FOOD SECURITY STATUS OF FISHING HOUSHOLDS IN KISHOREGANJ

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CERTIFICATE

This is to certify that the thesis entitled **"FOOD SECURITY STATUS OF FISHING HOUSHOLDS IN KISHOREGANJ"** submitted to the Department of Agricultural Economics, Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfilment of the requirements for the degree of **Master of Science (MS) in Agricultural Economics** embodies the result of a piece of food security research work carried out by **MD. MAKSODUR RAHAMAN, Registration No. 19-10110** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that the Author duly acknowledges any help or source of information, as has been availed of during this investigation.

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Dated:

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Dedicated to
My
Beloved Family
Members

ABSTRACT

Food security is mostly important for all the living people especially in the rural or under developed area where people are not conscious about food and nutrition. The study briefs out the existing issues of food security in *haor* area of Nikli Upzila. The overall objectives of this study were to examine the present socioeconomic status of the fishing household, which factors were constraints for food security and identified the problems of accessing foods in Nikli Upazila of Kishoreganj district. A total of 110 sample respondents were interviewed by using simple random sampling techniques. Both descriptive and inferential statistics were used to analyze the data. Socioeconomic status and problems faced by the respondents were assessed by using descriptive statistics and presented in tabular form. The extent of dietary diversity which was used to assess the food security status was assessed using descriptive statistics also. The factor determining the food security status of the small scale fishing community at Nikli Upazila was assessed using binary logistic regression analysis. After analyzing the respondent data, result showed that the average family size of sample households was 5.32 and 69.09 % of the survey respondents were found to have no education. Besides among the respondents 59.09 % hold yearly income from BDT 160000-190000. After analyzing, it was found majority of the expenditure spent on food items which hold 55.3 % of total cost. The result showed that age of the respondent, food expenditure, education, access to information having loan were significant factors those affect food security status of the fishing households. Various issues like climate change, population growth, increasing cost of food, uncontrolled market etc. were found to be encountered by respondents in the research region when attempting to obtain food. The respondents ranked the increasing cost of food items as the most serious problem among the six challenges. Therefore, it is highly needed to emphasis government support to ensure the food security.

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CHAPTER I

INTRODUCTION

1.1 Background

The recent growing world is roaring with economic development where food security is thought to be the most important agenda to all aspects of life. United Nations' Food and Agriculture Organization (FAO) defines food security as 'a state which exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life'. It is a starting factor for development of human capital of a society that integrates four dimensions of food security, viz. availability, accessibility, stability and utilization (Ali and Jabeen, 2015). Accessibility is the ability to have optimum nutritious diet and is precisely linked to individuals at the household level (Ahmed *et al.,* 2017), availability is related to the supply of food through production, dissemination and exchange, utilization denotes absorption of food by individuals and stability means the capability to take food at all times. Recently 795 million people in the world suffer from long lasting hunger and an additional 2000 million people will be on the same line due to lack of food by 2050 (Zabir *et al.,* 2020). Moreover, one out of three people have some form of nutritional deficiency which indicates the insufficiency of minerals and vitamins in their foods, making this the leading cause of poor growth in especially children. The picture for Asia is more critical, where about 526 million people pass their daily life with starvation and 3.1 million children die due to poor nutrition (Agriculture Organization 2014). So, despite industrialization and economic development throughout the world, food security has turned into a prime concern for people and also for different development organizations. Bangladesh, a developing country, has long been associated with food insecurity that coexists with poverty, the root cause of hunger and malnutrition. According to the World Food Programme (WFP), in Bangladesh 31.5 % people live in poverty which means one out of four people is food insecure and it affects 36% of children under the age of 5, with rates reaching 50% among the poorest and those living in slums. 5.5 million Children under the age of five are chronically malnourished. Despite this progress, Bangladesh food security is still fragile and major challenges remain as well.

The *haor* region is characterized by high frequency of natural hazards; dependence on a single annual rice crop and disproportionate lack of access to government services rendering low institutional capacity to support the most vulnerable. Extremely poor households in the *haor* region are generally landless, have little access to agricultural land, and have small homestead plots. The result is low-income levels, (due to few income generating opportunities); poor food utilization; large amount of debt levels due to reliance on moneylenders; and seasonal migration. Seasonal migration can exacerbate short term vulnerability for the family members left behind, predominantly women, the elderly and children. Women and girls are also vulnerable to a patriarchal system and discriminatory cultural practices.

Globally, small-scale fisheries and fisheries-related activities (processing, trading, net-repairing, etc.) make an important contribution to the nutrition, food security, sustainable livelihoods and poverty alleviation of many countries, especially developing countries. Small-scale fisheries usually require only small capital investment, use low technology gear and vessels (often non-motorized) and catch fish for subsistence or local markets. The work is often part-time or seasonal and is a key component in the livelihoods of millions of people. Small-scale fisheries are found in coastal marine areas, brackish water lagoons, and along freshwater lakes, rivers and reservoirs. Despite this significant contribution to food security, the position of small scale fisheries and how they fit into the multiple activities of the rural economy remains poorly understood. Large scale industrial fisheries have great attention to the policy makers but small scale have a low visibility and receive little attention from policy makers. They are often open access enterprises that contribute little to the national Gross Domestic Product (GDP) and command little political attention or support through research, subsidies etc. However, because of the poverty associated with some small-scale fisheries, they have tended to receive project support from international development donors but have not received systematic research support to improve understanding of their functioning, governance and human and resource benefits. Small-scale fisheries take on a great number of forms and modes of operation in the countries and cultures in which they are found. In *haor* areas a significant number of people directly depend on fishing as a means of livelihood. They include the catching of fish, post-harvest treatment and marketing of the catches, as well as ancillary trades.

Small-scale fisheries are a dynamic and expanding sub-sector of the fishing industry that uses labor-intensive harvesting, processing, and distribution technologies to exploit marine and inland water fisheries. The activities of this sub-sector, conducted full-time or part-time or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization (FAO, 2020). While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-making, boat-building, engine repair and maintenance, etc. can provide additional fishery- related employment and income opportunities in marine and inland fishing communities.

Small-scale fisheries operate at widely differing organizational levels ranging from self- employed single operators through informal micro-enterprises to formal sector businesses. This sub-sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation. Small scale fisheries imply traditional fisheries that require relatively low investment, which use traditional fishing gears and vessels, have limited access to well-developed fish-markets and catch fish for subsistence (Tanha *et al*, 2021).

1.2 Components of food security

Food security in a population means that all people, at all times, have sufficient access to food to meet their dietary needs for a productive and healthy life. One of the fundamental rights of the citizens stipulated in the Bangladesh Constitutions is food security for all. For ensured food security for all must be emphasize on food security components. Food security encompasses three elements: availability, accessibility and utilization. According to World Health Organization there are three pillars that determine food security: food availability, food access, and food use (Béné, 2020).

1.2.1 Food availability

In its most basic form, food availability refers to the scenario in which food is made available for consumption at local levels, where local individuals or households can find the foods, they require without having to search. Food availability refers to the availability of sufficient amounts of

appropriate quality food, whether produced domestically or imported. Food availability relates to the supply of food through production, distribution, and exchange. Food availability refers to the physical presence of food at various levels from household to national level, be that from own production or through markets (Hoddinott, 2002). One essential element of food security is adequate food availability at national level, which is often equated with national food security. Determinants of food availability at the national level are domestic food production, public and private food stockholding, food imports and food aid, food exports and wastage in the way of distribution, storage and consumption. With the liberalization of international trade, global availability of food is of increasing importance for national food security. Availability of food at the household level depends on the household's own production including homestead one, household food stock and availability of food in the local markets.

The principal food crops are readily available in Bangladesh, particularly rice, which is the country's staple diet. The quick invention and refinement of many high yielding crop varieties and technologies, as well as a stronger agricultural extension system, enabled people to have access to food all year. It was difficult for Bangladesh's government to ensure the availability of two meals a day for the general public during the 1970s and 1980s (Hossain M, 2014).

1.2.2 Access to food

Food access refers to the ability to obtain an appropriate and nutritious diet and is in particular linked to resources at the household level (Hoddinott, 2002). Food access refers to the affordability and distribution of food, as well as individual and household preferences. Hunger and malnutrition are often caused by an inability to acquire available food, which is usually due to poverty, according to the UN Committee of Economic, Social, and Cultural Rights. Poverty can limit access to food, and can also increase how vulnerable an individual or household is to food price spikes.

Food availability is determined by whether a household has adequate income to purchase food at current prices or sufficient land and other resources to grow its own food. Households with sufficient means can weather inclement weather and local food shortages while maintaining access

to food. Household income, assets, remittances, gifts, borrowing, income transfers, and food aid all influence access to food. Increased household income can improve household food security by increasing access to food. In addition, larger asset bases lessen households' vulnerability to short-term income interruptions and help prevent household food security from deteriorating in times of difficulty. Increased food costs also cause low-income households to experience temporary food insecurity by lowering their real income and, as a result, diminishing their purchasing power.

Adequate food availability may not necessarily ensure access to adequate food. One needs to have ability to afford it. Access or entitlement to food along with food availability is essential to ensure food security. Access to food depends upon entitlement to employment, adequate earnings from employment, access to credit, resources for disposal, price stabilization of food price and entitlement to social security benefits or other transfer such as remittance. Access to employment is one of the important drivers for increasing capacity to buy food and eventually access to food. In a market economy, the access to food depends on four elements (Nath, 2015):

a) Production based element that depends on ownership of land;
b) Trade based entitlement that depends on market prices of food;
c) Labour based entitlement that depends on employment and wages; and
d) Transfer based entitlement that includes gifts, remittances from relatives and relief and subsidies obtained from the government.

The ability of the household and the people to access food is the outcome of the complex operation and interactions of all these elements.

1.2.3 Food utilization

Food utilization refers to the proper use of food, which includes the existence of proper food processing and storage practices, adequate knowledge and application of nutrition and child care and adequate health and sanitation services (Hoddinott, 2002). Food utilization is an important component of food security. Ability to have access to food may not ensure food security unless one has ability to make effective use of that ability to ensure balanced, safe and nutritious food. Adequate food utilization requires a diet providing sufficient energy and essential micronutrients, safe drinking water, adequate sanitation, access to health services, proper feeding practices and sickness treatment facilities. Food utilization is determined by food safety and quality, how much a person eats and how well and how much quantity a person metabolises to energy, all of which affect health, nutritional status and growth. Adequate utilization requires a diet with sufficient

energy and essential nutrients, potable water, adequate sanitation, access to health services, proper feeding practices and illness management. Constraints to food utilization include nutritional losses associated with food preparation, inadequate knowledge and practices of health techniques and cultural practices that limit consumption of a nutritionally adequate diet by certain groups or families.

1.2.4 Food stability

Food stability refers to the ability to obtain food over time. Increased food availability and access to food may mitigate hunger, but not necessarily malnutrition. Food security can be transitory, seasonal, or chronic. In transitory food insecurity, food may be unavailable during certain periods of time (FAO, 2002). Food production instability, price instability, employment instability, import flow instability and political instability may affect persistence of food security. At the food production level, natural disasters and drought result in crop failure and decreased food availability. Civil conflicts can also decrease access to food. Instability in markets resulting in food-price spikes can cause transitory food insecurity. Other factors that can temporarily cause food insecurity are loss of employment or productivity, which can be caused by illness. Seasonal food insecurity can result from the regular pattern of growing seasons in food production. Thus, food security depends on many interlinked factors, all of which should receive adequate and simultaneous attention. There is also a definite interdependency among these factors, which demands a delicate balance among all issues related to comprehensive food security.

1.3 Description of *Haor*

*Haor*s are technically depressed and marshy lands that are nearly circular in form. The term "*Haor*" was originally derived from the Sanskrit word "Shagor," which means "sea." The key trait of *Haor*s is that they flood every year during the rainy season. A *Haor* is a wetland habitat in Bangladesh's north-eastern region that is geographically a shallow depression in the form of a bowl or saucer, also known as a back swamp, with an area of about 1.99 million ha and a population of about 19.37 million inhabitants (Mustafa *et al.,* 2019). In the districts of Sunamgonj, Sylhet, Habigonj, Maulavibazar, Netrokona, Kishoregonj, and Brahmanbaria, there are 373 *Haor*/wetland. These 373 *Haor*s occupy nearly 859000 *Haor*s, or about 43% of the overall region of the *Haor* disticts (Ahmed, 2013). Despite being one of the country's main economic production areas, the *Haor* region is still under construction due to its physical and hydrological conditions. Agriculture and fishing are the mainstays of the region's rich economic capital. This region has a total of 0.71

million ha of net cultivable property, which generates more than 5.25 million tons of paddy per year. Despite the zone's economic significance, inhabitants of the *Haor* region are poorer than those in other areas of Bangladesh. More than 28% of the overall *Haor* population resides in poverty (LPL). Almost half of Kishoreganj district, including Itna, Mithamoin, Oshtogram, Nikli upazilas are termed as completely haor areas. Besides all these upazilas there is also Karimganj, Tarail, Bajitpur, Kuliarchar and Bhairab, which are widely known as partly haor areas.

1.4 Role of *Haor* in Bangladesh economy

Despite being one of the country's main economic development areas, the *Haor* region is still underdeveloped due to its physical and hydrological characteristics. Agriculture and fishing are the principal sources of the region's diverse economic wealth. The *Haor* regions' gas and mineral deposits, biodiversity and wetland, livestock, tourism, and other economic activities are all significant to Bangladesh. The following is a list of their different roles:

Gas and Mineral Resources: This region has a higher proportion of gas and mineral resources than the rest of the world. The *Haor* districts generate approximately 90% of the country's overall gas output. The Surma Basin (SB), a depressed part of the Bengal Basin, covers the majority of the region. The *Haor* zone's geomorphology is made up of the Surma Kushiyara floodplain and the Meghna River Floodplain. In Sylhet's *Haor* fields, a dense stratigraphic succession of mainly tertiary sediments occurs. Silt, sand, gravel, and clay, pebbly sandstone, sticky clay, sandstone, coarse quartz pebbles, petrified wood, clay stone with siltstone and sandstone, marine shale, basalt, volcanic ash, and coal are among the stratigraphic sequences found in Bangladesh (Khan & Haque, 2010). The geological environment and formations of Bangladesh's northeastern area promote the deposit of a broad variety of mineral and energy resources. Natural gas, crude oil, shale, white clay, glass sand, peat, tar, asphalt, and building sand are among the mineral resources found. The box illustrates the different types of mineral resources available in the *Haor* area.

Employment: The inclusion rate of the amount of economically engaged persons over the age of 15 is a popular indicator of job prospects. Currently, 61.84 % of the *Haor* area's economically active workforce will function, which is better than the national average of 58.74 %. As a consequence, the job situation in the *Haor* region is crucial to our economy (MoEF, 2012).

Biodiversity and Wetland: *Haor* wetlands have a diverse ecology. Hakaluki *Haor*, Tanguar *Haor*, Hail *Haor*, Matian *Haor*, Pasuar Beel *Haor*, Dekar *Haor*, Baro *Haor*, Gurmar *Haor*, Sonamorol *Haor*, Baram *Haor*, Kalni *Haor*, Kawadighi *Haor*, and Pagner *Haor* are the most significant wetlands. Rots, rodents, humans, and amphibians make up a large wildlife population in these wetlands. Wetland plants are also enhanced in most of the essential *Haor* areas due to lowland plantation. By conserving water, improving irrigation and fish development, and rendering the *Haor* a safe zone for birds and wildlife, several steps are being taken to conserve the natural environment and local heritage. Tanguar *Haor* is a significant bird-watching region in Bangladesh. Hakaluki *Haor*, Hail *Haor*, Pasuar, and Panna beel are the other bird regions. The Bangladesh National Herbarium (BNH) discovered 78 plant species in the region during a survey. There are 11 free-floating organisms, such as Pistiastratiotes (Topapana), Salvanianatans (Tetulpana), 38 anchored, underwater species, such as Potamogetoncrispus (keorali), Aponogetonechinatus (Ghechu), 5 suspended species, such as Utricularia aurea (Chhotojanghi), Cerato-phyllumdemersum (also known as chhotojanghi), In Bangladesh, *Haor* habitats are the main habitat for birds and fish. Tanguar *Haor* is home to roughly 141 fish species, including several rare introduced species, accounting for more than half of the country's freshwater fish species, according to different reports (Miah, 2013). Air, Gang Magur, Baim, Tara Baim, Gutum, Gulsha, Tengra, Titna, Garia, Beti, Kakia, and others are notable animals. In the *Haor* field, there are 208 different bird species. As a consequence, these habitat and wetland upgrades are vital to our economic prosperity.

Agriculture: The seven *Haor* districts comprise a cumulative region of about 1.99 million hectares, with a net planted area of about 1.31 million hectares. Bangladesh has a combined rice field of 11.35 million hectares, with the *Haor* zone responsible for 15.3 % (1.74 million hectares) (Muzaffar, 2004). The *Haor* area generates 5.25 million metric tonnes of rice, accounting for 16.5 % of Bangladesh's overall rice production. Rice crops occupy approximately 90.2 % of the total crop area.

Non-rice harvested land accounts for around 9.8% of overall cropped land. The other main cereal crops, wheat and maize, account for around 0.7 % of the total cropped region. Potatoes, like sweet potatoes, account for 1.2 % of all cropped ground. Non- rice crops (pulses, oilseeds, vegetables, and so on) account for 6.7 % of total cropped land. Jute is a large cash crop, accounting for around 1% of total cultivated land. Sugarcane often occupies a limited portion of the property. Tea is the most important agricultural crop, accounting for around 3.7 % of the NCA, while fruits account for 0.42 % (Poffenberger, 2000). We will see from the table below that agriculture in the *Haor* regions plays an important role in the growth of our economy.

Fisheries: The *Haor* area is home to a large number of fin fish, including 143 indigenous and 12 endemic species, as well as many freshwater prawn species. Large fish (major carp, large catfish, chital, Gangetic stingray, gazar, and shol) and small fish (chital, Gangetic stingray, gazar, and shol) are classified into two groups. The *Haor* region's total fish habitat area is about 967,000 ha. The fish ecosystems contain a total of 4.32 lakh tonnes of fish, with catch fishing accounting for 73.7 % and culture fishing accounting for the remainder. Sunamganj accounts for about 23.4 % of overall fish output in the *Haor* districts, led by Netrakona (16.9%), Kishoreganj (16.2%), Sylhet (14.8%), Brahmanbaria (12.7%), Habiganj (8.1%), and Maulvibazar (8.1%). In the *Haor* region, culture fish ponds generate around 1.14 lakh tonne, or 26.3 % of total output. The *Haor* basin generates approximately 20% of Bangladesh's total inland fish output, and this sector is important to the country's overall economy. Bangladesh's fisheries industry accounts for about 22.2 % of the country's agriculture GDP (Hair, 2012). Overall, the fisheries business contributes 3.74 % of GDP, 2.7 % of foreign exchange profits, and 58 % of animal protein consumption (Hair, 2012). The *Haor* basin contributes about 0.6 % of the fisheries allocation to GDP, whilst the rest of the world contributes 3.14 %. During the 2009-10 fiscal year, the *Haor* basin shipped 452 tonnes of cod.

Livestock: Livestock is an important part of Bangladesh's agricultural economy, serving a variety of purposes including food security, revenue, draught strength, manure, diesel, transportation, and foreign exchange savings. Animal protein comes from livestock products with around 44% of overall animal protein. Cattle, buffaloes, goats, sheep, chickens, and ducks are the most popular

livestock in the *Haor* area. In the *Haor* farms, there are about 32.68 million head of livestock (cattle, goats, sheep, ducks, and poultry). They account for roughly 22% of the total cattle population in the world. Ducks and poultry are the most common livestock species here, with the *Haor* area accounting for more than a quarter of the country's total duck population.

Tourism: Tourism leads to a region's or community's socioeconomic well-being. It's the extension of a company that provides a blend of geological, geographical, archaeological, scenic, and cultural attractions. *Haor* are one of-a-kind wetlands with the ability to draw visitors (Bhuiyan et al., 2020). Thousands of migratory birds migrate to the *Haor* and beels throughout the winter. Winter is a wonderful time to go bird hunting, but it's also when the *Haor* diminish in size and sacrifice a lot of their watery charm. A variety of locations in the *Haor* districts may be established as tourist attractions. The government plans to lift the tourism sector's existing GDP levels from 0.70 % to 2% by 2015, and then to 5% by 2021.

1.5 Justification of the Study

A significant portion of the total populations in Bangladesh live in the *haor* area. They lead a miserable life due to lack of education, sanitation, regular loss of land, lack of developed communication facilities and don’t get proper idea about food security. They become a more vulnerable class of society compared to plain land people. The floodplain *haor* areas always faced natural disasters like regular loss of crops field by upcoming flood, drought etc. Geographical, social, immoral, political instability and insecurity pushed them to a vicious cycle of poverty. But in these *haor* areas, a large portion of under privileged poor people lives. In Kishoreganj *haor* area most of the people were fishermen and spent their life with poverty. They always suffer from food and nutritional security. But still now there’s not have enough thoughts about their food security in Bangladesh. If they got proper care, training and guidelines about their nutritional and food security, they also become more productive human resources for Bangladesh. Small scale fisheries, as compared to large scale fisheries, generally make broader direct and indirect contributions to food security; they make affordable fish available and accessible to poor population and are a key mean to sustain livelihoods of marginalized and vulnerable populations in developing countries. The importance of small-scale fisheries (including inland fisheries) in terms of overall production and contribution to food security and nutrition is often underestimated or ignored. Catches from subsistence fishing are rarely included in national catch statistics. There is, however, sufficient evidence to support a focus on small

scale fisheries for food security and nutrition interventions in developing countries.

Very little research works have done on food and nutritional security status of small-scale fishing households in *haor* areas. Most of the food security study conducted on marine fishing households. Although some GOs and NGOs worked scattered in *haor* areas of Bangladesh, no special programme were taken before for the betterment of the food and nutritional status of fishermen of *haor* dwellers. The present study attempts to know the socioeconomic status, the level and extent of food security and analyze the socioeconomic factors that affect the food security of the fishing households. The findings of the study are expected to be useful to the planners, research personnel as well as inhabitants of *haor* areas.

1.6 Objectives of the Study

The overall objective of the study is to examine the food security status of small scale fishing households in the *haor* areas. The specific objectives of the study are:

a) To document the present socioeconomic status of the fishing households.

b) To identify the factors affecting food security status of the fishing communities.

c) To identify the problems in accessing food items; and

d) To suggest policy guidelines for improving food security.

1.7 Organization of the Thesis

This thesis includes seven chapter or sections. Chapter I discusses the introduction including the background, components of food security, role of Haor in Bangladesh economy, justifications and objectives of the study. A review of literature is presented in chapter II. Chapter III explains the selection area of the study area, collection of data, data processing and research methodology of the study. The result and the discussion of the study are revealed in Chapter IV, V, and VI. Finally, Chapter VII shows the summery, conclusion and policy recommendations of the study.

CHAPTER 2

REVIEW OF LITERATURE

Review of related literature in any research is very essential in the sense that it provides an opportunity for reviewing the stock of knowledge and information to the proposed research. These knowledge and information give a guideline in designing the future research problem and validating the new findings. The purpose of this chapter is to review the previous research works which are related to the present study. In this chapter, only the most important and relevant studies which have been conducted in the recent past are reviewed.

Aryal *et al*. (2022) presented that global food security is threatened by the confluence of increasing demand for food due to a growing population and the inability of the food production system to meet the increasing demand due to climate change, worsening soil fertility, and challenges to water availability. These factors jeopardize achieving the Sustainable Development Goals such as Zero Hunger, food and nutrition security, and climate action, particularly in developing countries. Vulnerable and marginalized groups in these countries, such as women, widows, people with disabilities, and resource-poor households living in vulnerable areas, suffer disproportionately from food insecurity.

Alam *et al*. (2018) examined the factors influencing food security of vulnerable rural riverine households in Bangladesh. The results revealed that riverine households' lack of access to many basic necessities and services, such as food, safe drinking water, education and health, results in increased vulnerability to food insecurity which could lead to an unfortunate vicious cycle of poverty. Model results indicated that household heads' education, household size, adoption of livestock and access to non-farm earnings also affect food security. More importantly, evidence suggested that access to improved health care also needs policy support in parallel with improved access to food to achieve and sustain long-term food security in Bangladesh.

Adjimoti and Kwadzo (2018) conducted how crop diversification has affected the food security status of the rural household. They found that crop diversification has a positive effect on household food security status. The diversity of crops grown through dietary diversity can improve household food security. In rural remote areas where household access to food depends largely on its production, crop diversification provides farmers with the different crops that they cannot

access either because of the cost or because of the poor infrastructure constraints (physical access). Beyond, the results also show that some other factors are also affecting the household food security status such as access to extension services and storage facilities.

Abu *et al*. (2016) examined factors affecting household food security status among rural and urban farming household of Benue State, Nigeria. The rural and urban food secure households exceeded the recommended calorie intake by 39 % and 42 % respectively, while the rural and urban food insecure households fell short of recommended calorie by 24 % and 26 % respectively. It was also found that income of household's head ($p<0.10$), rural households' size ($p<0.01$), and farm size ($p<0.10$) had a positive impact on household food security. On the other hand, age of household head ($p<0.05$) and urban household size ($p<0.10$) had a negative relationship with household food security. It was recommended that credit be provided to farming households by government to reduce the constraint of not being able to access credit facilities, the agricultural policies which aimed at promoting farmers access to land and improving farm household productivity be encouraged and that farmers be provided with informal education through extension services on nutritional awareness and non-farm income generating activities.

Alderman (2010) reviewed evidence on climate shocks and nutrition and estimates the economic consequences in terms of reduced schooling and economic productivity stemming from nutritional insults in childhood. Panel data covering up to 20 y indicate that that short-term climate shocks have long-term impacts on children that persist, often into their adult lives. Other studies document the potential for relief programs to offset these shocks providing that the programs can be implemented with flexible financing, rapid identification of those affected by the shock, and timely scale-up. The last of these presumes that programs are already in place with contingency plans drawn up. Arguably, direct food distribution, including that of ready-to-use therapeutic food, may be part of the overall strategy. Even if such programs are too expensive for sustainable widespread use in the prevention of malnutrition, scalable food distribution programs may be cost effective to address the heightened risk of malnutrition following weather-related shocks.

Ahmed and Naphtali (2014) examined the socioeconomic characteristics and food diversity among households in Maiduguri Metropolis of Borno State, Nigeria. The Logit analysis revealed that the major determinants that positively influence food security in the study area among others are income, level of education, assets, cooperative membership and diet diversity while household size, child dependency ratio, hired labour and gender negatively influenced food security.

Basak (2015) conducted a study to empirically analyze food production and consumption pattern with nutritional status in Bangladesh. The study found that over the last twenty years (1991 to 2010) food production and resultant food intake has increased both in rural and urban areas, but it is increasing mainly in cereal-based carbohydrate which is likely to contribute in resolving the problems of inadequate food intake and chronic malnutrition among poor people, leaving inadequate supply and consumption of other elements of a balanced diet.

Bhattacharjee and Sassi (2021) presented the current food insecurity scenario in the slums of Dhaka city using the most recent 'Bangladesh Urban Informal Settlements Baseline Survey' dataset of the World Bank. They analysed the determinants of the household food calorie gap by applying the Inverse Hyperbolic Sine transformed Double Hurdle model. The determinants are organised to represent the three pillars of food security (food availability, access, and utilisation) and all three pillars had emerged as significant factors in determining the food calorie gap. From their empirical results, they highlighted some vital gaps in the National Food Policy and recommend broad areas of interventions for the betterment of the food security status among the slum dwellers of Dhaka.

Begum *et al.*, (2013) tried to understand the overall trend and pattern of food consumption and micro-nutrient intake using secondary data. The study revealed that total dietary energy consumption was 2230 kcal/capita/day which was higher than the total energy requirements of 2225 kcal/capita/day in 2003-2005. The shares of energy from protein (8.61%) and from fat (10.90%) were lower than 12% and 20% respectively, although upward trends for dietary fat and protein consumption were observed in between 1969-1971 and 2003-2005. The prevalence of child malnutrition declined in between 1992 and 2006. The results indicated that Bangladesh is not currently food secure in the sense of share of the total energy coming from protein and fat. **Fleming, E., & Luo (2021)** stated that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), most commonly referred to as COVID-19, is an acute infectious respiratory disease that has led to a global pandemic. While vaccination rollouts have begun, there is currently no effective cure for COVID-19. However, multiple factor treatment of the virus has been proven to be most efficient at slowing the rate of reproduction and spread of the virus as well as improving immune response once infected. Therefore, exploring the role that diet plays in both general immune function and specifically with SARS-CoV-2 may lead to better health outcomes globally. In addition, the role that national lockdowns have had in lifestyle changes will be discussed, and how

these shifts may exacerbate the morbidity and mortality of COVID-19.

Mustisya *et al*. (2016) investigated the effect of household education attainment on food security among poor urban households in Kenya. Household food security was constructed from a set of four key items while education was the average years of schooling for individuals aged 18 years and above in a household. The ordered probit results showed a significant effect of education on food security. The probability of being food insecure decreased by 0.019 for a unit increase in the average years of schooling for a given household. The effect of education, remained significant even after controlling for household wealth index, a more proximate determinant of food security in a cash-based economy such as the urban slums. The findings highlighted the need to focus on the food security status of the urban poor. Specifically, results suggested the need for programs aimed at reducing food insecurity among the urban poor and enhancing household livelihoods.

Mazumdar (2012) reveals the contribution of increased agricultural productivity in food security in the developing countries. An intensive literature review is conducted in writing the article. It has depicted the different productivity measures in agriculture and their relative uses. It explains several non-conventional production factors influencing agricultural productivity growth along with conventional production factors. It also explains how increased agricultural productivity is linked with food security, rural livelihood as well as rural poverty reduction. Finally, it demonstrates why increased agricultural productivity is necessary for developing countries including Sub-Saharan Africa and it also provides a few policy options to increase agricultural productivity in developing countries.

Moniruzzaman (2020) conducted the impact of international remittances on household food security, using robust food security measurement indices constructed from a cross-section sample of rural households in Bangladesh. A Two Stage Least Square Instrumental Variable Method (2SLS-IV) and Generalised Method of Moments (GMM) were used to regress food security measurement indicators with remittances and households socioeconomic and demographic variables. Results indicated that remittances influence food security conditions significantly and therefore represent a critical component of household food security. In general, remittances are positively correlated with household food-related consumption expenditures. The results also indicate that the presence of remittances reduces food-related uncertainties and provides a coping strategy for the household to counterbalance food-related shocks and improves the quality of diet in remittance-receiving households.

Ngambi *et al.*, (2013) focused on the potential for goats to reduce poverty in Sub-SaharanAfrica. They offered information on the present status of goat populations and their productivity. The current systems of production are described. The social and economic roles played by goats in food security and income generation are considered. The potential of goats in food production is discussed in terms of productivity, economic importance and potential for increasing food production in Sub-Saharan Africa. The rising demand for animal products from increasingly wealthy urban elites also offers a tremendous opportunity for goat farmers to share in the growing wealth of urban centres.

Omotayo *et al.* (2018) examined the socio-economic characteristics of the farming households in the study area and empirically analyzed the effect of poverty on their food security level in some selected states of Nigeria. Data were analyzed using linear regression with endogenous treatment effect. The empirical findings of the study therefore, recommended among others that considerable investment in human capital should be encouraged since that could help in reducing poverty and food insecurity in the study area. Also, there should be intensification of enlightenment campaigns and programs on birth control measures and on the benefits of small household size as increase in households size increases the odd food insecurity among the rural dwellers.

Roy *et al*. (2021) examined household food insecurity and dietary diversity of women of reproductive age in the rural areas of northwest Bangladesh. Determinants of household food insecurity were examined, and associations between household food insecurity and low dietary diversity were determined. The majority of the households were mildly insecure (51.2 %) followed by moderately insecure (27.4 %). The households felt anxiety of food insecurity for more than six months a year (Food Security Index = 2.10 out of 4.00). The mean food group consumed by women was 4.63 indicating low dietary diversity and dominance of diets by grains and dark green leafy vegetables. The findings also indicated a significant and positive association between household food insecurity and low dietary diversity of women.

Ruel *et al.* (2017) reviewed the status of poverty, food security and malnutrition in urban compared to rural areas; provided an overview of the unique challenges and opportunities for urban dwellers to generate income and achieve food security and nutrition; and discusses the implications for urban programs, policies and research. Their review confirmed that the location of poverty is rapidly shifting from rural to urban areas and that food insecurity and malnutrition in all its forms are highly prevalent among urban dwellers.

Rahman *et al.*, (2021) highlighted the current state and changes of food security in Bangladesh in the context of COVID-19. During the COVID-19 period, the income of a certain set of people fell, which may have contributed to the growth in the poverty rate. It also had an impact on the agro-food systems, supply-value chain, and market levels as a result of the lockdown, movement and social gathering restrictions. The COVID-19 pandemic has an impact on the total food consumption status of the entire country, affecting all segments of the population. To obtain a greater understanding, our analysis identifies current gaps and the pandemic's potential impact from previously published works and reports.

Shetu (2016) conducted a study to measure by taking the primary data from respondents of four upazilas namely Sirajgonjsadar, Kazipur, Belkuchi and Shahjadpur. To assess the food security condition, protein intake was also taken as a basis besides the traditional practice of the use of calorie intake. About 58.3 % and 15 % of the total respondents were found to be food secure on the basis of calorie and protein intake respectively. The level of income and education was found positively significant for the food security status. The study also showed that the effects of age of the family head and family size were found significantly negative to the food security.

Thorne-Lyman *et al.*, (2010) examined associations between a simple dietary diversity score and commonly used indicators of socioeconomic status in Bangladesh. Data representative of rural Bangladesh was collected from 188,835 households over 18 rounds of bi-monthly data collection from 2003–2005. A simple household dietary diversity score was developed by summing the number of days each household consumed an item from each of 7 food groups over a 7-d period. The dietary diversity score was associated with per capita nongrain food expenditures (r =0.415), total food expenditures (r = 0.327), and total household expenditures (r = 0.332) using Spearman correlations (all P , 0.0001). The frequency of meat and egg consumption showed greater variation across quintiles of total monthly expenditure than other items contributing to the dietary diversity score. After controlling for other measures of socioeconomic status in multiple linear regression models, the dietary diversity score was significantly associated with monthly per capita food and total expenditures. Low dietary diversity during the period prior to major food price increases indicates potential risk for worsening of micronutrient deficiencies and child malnutrition in Bangladesh.

Wei *et al*. (2021) conducted to examine the relationship of six domains of women's empowerment with their food security in rural Bangladesh using a partial least square structural equation modelling approach. Their empirical analysis indicated that women's accesses to their legal and familial rights and decision-making roles in households increase their bargaining power over the utilization of resources and to choices of food which significantly and negatively decrease their food insecurity. Moreover, information and communication technologies and infrastructure facilities also negatively and significantly associated with women's food insecurity. However, women's leadership has a negative but not significant effect on their food insecurity, as low self-esteem rural women feel no ease in publicly addressing their inequalities. By understanding family composition from women's perceptions, the results from our research can assist policymakers to develop more suitable strategies to enhance the empowerment status of rural women and reduce their food insecurity.

Zabir *et al.* (2020) examined the difference in food security status of recipients and non- receivers of institutional support living under similar socioeconomic conditions. The food security index was 0.95 and 1.08 for non-receivers and recipients of institutional support, respectively. On the basis of calorie intake, with an average calorie intake of 2298.58 KCal, recipients of institutional support were found to be more food secured than non-receivers who reported 2020.75 KCal. The results also revealed that, though recipients of institutional support were more food secured, higher fluctuations were found in individual calorie intake by recipients than non-receivers. Finally, the food security of the farming households was found to be influenced by educational level, family size, number of facilities received and size of cultivable land area.

The above-mentioned review and discussion indicate that there are limited number of studies on food security and nutritional status Kishoreganj district. The result of these studies varies widely in different reasons. Most of the studies dealt with food production and consumption pattern with nutritional status, the economic losses of the affected people along with their food security condition, studied the availability of food as an essential element of the concept of food security. But there is hardly any study related to the food and nutritional security status of Kishorgonj area. Therefore, the present study is different from other research, and it adds a new dimension to the existing research in Bangladesh. Thus, the findings from this research are likely to provide useful information which will be helpful for researchers, related to policy maker in taking necessary steps for improving food and nutritional security of Kishorgonj district. Achieving food security requires

several transformations in agricultural as well as socio-economic policies such as targeting susceptible communities, promoting climate-smart agricultural practices, improving the resilience of resource-poor households, setting up a strong social safety nets program, reducingpost-harvest losses and food waste, and ensuring an efficient food distribution mechanism.

CHAPTER 3

METHODS AND MATERIALS

3.1 Prologue

An appropriate methodology is very essential for conducting scientific research. The method of collecting data depends on the nature, aims and objectives of the study undertaken. There are several methods of collecting necessary data and information. The present study based on field survey method where primary data were collected from the respondents. The following steps were followed in conducting the present study.

3.2 Selection of the Study Area

A *haor* is a wetland environment in Bangladesh's north-east that is literally a shallow dip in the shape of a bowl or saucer, also known as a back swamp. *Haors* absorb surface runoff water from rivers and canals during the monsoon season, resulting in wide lengths of turbulent water. *Haors* are vast bowl-shaped floodplain depressions in Bangladesh's north-eastern region, covering around 1.99 million ha (19,998 sq km) and housing over 19.37 million people. They have distinct hydro-ecological characteristics.

Kishoreganj is a district in the division of Dhaka, Bangladesh. It was previously a Mohkuma in the Mymensingh district. Greater Mymensingh, India's largest district, was divided into six districts: Mymensingh (Sadar), Kishoreganj, Tangail, Sherpur, Jamalpur, and Netrokona (presently all Mohkuma upgraded as district status). Kishoreganj is divided into eight municipalities, thirteen upazilas, 105 union parishads, 39 wards, 145 mahallas, 946 mouzas, and 1775 villages. There are 373 Haor/wetland located in the districts of Sunamganj, Sylhet, Habiganj, Maulvibazar, Netrakona, Kishoreganj and Brahmanbaria.

Nikli Upazila (kishoreganj district) covers an area of 214.40 sq km and is situated between the latitudes of 24°15' and 24°27' north and the longitudes of 90°52' and 91°03' east. It is bordered on the north by Karimganj and Mithamain upazilas, on the south by Bajitpur upazila, on the east by Mithamain and Austagram upazilas, and on the west by Katiadi and Karimganj upazilas.

Selection of the study area is an important step for this study. A study usually requires selection of an area for collecting data in accordance with the objectives set for the study. The area in which a field survey is to be made depends on the particular purpose of the survey and possible cooperation from the respondents.

According to Yang (1965) “the area in which a business survey is to be carried out depends on the particular purpose of the survey and the possible cooperation from the farmers. ’’The study area and sample units were selected keeping in mind the objectives of the study. The selected area is Nikli Upazila under Kishoregonj District. In Bangladesh most of the *haor* areas are located in Kishoreganj district. In Kishoreganj, among all the upazilas, Nikli Upazila has comparatively more small scale fisheries and majority of them are leaves a poor standard of living. They have not even enough education to understand about the food security also don’t have proper training about food security. That is why Nikli Upazila of Kishoreganj was considered as the study area for this study.

The reasons of selecting this area for the present study are noted below:

i. The areas were preferred because of the uniformity to the objectives of the study;
ii. The areas were well communicated for free movement and data collection; and
iii. It was projected that cooperation from the respondents in this area would be high. So that reliable data required for the study could be obtained.

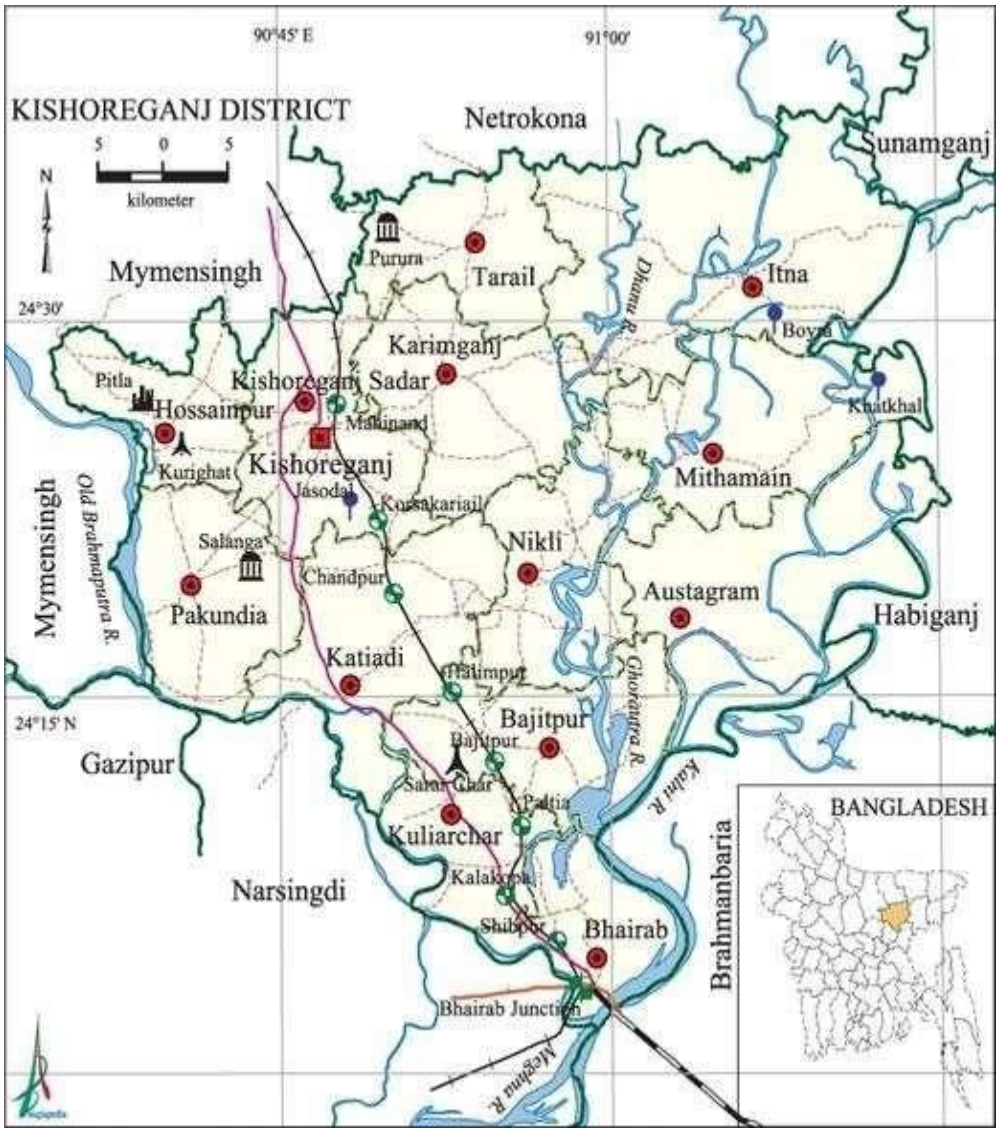

Figure 1: Map of the Kishoreganj District

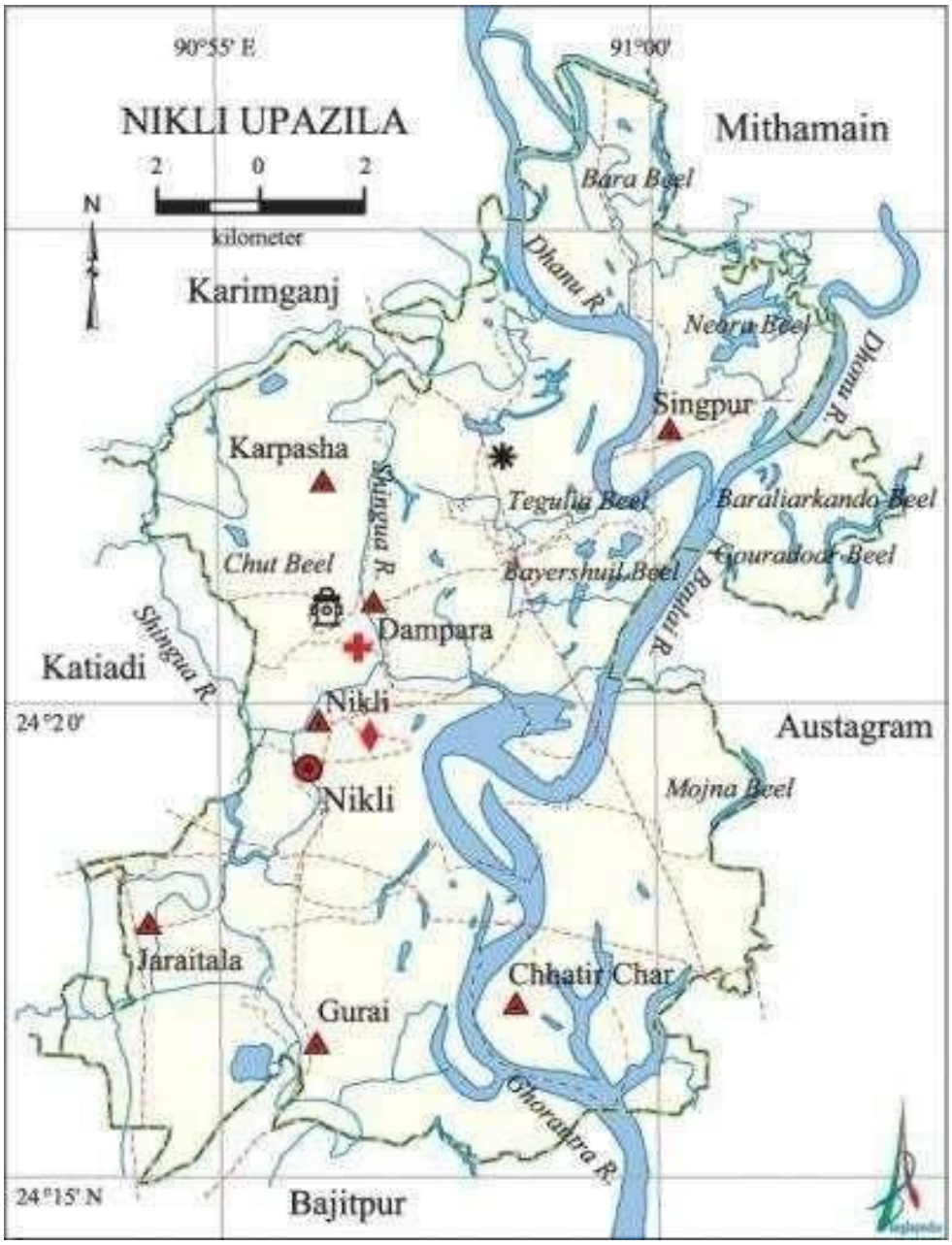

Figure 2: Map of the Nikli Upazila

Figure 3: Scenario of Nikli *Haor*

3.3 Preparation of Interview Schedule

The survey schedule was developed by keeping in view the objectives of the study to collect the expected primary data from Nikli Upazila of Kishoreganj district. A draft schedule was first prepared having the advice of the Supervisor. A set of interview schedules was prepared for collecting reliable information from the respondents. Later on, the draft schedule was tested and attention was paid for inclusion of new information that was not included in the draft schedule. Thus, the draft schedule was improved, rearranged and modified in the light of the actual and practical experiences. After making necessary adjustments, a final survey schedule was developed in logical sequence of the following items of information:

a. Socio-economic characteristics of the respondent;

b. Food and nutritional security related information of the respondents.

3.4 Selection of Sample and Sampling Technique

The selection of sample size was one of the crucial aspects for the study. A reasonable size of sample to achieve the objectives of the study was considered. A representative sample of respondents is thus chosen in such a way that the information meets the purpose of the study. Because the population was large, and also because time, effort, and funds were limited, 110 small scale fishermen were drawn from the study area using a simple random sampling technique.

3.5 Collection of Data

Data and related information collected through direct interview from the selected respondents. Collection of accurate and reliable data from the field is not an easy work. All possible efforts were made to ensure the collection of reasonably accurate information from the field. When the respondents were not so much busy with their activities, then the selected respondents were interviewed using semi-structured interview schedule. During the interview, each respondent was given a brief introduction about the nature and purpose of the study. The questions were asked systematically in a very simple manner with explanations wherever it was felt necessary and the replies were recorded on the schedules. After completion of each interview, the interview schedules were checked and verified to be sure that answers to each question was properly recorded. If any data appeared to be inconsistent, the respondents were again interviewed for relevant answers. In order to minimize errors, data were collected in local units. The data and information were collected in January to March, 2021.

3.6 Data Processing

After collection of primary data from the study area, these data were summarized and scrutinized carefully before the actual tabulation was done. The processed data were transferred to a M.S. Excel sheet. After completing the pre-tabulation task, actual tabulation work was stated. Lists of the tables were prepared and finally tabulated data were analyzed on the basis of the objectives of the study. Data were analyzed using STATA.

3.7 Methods of Data Analysis

Analysis of data provides sense for the data collected during the field work. The details of

methodological approach employed on outlined below. The method of data analysis is presented with uniformity of the objectives of study under following heads.

3.7.1 Descriptive statistics

The study employed frequency tables, percentages and arithmetic mean in analyzing the socioeconomic characteristics of the respondents, dietary diversity of households, and average etc.

3.7.2 Binary Logistic regression

Following Wongnaa and Babu (2020), the binary logistic regression model was employed in analyzing the factors influencing food security status of the farming households. The dependent variable was food security which was measured as whether or not a respondent household was food secure. Households with dietary diversity scores of at most 4 points were considered food insecure and those with scores of at least 5 points were considered food secure (Zabir *et. al.*, 2020). This led to a binary dependent variable, making the logit model an appropriate model to be employed in this study. The framework employed to examine determinants of food security of small scale fishing community is such that individual fishing households may or may not be food secured. The food security model representing food security status employed in this study, follows the threshold theory of decision-making Hill and Kau (1973) proposed. That is, whether or not individuals are food secured has a reaction threshold.

The objective of this study can be achieved by using the linear probability model (LPM). But this LPM is plagued by many problems including heteroscedasticity of the error term, the possibility of 'y' lying outside the range (0, 1). To avoid the problems associated with the LPM, we should model the relationship in such a way that 'y' is unobservable variable, and the relationship is given by

$$Y = 1 \text{ if food secured}$$

$$0 \text{ if not secure}$$

Where, 1 stands for food secured and zero for food insecure.

Logistic regression technique can be used to model the relationship between the dichotomous dependent variable and set of independent variables that are hypothesized to affect the outcome. The logistic regression model characterizing the adoption of household food security is given by:

$$Ln\{P_i/(1-P_i)\}=\beta_0+ \beta_1X_1+ \beta_2X_2+\ldots\ldots\ldots+ \beta_{10i}X_{10i}\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

This $[P_i/(1 - P_i)]$ is simply the odds ratio in favor of food security i.e. the ratio of the probability that the household is food secure to the probability that it is not food secure. The subscript 'i' shows the i^{th} observation in the data. β_0 is the intercept of the model, while X_1, X_2, X_3… X_{10} are the independent variables. It should also be kept in mind that the estimated coefficients do not directly affect the change in corresponding independent variables on the probability of the outcome. Rather, the coefficients reflect the effect of individual independent variables on its log of odds. The positive coefficient shows that the marginal effect will increase as the independent variables increases, and conversely, the marginal effect will decrease as the independent variables decreases. The logistic regression coefficients are estimated by utilizing the maximum likelihood estimation methodology.

3.7.3 Constraints facing index (CFI)

Constraints faced by survey respondents in the study areas were measured by using structured questionnaire. The respondents were asked to give their opinion on 6 selected constraints which were identified during data collection period. A four-point rating scale was used for computing the constraint score of a respondent. For each constraint score of 3, 2, 1 and 0 was assigned to indicate the extent of constraint as high, medium, low and not at all, respectively. The total constraint scores were computed for each respondent by adding his scores for all the constraints. The Constraint Facing Index were computed using the following formula (Mozahid *et al.*, 2017):

$$CFI = (C_h \times 3) + (C_m \times 2) + (C_l \times 1) + (C_n \times 0)$$

Where, CFI = Constraints Facing Index;

C_h = Number of respondents having high constraints;

C_m= Number of respondents having medium constraints;

C_l= Number of respondents having low constraints;

C_n =Number of respondents having no constraints.

CHAPTER 4

SOCIOECONOMIC CHARACTERISTICS

4.1 Preface

An attempt has been made in this chapter to identify the socioeconomic characteristics of the households in the study area. There are numerous interrelated and constituent attributes that characterize an individual and these profoundly influence development of his or her behavior and personality. Behavior of an individual is largely determined by his or her socioeconomic characteristics. Food security situation of different households would be influenced by their characteristics. The major characteristics considered in this study were age, family size, literacy level, occupational structure, land ownership, monthly family income and expenditure etc.

4.2 Age Distribution

Age of the respondents is an important factor in the involvement in an income generating activities. The age of the respondent varied from 16 years to 80 years. In the present study, they were classified into different age groups such as: 16-25 years, 26-35 years, 36-45 years, 46-55 years and above 55 years (Abka, 2013).

Table 4.1: Age Distribution of the Respondents According to Age

Age group (years)	Number of respondents	percentage
16-25	17	15.45
26-35	43	39.09
36-45	34	30.91
46-55	10	9.09
Above 55 years	6	5.45
Total	110	100

(Source: Household Survey, 2021)

Table 4.1 shows some basic information about the respondents. This table reveals that 39.09 % of the respondents were between the ages of 26-35 years, 30.91 % of the respondents were between the ages of 36-45 years, 15.45 % of the respondents were between the ages of 16-25 years, 9.09 % of the respondents were between the age of 46-55 years and above 55 years.

4.3 Family Size of the Respondents

Family size of the respondents ranged from 2 to 9 members. Distribution of households according to their family size is shown in Table 4.2

Table 4.2: Distribution of Households According to their Family Size

Categories	Number of households	Total members	Average
Small family (up to 3)	21	54	2.57
Medium family (4-6)	51	245	4.80
Large (7 and above)	38	286	7.52
Total	110	585	5.32

(Source: Household Survey, 2021)

Family size of the respondents is classified into three categories (Abka, 2013).

a. Small (up to 3members);
b. Medium (4-6 members) and
c. Large (7 and above).

It is evident from the table 4.2 that the average family size was about 5.32. The table also reveals that most of the respondents were within medium family size.

4.4 Educational Level of the Respondent

Learning, or the acquisition of knowledge, skills, values, morals, beliefs, habits, and personal development, is facilitated by education. It helps a person to have day to day information about the modern technologies, production cost and also production skills. Bangladesh literacy rate for 2020 was 74.91%, a 0.22% increase from 2019.

Table 4.3: Educational Status of the Respondent

Literacy level	Number of respondents	percentage
Illiterate	76	69.09
Literate	34	30.91
Total	110	100.0

(Source: Household Survey, 2021)

Literacy has its own merits and it contributes to economic and social development. Table 4.3 shows the educational level of the respondent's household. The table reveals that 69.09 % of the respondent were illiterate where as 30.91 % were found to be educated in the study area.

4.5 Average Annual Income of the Respondent

Income is the most important indicator of socio-economic status of people. Annual income of a family has been estimated on the basis of yearly carrying from all sorts of income accrued by all active male and female members of the family. The income distribution of the respondent was categories following household income and expenditure report (BBS, 2016).

Table 4.4: Distribution of Sample Households on the Basis Annual Average Income (BDT)

Categories according to Income (Annual)	Number of respondents	percentage of total
160000-190000	65	59.09
190000-270000	35	31.81
>270000	10	9.09
Total	110	100

(Source: Household Survey, 2021)

Table 4.4 depicts that about 59.09 % of the respondents income were fall in up to BDT 160000-190000. 31.81 % of the respondents were within BDT 190000-270000 and there were 9.09 % respondents in the category of BDT >270000.

4.6 Average Annual Family Expenditure of the Respondent

Average annual family expenditure of the respondents was categorized as foods, treatments, cloths, shelter, education, seed/feed/fertilizer, social program, religious program, net purchase, agricultural equipment's and entertainment.

Table 4.5 shows that annual family expenditure of the respondent was BDT 80400.8 of which 55.3 % was spent on consumption of food, second highest expenditure on shelter (12.8 %), 6.9 % expend on seed/feed/fertilizer, 8.0 % on net purchasing, 6.8 % spend on loan payment, 2.7 % spend on religious program, 3.3 % expend on treatments, 2.0 % spend on cloths, 0.4 % spend on entertainments and only 0.4 % expend respectively on education and agricultural equipment.

Table 4.5: Average Annual Family Expenditure of the Respondent (BDT)

Items	Per sample households	percentage of total expenditure
Foods	44466.8	55.3
Treatments	2710.0	3.2
Cloths	1621.6	2.0
Shelter	10331.6	12.8
Education	333.3	0.4
Agricultural input	5590.0	6.9
Social program	510.0	0.6
Religious program	2223.3	2.7
Net purchase	6467.5	8.0
Agricultural equipment's	333.3	0.4
Entertainments	321.6	0.4
Loan payment	5491.6	6.8
Total	80400.8	100.0

(Source: Household Survey, 2021)

4.7 Livelihood Status of the Households

Food security can be achieved by ensuring sufficient availability or supply (e.g. through agricultural production or food aid) and also access (e.g. entitlements to food through market exchange, labour, or social networks). Food insecurity is the opposite state of a lack of access to food or an adequate diet – either temporarily (transitory food insecurity) or continuously over time (chronic food insecurity). These definitions emphasize the temporal aspects of food insecurity, the significance of treating vulnerability, and the significance of safe and sustainable livelihoods as the foundation of food security

Similarly, Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) defines food security as a state that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active life.

Food insecurity, when people lack this, is seen to be due to unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate utilization at household level. Vulnerability is also seen to be key, referring to factors placing people at risk of becoming food

insecure or reducing ability to cope. As do other definitions, the FIVIMS definition highlights the importance of food access entitlement and availability, and the importance of the temporal dimension, risk and vulnerability. Other key elements of livelihoods approaches are relevant to food insecurity measurement at the national and international levels (participation, user focus, complexity of livelihoods: importance of access as well as food availability; importance of agriculture as well as non-agricultural activities etc) Further, sustainable livelihoods for poor people are recognised by international agencies as vital ensure food security. It is these factors that demonstrate the close link food security most closely to livelihoods concepts.

Livelihood standards were measured by indicators such as: use of sanitary latrine, drinking of tube well water, use of electricity, buying ability, adoption of contraceptive measures, opportunity for medical facilities, schooling of children, and participation in cooperative society.

Higher the users of these facilities higher were their standard of living. Table (4.6) shown that, 56.36 % of households had using pit latrine and 43.64 % using sanitary latrine, 69.09 % of households were using tube-well water as the source of drinking water, and 40.00 % of households had credit facilities but most of the facilitator gets credit from NGOs.

Table 4.6: Livelihood Status of Respondent

Indicators		Users	percentage
Using latrine	Sanitary latrine	48	43.64
	Pit latrine	62	56.36
	Total	110	100.00
Drinking tube-well water		76	69.09
Credit facilities		44	40.00
Credit institutions	NGOs	34	77.20
	Bank	05	11.36
	Relatives	04	09.09
	Money lender	01	02.27
	Total	44	100.0

(Source: Household Survey, 2021)

The socioeconomic condition of the urban poor community in the study area was not satisfactory. The respondents were deprived of many amenities including some basic necessities such as treatments, education and recreations. The education level of the respondents was so poor. Lack of awareness is the cause of poor income of the respondent's families. They also not aware about the sanitation and family planning, most of the urban poor community households used pit latrine in their resident and family size in urban poor community area was large.

CHAPTER 5

FACTORS INFLUENCING FOOD SECURITY

Dietary diversity is usually operationalized as a summing of foods or food groups over a given reference period (Hoddinott and Yohannes, 2002). There is no standard way in which to operationalize dietary diversity which has led to many studies employing their own version of the score. Hoddinott and Yohannes (2002) compare dietary diversity to consumption (food and non-food) which is a proxy for food access, and caloric availability, which is a proxy for energy availability.

5.1 Household Dietary Diversity

Dietary diversity and also ranked accordingly into high dietary diversity (7-12), medium dietary diversity (4-6) and low dietary diversity (0 -3) (Taruving *et al.*, 2013). One of the most commonly used indicators is the Household Dietary Diversity Score (HDDS). HDDS indicator for sample population was also measured by the sum of HDDS of households divided by the total number of households. Twelve (12) food groups included in the HDDS were:

1. Cereals;
2. roots and tubers;
3. Vegetables;
4. Fruit;
5. Meat, poultry, offal;
6. Eggs;
7. Fish and sea foods;
8. Legumes, nuts and seeds;
9. Milk and milk products;
10. Oils and Fat;
11. Sugar/honey;
12. Condiments and Beverages.

These food groups were used to identify food intake quality of the households. Foods locally consumed in these food groups were determined and considered for the measure of food intake diversity in the study area. For the purposes of analysis, I arranged these into different groups according to the categories defined above which is computed in monthly basis.

Table 5.1: Categories of Food Groups

Serial Number	Food Groups	Point
1	Cereal food (Any bread, rice, noodles, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat or any other locally available grain)	1
2	Root and tuber (Any potatoes, yams, manioc, cassava or any other foods made from roots or tubers)	1
3	Vegetables	1
4	Fruits	1
5	Meat (Any beef, pork, lamb, goat, rabbit, wild game, chicken, duck, other birds, liver kidney, heart or other organ meats)	1
6	Egg	1
7	Fish (Any fresh or dried fish)	1
8	Any foods made from beans, peas, lentils or nuts	1
9	Milk or milk products	1
10	Any foods made with oil, fat or butter	1
11	Sugar or honey	1
12	Any other foods such as condiments, coffee or tea	1
	Total points	12

Key: If the answer is “YES” then award 1 point: If the answer is “No” award 0 points

This section presents estimated rural household dietary diversity categories as derived from the 12 food groups into: low, medium and high dietary diversity groups as summarized in the following table. Table shows that in the study area 60 % respondents have medium dietary diversity, 30.91 % have low dietary diversity and 9.10 % high dietary diversity. Low dietary diversity indicates those groups who consume three items of foods; medium dietary diversity indicates those groups who consume four to six items of food and high dietary diversity consume seven to twelve food items.

Table 5.2: Categorization of Respondents with Respect to Dietary Diversity

Particulars	Low dietary diversity	Medium dietary diversity	High dietary diversity
Dietary diversity score	0-3	4-6	7-12
No. of respondents	34 (30.91%)	66 (60%)	10 (9.10%)

(Source: Household Survey, 2021)

5.2 Food security status of the survey respondents

Food security refers to the availability of food and people's ability to obtain it. Household food security is defined as having adequate food for all members of the household at all times to live an active, healthy life. Households with dietary diversity scores of at most 4 points were considered food insecure and those with scores of at least 5 points were considered food secure. After analyzing the collected data by following dietary diversity scores, result presented in Table 5.3 shows food security status of the small scale fishing community at Nikli Upazila of Kishoreganj district. Result showed that among the respondents 55.45% were found food secured whereas 44.45 % were found food insecure.

Table 5.3: percentage of Food Security Status of the Survey Respondents

Variable	Number	%
Food secured	61	55.45
Food insecure	49	44.55

(Source: Household Survey, 2021)

5.3 Factors determining food security

Food and nutrition security is important as underlying factors in each individual's food intake and health, in their physical and cognitive capacities, and in a nation's capacity for economic and social growth and development. The respondents of this study are poor and they always survive with food insecurity. This chapter provides information on factors affecting the food security status of the respondents. A number of factors influence household food security including household assets; homeownership; household saving; financial constraints; access to credit; education; ownership of livestock; knowledge of the household about food storage, processing, nutrition and management of illness and etc. This study taken into consideration with nine variables as affecting factors. The descriptions of the study findings are stated below. Table 5.4 presents the results of the logistic regression model for factors influencing food security status of the households interviewed for the study. Depending on the nature of variables, different researchers used different

methods in order to analyse the factors affecting food security. Here, both qualitative and quantitative variables such as age, education, family size, training, access to alternate income source, access to information, access to credit, expenditure on food items, farming at home were used as independent variables.

Based on previous literature and consulting with key informants of the study area, these variables were hypothesized to affect food security. The same variables were then used in this study to aid comparison of factors influencing the food security status of fishing community in the study area.

Table 5.4: Estimates of Factor Affecting Food Security Status of Fishing Community in Nikli Upazila

Variable	Estimated Coefficient			Marginal effect		
	Coefficient	SE	p-value	ME	SE	p-value
Constant	-73.394	30.648	0.017			
Age	-0.197	0.084	0.020	-0.0078**	0.003	0.013
Family size	0.354	0.315	0.262	0.014	0.012	0.269
Expenditure on food	16.569	6.786	0.015	0.657***	0.230	0.004
Education	3.032	1.408	0.031	0.135**	0.055	0.014
Training	0.958	1.532	0.532	0.042	0.075	0.569
Access to information	3.970	1.457	0.006	0.280***	0.101	0.006
Access to alternate income	0.739	1.143	0.518	0.032	0.053	0.549
Homestead gardening	0.301	1.095	0.783	0.012	0.044	0.786
Having loan	-2.651	1.095	0.052	-0.107**	0.046	0.021

Dependent Variable: Food security status; Reference category for Access to Alternate Income Source, Access to Information, having loan, Farming at Home is NO.

Age

The age of household's head in year is expected to have impact on his labor supply of food production. It is also expected to have impact on ability to seek and obtain off-farm jobs and income, which could increase household income. Young people are stronger and are expected to cultivate larger size farm than old people. However, the marginal effect (ME) of the independent variable age was found to be -0.0078 which implies that an increase in age by one year would decrease the probability of a household being food secure by 0.78 %. The result is significant at 5 % level of significance.

Family Size

The number of individual members in the household measures household size. Since food requirements increase with the number of persons in a household, it is expected that with the increase in family size food security status may decrease. The marginal effect (ME) of family size was found 0.014 which implies that, an increase in household size by one person would increase the likelihood of a household being food secure by 1.4 %. But the finding was found insignificant.

Education

Education, which is one of the most important basic needs for humans irrespective of status and geographical area, was found insignificant associated with household food security (p=0.922). The marginal effect (ME) of education (0.135) showed that people who are educated 13.5 % probably they are more food secured than the people who are illiterate. The effect of education was found to be significant at 5 % level of significance for the respondents in the study.

Training

Food can become contaminated by improper storage, cross contamination, undercooking and person-to-person contact. Food safety training will ensure that households are aware of the ways to prevent these things from happening. Food safety training can help with quality control. When households are properly trained, less food is spilled, contaminated or lost due to poor handling. Besides other types of training like crop farming, livestock rearing, homestead gardening etc. help and encourage people to start in home food production. The ME of training was found to be 0.042 which implies that household who has training 4.2 % probably more food secured than who don't have any training. The finding is insignificant (p =0.569).

Access to information

Access to reliable and timely information is important to households, the major bottlenecks household cited to improving their income were related to physical resources and the natural situation, including climate variability, flood conditions, and inadequate irrigation. High costs of inputs, labor availability, and access to markets were also ranked as major bottlenecks to improve household incomes. The ME of access to information was found to be 0.280 which implies that household who has access to information 28 % are probably more food secured than who don't have access to information. The finding is significant at 1 % level of significance.

Access to alternate income source

Income sources are divided into: (i) income obtained by the household in the form of food which is directly consumed by the household. (ii) income in cash. Alternate source of income has an impact on food security since alternate source helps people to ensure a smooth flow of food supply for the household. The marginal effect of access to alternate income source was found to be 0.032 which means that household who has access to alternate income source was 3.2 % likely to more food secured than who don't have access to alternate income source. But the finding is insignificant.

Having loan

Since majority of the households have limited earnings and no saving at all, they are forced to take loan from various informal and formal sources. In this study, households were considered who have taken loans from formal sources (NGOs and Govt. agencies), which is termed as microcredit. The ME of having loan was found to be -0.107 which implies that household who has loan was 10.70 %, probably they are less food secured than who don't have loan. The finding is significant at 5 % level of significance (P = 0.028). The association between food security and access to credit was discovered to be negative, and one probable explanation is that individuals who have loans must pay the debt, which requires them to decrease their budget from food products.

Expenditure on food items

The share of total household expenditure spent on food is an indicator of household food security because it is widely documented that the poorer and more vulnerable a household, the larger the share of household income spent on food. This observation is known as Engel's law, which demonstrates that as incomes rise, both within a country and across countries, expenditure on food increases while expenditure on other things increases even more, so that the share of total income spent on food declines. Given this observation, the indicator is especially helpful to understand the impact of food price fluctuations on both the quality and quantity of household food consumption. If a change in food prices results in a higher share of total household expenditure being spent on food, then this can result in the household being more resource constrained (i.e., poorer) as a result of the increase in food prices. Consequently, depending on the specific foods, households that are very poor and already consuming the lowest-cost foods will be unable to substitute cheaper foods and will be forced to spend more on basic staples, reduce the quality of their diets, or even reduce

the quantity consumed of the least expensive foods, while also reducing non-food expenditures that may be equally needed (e.g., on health and education). The ME of food expenditure was calculated 0.230 which implies that an increase in household expenditure on food items would increase the probability of a household being food secure by 23 %. The implication was that increasing household expenditure on food items would increase food security. And the finding is significant at 1 % level of significance.

Homestead gardening

The most fundamental social benefit of farming at home from their direct contributions to household food security by increasing availability, accessibility, and utilization of food products. Farming at home is maintained for easy access to fresh plant and animal food sources in both rural and urban locales. Food items from farming at home add substantially to the family energy and nutritive requirements on a continuous basis. The ME of farming at home was found to be 0.012 which implies that households with farming at home is 1.22 % likely to be more food secured than the household who don't have farming at home. But the finding was found insignificant.

The findings of this chapter shows that there are five factors among nine, namely family size, training (yes), access to alternate income source (yes), access to information (yes), having loan (yes) and expenditure on food items, those have significant on food security status of the study area. Here the Hosmer and Lemeshow Test statistics was estimated as insignificant which implies that the model is well fitted.

Table 5.5: To Check Multicollinearity of Independent Variables

	Age	Family Size	Food Expenditure
Age	1.0000		
Family Size	0.0660	1.0000	
Food Expenditure	-0.1714	-0.0779	1.0000

From table 5.5 it can be seen that the highest value of correlation is 0.0660 which is less than 0.7. Also tested the VIF (Variance inflation factor) to check the multicollinearity among the independent variables. However, from table 3.2 the result show that, Variance inflation factor's minimum value is 1.07 and the maximum value is 2.44 which is less than 10. That's why there's no multicollinearity problem in this data.

Also tested the heteroskedasticity where Chi-Square value is 0.00 with P-value 0.9990 indicates that there's no problem in this data.

Table 5.6: To Check the Variance Inflation Factor

Variable	VIF	1/VIF
Age	1.11	0.898253
Family Size	1.07	0.934262
Food Expenditure	2.44	0.409371
Education	1.21	0.826006
Training	1.57	0.635501
Access to information	2.21	0.452454
Access to alternate income	1.88	0.532643
Homestead gardening	1.17	0.855069
Having loan	1.21	0.828589

CHAPTER 6

PROBLEMS FACED DURING ACCESSED TO FOOD

6.1 Constraints Faced by the Respondent

The respondents were asked to mention the problems they faced during accessed to food. The respondents were given 6 problems related to the problems of access to food. The problems were climate change, population growth, increased cost of food items, uncontrolled market, high extent of poverty and limited access to alternate source of income. The respondents specify the level of problems between high problems to not at all a problem. The findings of problems faced by the respondents are stated below.

6.1.1 Climate Change

Global warming is increasing temperatures by around 0.2°C every 10 years. Rainfall is increasing in some places, but decreasing in others. Higher temperatures and unreliable rainfall make farming difficult, especially for those farming marginal lands, who already struggle to survive. When they suffer drought there is less food available globally and global food prices increase, leaving the poor most vulnerable. Climate change poses crucial impediments to sustainable development for Bangladesh. Sea level rise due to climate change could engulf 17 % of the land area in Bangladesh by 2050, diminishing cultivatable areas and causing 35 million people to be landless (Ismail, 2016). The increasingly unpredictable weather and climate changes jeopardise the already fragile agricultural support and elements of food security in Bangladesh. This simple supply-and-demand has big impacts: Climate change and weather disasters (such as floods or drought) can lead to inflated prices for the food that is available.

Among 110 sampled respondents 55 faced this constraint at high extent, 19 intermediaries faced at medium extent, 22 intermediaries faced at low extent and about 14 intermediaries did not face these constraint In this case, the computed value of CFI was 330against a possible range from 0 to 240 for each (Table 6.1). This problem was ranked 5th among 6problems.

6.1.2 Population Growth

Population growth, however, is one of several demographic factors likely contributing to the current food crisis. Urbanization, the growth of the middle class and associated changes in consumption patterns, migration and wage employment and large family size are all contributing factors as well.

Population growth has been the most discussed demographic dimension of the food crisis because of its very direct impact on the growth in food demand. Demand for food is projected to double by 2030 and 20 % of that increase is attributed to population growth. Neither population growth nor food productions are evenly distributed across the globe. The relationship betweenpopulation growth and food security is not limited to increased demand for food. Population growth can also have an impact on the food supply and access. Out of 110 respondents in the study area, 52 faced this constraint at high extent, 26 actors faced at medium extent, 25 intermediaries faced at low extent and about 8 intermediaries did not face this constraint. In this case, the computed value of CFI was 233 against a possible range 0 to 330 for each (Table 6.1). This problem was ranked 3th among 6 problems.

Table 6.1: Problems Faced by the Respondents during Access to Food in the Study Area

Variables	Level of problems					
	High (3)	Medium (2)	Low (1)	Not at all (0)	CFI	Rank
Climate Change	55	19	22	14	225	5
Population Growth	52	26	25	8	233	3
Increasing cost of food	76	17	11	6	273	1
The uncontrolled market	61	34	10	5	261	2
High extent of poverty	44	34	18	14	218	6
Lack of alternate source of income	56	25	12	17	230	4

(Source: Household Survey, 2021)

6.1.3 Increasing Cost of Food

Rising food prices can have a devastating effect on the health of poor households by making it more difficult for them to afford basic food baskets. A sharp rise in food prices can significantly affect household consumption and nutrition, particularly in developing economies, where food accounts for a larger share of family budgets than in developed countries. Rising inflation, particularly when driven by sharp increases in food prices, raises poverty, increases malnutrition, and curtails the consumption of essential services such as education and health care. Out of 110 respondents in Nikli Upazila of Kishoreganj, 76 faced this constraint at high extent, 17 actors faced at medium extent, 11 intermediaries faced at low extent and about 6 intermediaries did not faced these constraint. In this case, the computed value of CFI was 273 against a possible range from 0 to 240 for each (Table 6.1). This problem was ranked 1st among 6 problems.

6.1.4 The Uncontrolled Market

The uncontrolled market, which is officially recognized, is free of controls and legal provisions that affect prices of food items. The supply and demand conditions in the uncontrolled market are largely determined by the level of activity in the controlled economy owing to resource constraints. These conditions form linkages with the controlled economy and allow feedbacks between the two markets to occur.

Supply in the uncontrolled market is limited by the demand for factor inputs and services in the controlled economy. The traditional sources of supply are re-trading of controlled goods and non-controlled production. However, with economic reforms and liberalization of the controlled economy in a number of CPEs, the source of supply is substantially widened as enterprises are officially permitted to sell their above-quota production in the uncontrolled market.

Demand in the uncontrolled market is determined by factor incomes, including unplanned wage increases. Since the controlled economy is characterized by shortages of goods at the official prices, the uncontrolled market provides an outlet for this excess demand. The outlet is not only just for consumer goods but also for production goods. An uncontrolled market reduces excess demand but it cannot eliminate the inflationary gap because of repressed inflation in the controlled market. In reaching the equilibrium, prices and wages rise to a higher level (once and for all), while output expands to its potential consistent with efficient utilization of resources. Out of 110 respondents in the study area, 61 faced this constraint at high extent, 34 actors faced at medium extent, 10 intermediaries faced at low extent and about 5 intermediaries did not face this constraint. In this case, the computed value of CFI was 261 against a possible range 0 to 330 for each (Table 6.1). This problem was ranked 2nd among 6 problems.

6.1.5 High extent of poverty

A vital relationship exists between food security and poverty. Poverty creates unstable and unfavorable conditions that may contribute to fueling the problem of malnutrition. People living in poverty often face financial limitations, which hinders their ability to access safe, sufficient, and nutritious food. Food insecurity compromises people's ability to acquire the amount of food needed to fulfill the bodily requirement of calories and without sufficient calorie intake, an individual may not be able to build up energy or strength to carry out everyday life activities and this also hampers the capacity and productivity to earn. While people living in poverty may require a greater quantity of food than they currently have, it is important to take into

consideration that appropriates intake of nutrients and quality of food is equally important. Poverty can contribute to worsening malnutrition by compromising the quality of food intake and bolstering hidden hunger which is the deficiency of essential vitamins and minerals. Poverty leads to financial constraints that in turn lead to the consumption of cheap, high-energy staple foods, primarily carbohydrates, and fats rather than nutritionally dense food. Poverty plays a significant role in regulating access and preference of foods and this is evident in studies that showcase that when people living in poverty get a chance to spend relatively more on food; they often prefer to buy better tasting food, rather than good quality food.

Out of 110 respondents in the study area, 44 faced this constraint at high extent, 34 actors faced at medium extent, 18 intermediaries faced at low extent and about 14 intermediaries did not face this constraint. In this case, the computed value of CFI was 218 against a possible range 0 to 240 for each. This problem was ranked 6th among 6problems.

6.1.6 Lack of Alternate Source of Income

Passive income can be a great way to help you generate extra cash flow. Sustainable is important for ensuring continuous access to food. Where there is a lack of adequate income source, an alternate source of income can help a great extent to ensure flow of cash in all situations. Access to alternate income Out of 110 respondents in the study area, 56 encountered these constraints to a greater or lesser extent, 25 actors confronted them to a greater or lesser extent, 12 intermediates faced them to a lesser or lesser extent, and about 17 intermediaries did not face them at all. CFI was estimated to be 230 in this example, versus a theoretical range of 0 to 330 for each. This problem was ranked 4th among 6 problems.

CHAPTER 7

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Summary

The study was conducted at the Department of Agricultural Economics, Sher-e-Bangla Agricultural University from January, 2021 to March, 2021 to study of Food Security Status of Fishing Households in Kishoreganj.

This chapter highlights on the summary in the light of the discussions made in the earlier chapters. Conclusion is done on the basis of empirical result. Policy recommendations are given for improvement of the existing inefficiency of tomato production in Bangladesh.

This chapter presents the summary, conclusion and policy guidelines of the study. The study contains the salient features from the chapter dealing with introduction, literature review, methodology, description of the study area, socioeconomic characteristics of the respondents, food security, factor influencing food security and problems faced during accessed to food. Finally, it includes conclusion and policy guidelines. The specific objectives of the study are as follows:

- To document the present socioeconomic status of the households;
- To analyze the socioeconomic factors that affects the food security status of the households; and
- To suggest policy guidelines for improving food.

For fulfilling the objectives of the study, urban poor community of Nikli Upazila were selected purposively for the collection of data. 110 samples were selected purposively. Both tabular (i.e., average, percentage, ratio) and statistical techniques (i.e., binary logistic regression model) were done to achieve the major objectives of the study. Data were collected through direct interview using semi-structured questionnaire. The collected data were then entered in to the computer and data analysis was done by using the concerned software Microsoft excel and STATA.

Socioeconomic characteristics of the sample farmers considered composition of family size, educational status, occupational status and land ownership pattern. The average family size of sample households was 5.32 appears to be higher than the national average of 4.06 members (HIES, 2016). Education of level of sample respondents are 69.09 % are illiterate and 30.91 % are literate. Besides among the survey respondent’s 31.81 % hold yearly income from BDT

190000-270000. In the study area majority of the expenditure was observed in food items which hold 55.3 % of total cost.

The empirical results of the binary logistic regression model also indicated that there are several factors those affect food security status. Results showed that with the increase of expenditure on food, it would increase the food security status. Here access to information was found significant and has a positive relation with food security status. Same was observed on education. But having loan was observed as negatively related and significant. Among problems increasing cost of food, uncontrolled market situation and population growth was observed as serious problem.

7.2 Conclusion and Recommendations

By analyzing food security of household, it is founded that most of the household is live with poverty and food insecurity. Most of their income is expensed on food. They have very little amount for other basic needs. Government and different NGOs, development agencies should give attention to improve their situation. The *haor* fishing poor communities of the study area were found as the disadvantaged group of the society. The monthly income per household was comparatively lower from the national per capita income. On the whole, the households have to experience with risk and their life passed without refreshment. Their social status is very low. From the findings of the study, the following recommendations can be made to improve the socio-economic condition of the household and thereby improve their well fare. This research identified the socioeconomic conditions of small scale fishing community is not better.

- Most small-scale fishermen have trouble getting food because of factors like rising food prices, population growth, and uncontrolled markets. The government should take appropriate action to manage these circumstances, it is said.
- The government should provide loans with no interest or a minimal interest as they have not fallen into vicious cycles of interest and ensured their food safety;
- There remains an insignificant relationship between training of the small scale fishing community and food security. Thus, it may be recommended that suitable steps might be taken to increase the training level of the fishing households by establishing proper learning centers to reduce food security problems.

People of the urban poor community of Nikli Upazila *haor* community should be thinking of establishing small business, focus in on off farm activities, setting up cottage industries and so

forth. Increase of public awareness through the various publications and publicity for protecting resources should be done. Institutional credit should be made available to the household to meet their requirements.

The government and concerned authorities should take proper steps to reduce poverty and improve food security situation of the households. Government should give loans for them at a low interest rate. In different stress situations households could not take three meals in a day. In stress situations remained helpless and survive on their small savings, livestock, and other irregular non-farm and off-farm activities. Therefore, also provide more effective support to the vulnerable households during stress situations.

7.3 Limitations of the Study

In spite of all positive initiatives taken to conduct this study properly, the study had a number of limitations. These were:

- This thesis is limited to food security measurement, with focus on the three key indicators; it did not cover all existing food security indicators. Also, it did not cover the health aspect of nutritional security, as human nutrition goes beyond food to include health and care.
- The work is also limited to a household level study. This was chosen because the household still remains the most important space through which humans obtain their food. The sample included only 'regular' households and so excluded the homeless and people in transit.
- Most of the households were hesitant, also in some cases; they were reluctant to answer questions since they thought that the researcher might use the information against their interests. To earn the confidence of respondents a great deal of time was spent.
- Majority of the respondents were little educated and other were illiterate, thus it was very difficult to get accurate information because they did not keep the written records of their farm activities, income, expenditure, etc. The researcher had to depend solely on the memory of the respondents for collecting data because they did not care to keep any written records for their daily activities.

The limitations discussed above are, however, common in case of any field study. It can be assumed that the limitations stated above would not affect the findings of the study. Appropriate methodology, proper research design and appropriate statistical techniques have been used to overcome these limitations.

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APPENDIX

Definition of Terms

A number of key terms are used throughout the study are defined below for clarity of understanding.

Age

Age of a respondent was defined as the period of time in years from his or her birth to the time of interview.

Education

Education is defined as the ability of an individual to read and write or formal education received on to a certain standard.

Family size

It referred to actual number of permanent members in a family who live in a fixed dwelling unit and eat from the same cooking arrangement.

Family Member

A family member is a person who depends on the family. Family member can be a head of household, spouse, unmarried sons and daughters, married sons who are direct dependants, parents; unmarried sisters divorced or separated daughters or sisters. Servants, labourers and lodgers who have no other usual place of residence but live and eat together within the household with or without payments are not considered as family members.

Household

Household is the smallest unit of social institution. Almost all the socioeconomic activities are being performed around this unit. It can be defined as a dwelling unit where one or more persons live and eat together under a common cooking arrangement. Matrimonial or blood or both relations exist among most of the persons who reside in the dwelling.

Occupation

Occupation is generally the acceptable means of income to fulfill the financial requirement. It can be defined as a means associated with the activities from which the individual earns livelihood. Occupation may be a major or a minor, according to the greater or smaller share in income

Income of Household

Income means material return in cash or kind received in exchange of goods and services in a particular period. In case of household income, it refers to the material return of all the members of the household in the same period. So, household income in a particular period can be defined as the sum of the earnings of all the members of the household in cash or kind in the same period of time. Income from wages and salaries, pensions, contributions and professional fees earned by the members of the household are estimated on yearly basis Income from interest, dividends, earnings from agricultural activities, business, commercial and industrial establishments, land and property, rent, gifts and assistance and insurance benefits, including other special types or receipts by the member of the household are also estimated on yearly basis.

Secondary Income

Income received from extra source other than main source. This share of extra income must be less than that of main source.

Household Expenditure

Household expenditure includes household consumption and certain other outlays of the household. Consumption expenditure of the household is the aggregate value of goods and services actually consumed during the reference period. The non-consumption expenditure of the household includes income tax and other taxes, pension and social security contributions and related insurance premium, gifts and other transfers. Items extended from the expenditure schedule are additions to saving, various types of investment expenditure (both monetized and non-monetized) including amount spent.

Calorie

Calorie is the unit of heat. It is the amount of heat that requires changing the temperature of 1 cc of water to 1 degree Celsius. In case of poverty measurement, we used k.cal as the unit. It means that, the amount of heat required changing the temperature of one kilogram of water to 1 degree Celsius.

Food frequency

In this context, is defined as the frequency (in terms of days of consumption over a reference period) that a specific food item or food group is eaten at the household level.

Food group

Food group is defined as a grouping of food items that have similar caloric and nutrient content. Food item cannot be further split into separate foods. However, generic terms such as ‘fish’ or ‘poultry’ are generally considered to be a food items for the purpose of this analysis.

Food Security Status of Fishing Households in Kishorganj

1. Respondent information

Name of the respondent: ……. Mobile No: ……
Village:…….. Union:…….. Upazila:……..
District:…….

2. Household information

Sl. No	**Name**	**Relation with HH**	**Gender** 1=Male, 2= Female	**Age**	**Education**	**Marital status** 1=Yes, 2=No	**Main occupation**	**Subsidiary occupation**

Code

Occupation
1=House wife; 2=Landless farmer;3=Marginal farmer; 4=Ag.labor; 5=Factory worker; 6=Helper; 7=Fishing; 8=Small business; 9=Goat/sheep rearing; 10=Poultry; 11=Cattle; 12=Job holder; 13=Student; 14=Unemloyment; 15=Old;16=Children; 17=Paralysis; 18=Beggar; 19=Large farmer; 20=Probasi

3. Annual Expenditure pattern by respondents

Items	**Tk**
Foods	
Treatments	
Cloths	
Shelter	
Education	
Agricultural input	

Social program	
Religious program	
Net purchase	
Agricultural equipments	
Entertainments	
Loan payment	
Others	

4. Land ownership (in decimal)

Homestead land	Own cultivated	Mortgage in	Lease in	Fellow land

5. Other information

A. Access to credit:……. (1=Yes, 2=No)

B. Monthly family income:…… TK

C. Monthly expenditure:……. TK

D. Monthly expenditure on food items:…….TK

E. Yearly Savings:……..TK

F. No of earning member:……..

6. Categories of food groups you have consumed in the last 24 hours.

Food Group	**If yes give tick mark**
Any eggs	
Any vegetables	
Foods made from peas, lentils, nuts or beans	
Foods made from wheat, maize, millet, sorghum, rice, or any noodles, biscuits, bread, rice, or other locally available grain	
Any goat, lamb, rabbit, beef, wild game, pork, duck, chicken, other birds, kidney, heart, liver or other organ meats	
Any cassava, yams, manioc, potatoes, or any other foods made from tubers or roots	
Any fruits	
Any fresh, dried fish or shellfish	
Any other foods such as coffee, tea or condiments	
Any foods made with fat, butter or oil	
Any yoghurt, cheese, milk or other milk products	

Any sugar or honey	

7. **Livelihood Status**

Indicators		**Response** (1=Yes, 2=No)
Using latrine	Sanitary latrine	
	Pit latrine	
Drinking tube-well water		
Credit institutions	Money lender	
	Bank	
	Relatives	
	NGOs	

8. **Problems Faced by the Respondents**

Variables	**High (3)**	**Medium (2)**	**Low (1)**	**Not at all (0)**
Climate Change				
Population Growth				
Increasing cost of food				
The uncontrolled market				
High extent of poverty				
Lack of alternate source of income				

……..

Signature of the interviewer