ethical guidelines. In this respect, data regarding their socioeconomic characteristics, food availability, food accessibility, and access to credit were obtained for analysis.

### Determination of household food security status:

Household Food Insecurity Access Scale (HFIAS) Questionnaire was used to collect data on food security. The HFIAS is intended to capture household behaviors in terms of insufficient quality and quantity, as well as anxiety and uncertainty over insecure access or food supply to households (13). The following algorithm is applied to determine the food security category (Table

1).

**Table 1: Algorithm to determine the category of food security**

HFIAS category = 1 if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q9=0]
HFIAS category = 2 if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]
HFIAS category = 3 if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0]
HFIAS category = 4 if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3]

2. Determining factors influencing food security status of households:

A logistic regression model was used to determine factors influencing the food security status of

households and the variables included in the model are described as in Table 2 below, and a priori hypothesis is included in the table (Table 2).

**Table 2. Explanatory variables used in the Logit Model Regression to determine factor influencing food security status of households**

Variable	Descriptions	Measurement	A priori Expectation
Age-g-h-r	Age group of household respondent	<20 Years = 1 20-24 Years = 2 25-29 Years = 3 >30 Years = 4	+ / -
Gender-h-r	Gender of household respondent	Male= 1, Female = 0	+
Mon-hh-income	Monthly household income	Below 10,000 BDT = 1 10,000-14,999 BDT = 2 Above 15,000 BDT = 3	+
Edu-lev	Level of education	Primary school = 1 High school = 2 College & above = 3 No formal education = 4	+
Nutri-knowle-lev	Level of nutritional knowledge	Poor = 1 Moderate = 2 Good = 3	+
Hdds-lev	Level of Household dietary diversity	Inadequate= 1 Adequate= 2	+

Android-based Kobocollect application (version 1.23.3) was used to collect the data. Survey mapping was done using QGIS (version 3.8) software. Statistical analysis was carried out using IBM SPSS Statistics (version 23.0).

**Results:**

Table 3 indicates demographic information of the respondent's gender, age, institutional background,

nutritional knowledge level, and his/her monthly family income. Of all respondents, 38% were male, while 46% were female. The larger group of respondents was between 26-30 years of age. The average monthly family income of almost half of households was between 10,000-14,999 BDT. The majority of the sample population were deprived of formal education, and only one-fifth of the sample received higher education (Table 2).

**Table 3: Demographic characteristics of the individual**

Variable (n= 93)	Frequency	Percentages (%)
Gender		
Male	41	38.13
Female	52	46.2
Age group		
18-25	12	11.13
25-34	39	36.27
34-49	21	19.53
>50	39	36.27
Educational Background		
No formal education	49	45.57
Primary education	23	21.39
Higher education	21	19.53
Monthly income (BDT)		
Below 10,000	11	10.23
10,000-14,999	49	45.57
Above 15,000	20	18.6

Using the method of Household Food Insecurity Access Scale (HFIAS), it has been found that 84 households are food secure. Only 10% of households are food insecure. Among them, 6.45% is severely food insecure, and 3.2 % is moderately food insecure (Table 4).

**Table 4. Frequency and percentage of occurrence issues based on the categorization of food insecurity in households according to HFIAS.**

HFIAS category	Frequency interval	Frequency	%
Food secure	≥1	84	90.33
Mildly food insecure	2-15	0	0
Moderate food insecure	16-23	3	3.22
Severely food insecure	24-27	6	6.45

The study also revealed that the respondent's gender, level of nutritional knowledge, and level of monthly income are vital variables that have a significant correlation with food security in their households, which have been found by the chi-square test (Table 5).

**Table 5: Socioeconomic status of the study population and their correlation with a food security status**

Variable		Food secured	Food insecure	Total	Chi-Square value	p-value
Gender	Male	40	1	41	4.395	0.036*
	Female	44	8	52		
Level of education	No formal education	44	5	49	0.894	0.639
	Primary education	20	3	23		
	Higher education	20	1	21		
Level of Nutrition Knowledge	Poor	21	7	31	10.762	0.005**
	Moderate	33	1	45		
	Good	30	1	17		
Level of income	Below 10,000	11	3	11	6.896	0.03*
	10,000-14,999	17	4	49		
	Above 15,000	56	2	20		
Level of Household dietary diversity	Inadequate	27	5	32	1.974	0.16
	Adequate	57	4	61		

\*\*( $p < 0.01$ ); \*( $p < 0.05$ )

Binary logistic regression analysis shows that having less income, having poor nutritional knowledge, have a significant risk associated with food insecurity. On the other hand, there is no significant risk association was found between education level, household dietary diversity, and food security status (Table 6).

**Table 6: Association of different socioeconomic factors with the incidence of food Insecurity**

Variable		Odds Ratio	p-value	95% CI
Level of education	No formal education	3.000	0.467	0.249-20.741
	Primary education	2.273	0.359	0.287-31.347
	Higher education (Ref)			
Level of nutrition knowledge	Poor	1.604	.037*	1.144-87.428
	Moderate	0.909	.94	.54-15.184
	Good (Ref)			
Level of income	Below 10,000	7.636	0.04*	1.139-51.177
	10,000-14,999	6.588	0.04*	1.109-39.147
	Above 15,000 (Ref)			
Level of household dietary diversity	Inadequate	0.379	0.17	0.094-1.525
	Adequate (Ref)			

\*(p<0.05)

### Discussion

According to the study, around 90% of households are food secure, and this rate is satisfactory compared to the national level <sup>(6)</sup>. In the current scenario, most of the people prefer to work in the office and avoid work involving physical labor. Although the study area is coastal, people are still inclined towards businesses or government jobs and oppose farming. As it is clear from Table 3, about 45.57 percent of people’s monthly income is 10000-14999 TK, which is higher from the national level <sup>(14)</sup>. This means that they have higher access to food. If the income of a person is low, it affects the purchasing power of the person <sup>(15)</sup>. It can limit caloric intake, which can cause food insecurity and eventually leads to malnutrition <sup>(16)</sup>. Households with more considerable financial and food-management skills (i.e., managing bills, making a budget, stretching groceries, preparing meals) are less likely to be food insecure <sup>(17)</sup>. The elevated incidence levels of hunger and food insecurity are not only detrimental to the welfare of the affected households and individuals but

also pose a danger to the local social and political setting <sup>(18)</sup>. According to our study, nutritional knowledge plays a pivotal role in terms of food insecurity. Nutritional knowledge promotes a healthier lifestyle; thus, food security <sup>(19)</sup>. Nutritionally educated parents can raise their children safer by supplying the baby with adequate nutrition. They can also decrease the frequency of gastroenteritis and respiratory infections and reduce the number of infant deaths <sup>(20)</sup>. The results show that the full 18-item food security scale is robust in classifying household food security among the general population. Assuming that one’s research and monitoring goals require the combination of food safety categories to be healthy, mild, moderate, and severe, the short form may be sufficient to assess household food safety rates when survey resources do not allow full-scale use. Despite its brevity, this measure maintains many essential indicators of food security. The indicators include self-perceived nutritional inadequacy, household food depletion, impaired eating patterns, and a repetitive pattern of reduced food intake. When concentrating on financial

constraints, the short form ignores many possible causes of food insecurity, such as the lack of a sufficient quantity of nutritious food in the community, the religious beliefs that make available food undesirable. the physical inability of some citizens to purchase food <sup>(21)</sup>.

### Conclusion

Increased purchasing power and rural employment through improved value-added, agro-processing, development of rural business, access to the market is the key to access food.

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**Conflict of Interest:** The authors have declared no conflict of interest.

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