FARMERS' PERCEPTION TOWARDS HARMFUL EFFECTS OF SOIL SALINITY ON FOOD PRODUCTION

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CERTIFICATE

This is to certify that thesis entitled, "**FARMERS' PERCEPTION TOWARDS HARMFUL EFFECTS OF SOIL SALINITY ON FOOD PRODUCTION**" *submitted to the Department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* **MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM**, *embodies the result of a piece of bona fide research work carried out by Registration No.* **19-10327** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

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TO

MY BELOVED

PARENTS

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The Author

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ABBREVIATION AND ACRONYMS

DAE	Department of Agricultural Extension
BBS	Bangladesh Bureau of Statistics
SPSS	Statistical Package for Social Sciences
GOs	Governmental Organizations
NGOs	Non-governmental Organizations
SAAO	Sub Assistant Agriculture Officer
AEO	Agricultural Extension Officer
UAO	Upazila Agricultural Officer
UISC	Union Information Service Centre
AICC	Agricultural Information and Communication Centre
et al.	And Others (at Elli)
Ha	Hectare
TK	Taka

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MD. HUMAYUN KABIR

ABSTRACT

Soil salinity seems to be one of the Important aspects of climate change that have harmful consequence on crop production .The purpose of this study was to determine farmers' perception towards harmful effects of soil salinity on food production and to explore the relationships between the characteristics of the farmers and their perception towards harmful effects of soil salinity on food production. The study was conducted in 3 villages of Taltali upazila under Barguna district. The populations of the farmers in these villages were 713 from where 106 samples were drawn by using random sampling technique. An interview schedule was used for data collection. Perception towards harmful effects of soil salinity on food production was measured by 5 point likert scale. Descriptive statistics such as mean, standard deviation, range and percentage were used to describe the variables under consideration. Pearson's Product Moment Correlation Co-efficient test was used to ascertain the relationship between the concerned characteristics and focus variables. Majority (84.9 percent) of the farmers' possessed favorable perception and (15.1 percent) of the farmers had unfavorable perception towards harmful effects of soil salinity on food production. Education, farm size, land under soil salinity, knowledge on soil salinity effects, of the farmers had positive significant relationship with their perception towards harmful effects of soil salinity on food production. The policy makers may concentrate the significant factors while making policy to reduce the harmful effects of soil salinity on food production

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Global climate change is predicted to decrease Bangladesh's agricultural gross domestic product (GDP) by 3.1% annually, and the importance of the intersection between agriculture and global climate change in Bangladesh cannot be overstated (Rajashree, 2018). The coastal regions of rural Bangladesh are particularly vulnerable to global climate change; climate change is threatening the life and livelihoods of coastal people through extremes of temperature and rainfall, drought, cyclones, storm surges, erosion of land masses, and disrupted soil salinity (Hasan *et al.*, 2013). Soil salinity describes the salt content naturally occurring within soil, and increasing the salt content is known as salinization. While the nature of the soil salinity problem is similar in different parts of the world, low-income countries like Bangladesh are more vulnerable than those in the developed world. Salinity and related saltwater intrusion are driven by climate-induced hazards, and in turn they adversely affect crop production in coastal zones of Bangladesh.

The World Bank (2000) estimated 0.10, 0.25, and 1 m rise in sea levels by 2020, 2050, and 2100, respectively, in Bangladesh. Three factors significantly impact soil salinity and its related impacts: direct contamination with salt water, tidal flooding during the wet season (June-October), and upward or lateral movement of saline spring water due to evaporation (Rasel *et al.*, 2013). The coastal region of Bangladesh is unevenly distributed into 64 upazilas (sub districts) in 13 districts covering eight Agro-Ecological Zones (AEZ) (Seraj and Salam, 2000). Large proportions of this land: about one-third of the cultivable land in Bangladesh fall within the districts of Satkhira, Bagerhat, Khulna, Patuakhali, Pirojpur, Barguna, and Bhola in southern Bangladesh. The farming community has shifted from native to high yield rice varieties to increase production and cope with rising soil salinity. Over half of coastal areas in Bangladesh have significantly reduced agricultural productivity due to increases in soil salinity (Hassnain *et al.*, 2005). Therefore, salinity represents a serious threat to global food security, especially in low-income countries like Bangladesh. Rabbani *et al.* (2013) reported that, after Cyclone Aila in 2009, farmers

experienced high salinity on their land, which consequently impacted their livelihoods. Farmers were unable to grow their regular crops due to high salinity and crop production was reduced.

Bangladesh is one of the most vulnerable countries to sea level rise due to the climate change. Soil salinity is one of the potential threats to the coastal ecosystem and agriculture which might hinder the country's future food security. The Intergovernmental Panel on Climate Change (IPCC) reports with high confidence that the landward intrusion of salt water is increasing and constitutes a climate change-sensitive trend that will lead to the salinization of groundwater, surface water, and soil resources particularly in low-lying coastal areas, river deltas, and estuaries (Oppenheimer *et al.*, 2019; Wong *et al.*,2014). Salinity from saltwater intrusion may contribute to the global scarcity of freshwater resources which is critical for the future global food security. The salinization of soil and water might cause a severe threat to aquatic balance, coastal livelihood, agriculture and infrastructure. The soil salinity is dynamic, globally spreading over more than 100 countries, and no continent, even Antarctica (originally thought to be free from salinity but glaciers), is not completely free from salinity. It occupies more than 20% of the global irrigated area. In addition to the generation of latest information on the global and regional extent of salinization, it is also essential to estimate economic losses due to salinization.

Recently Qadir *et al.*, (2014) presented global annual cost of salt-induced land degradation in irrigated areas. World is losing 2,000 hectares of farm soil daily to salt-induced degradation. Salt-spoiled soils worldwide are 20% of all irrigated lands, extensive costs include US$27 billion + in lost crop value per year. In 1990 annual cost of salt induced land degradation was US$ 264 per hectare, which increased to US$ 441 per hectare in 2013. With the pace of 2,000 hectares daily loss due to salinization, and assuming the business as usual, we leave it to the readers to project how soon the current irrigated land (310 million hectares currently producing 40% world food) will go out of agriculture production, and also forecast the population by then, and the fate of such decline on food supply.

Global environmental change poses complex threats to health and livelihoods, and food security is one of the major impact pathways. The literature on climate change

vulnerability links warming temperatures, precipitation variability, ocean acidification, drought, and flooding to food insecurity and the breakdown of food systems (Field *et al.*, 2014; Myers *et al.*, 2017).Increased rainfall and prolonged dry season, 62 cm sea level rise will claim about 364,200 ha (10%) more land inundated in the year 2080 (IWM and CEGIS, 2007). Depending on a study of the Soil Resources Development Institute (SRDI, 2010) an average increase of salinity is about 0.74% per year.

Evidently, soil salinity has increased from 0.833 million hectares to 1.056 million hectors in between 1973 and 2009 where only in nine years (2000-2009) it's affected 3.5 percentage of coastal land (SRDI, 2010). Interior coastal districts have been newly salinized about last four decades and has increased significantly to 3.76 m ha in 2007 from 2.96 m ha in 2000 (Ahsan and Sattar, 2010). Therefore, Bangladesh has 12.5 decimals arable lands per capita due to dense population and the newly climatic changes has increased threat on shrinking lands too (Quasem, 2011). This study has been conducted at Taltali Upazila under Barguna district where a good amount of land is severely affected by salinity. That is why the current study has been taken to understand the farmers' perception towards harmful effects of soil salinity on food production.

1.2 Statement of the Problem

Salinity intrusion is one of the major environmental issues throughout the world . Salinity causes a hostile environment for the normal crop production throughout the year in the coastal belt of Bangladesh. The organic matter content of the coastal soils is pretty low (1.0–1.5%). Nutrient deficiencies of N and P are quite common in saline soils. Micronutrients such as Cu and Zn are both widespread. As a result, the reduction of food crop production in the coastal region has significant impact on the national economy of Bangladesh. This threat is elevated because of the reduction of fresh water flow from upstream tidal flow and groundwater discharge. The coastal belt of Bangladesh consists of 19 districts, which cover 32% of the country and accommodate more than 35 million people During 1973, salinity affected 83.3 million hectares of land; this was increased to 102 million hectares by the year 2000. After that, salinity affected a recorded 105.6 million hectares during 2009. Among these affected areas, around 2.5 million hectares of low-lying coastal lands represents 0.9 to

2.1 salinity level (SL) in Bangladesh. Moreover most of the farmers in saline affected area are not aware of the proper drainage management to get maximum production from the existent land area due to the lack of knowledge and perception. Research is needed to find out farmers' perception towards harmful effects of soil salinity on food production. However, in order to make the present study meaningful attempts were made to find-out the answer of the following questions:

1. What is the scenario of socio-economic condition of farmers in saline affected area?
2. What is the perception of the farmers regarding harmful effects of soil salinity on food production ?
3. Are there any relationships between the selected characteristics of the farmers with their perception on harmful effects of soil salinity on food production ?

1.3 Specific Objectives

From the above statement of problem the researcher had set the following specific objectives:

I. To assess farmers perception towards harmful effects of soil salinity on food and income security.

II. To describe the selected characteristics of the farmers.

III. To explore relationship between selected characteristics of the farmers & their perception towards harmful effects of soil salinity on food production.

1.4 Justification of the Study

More than 600 million global people living in the low elevation coastal zone which will cross a billion by 2050, are vulnerable to climate change. The impact of climate change on these areas are not only potential inundation and coastal serge but also many factors including but not limited to soil salinity intrusion, aquatic habitat loss, land subsidence. Saltwater intrusion is one of the severe problems for the coastal areas around the world. Salinity from saltwater intrusion may contribute to the global scarcity of freshwater resources which is critical for the future global food security. The salinization of soil and water might cause a severe threat to aquatic balance, coastal livelihood, agriculture and infrastructure.

Bangladesh, a densely populated country, is one of the most vulnerable countries to the potential sea level rise due to the climate change. Many researchers claim that soil

salinity in coastal Bangladesh is increasing at an alarming rate due to the climate change. Cropland, fisheries and mangrove forest in coastal Bangladesh are already at risk due to the saltwater intrusion. In this context, the present study has been under taken to assess farmers' perception towards harmful effects of soil salinity on food production. The findings of the study may be helpful to formulate better strategies towards reduce the harmful effects of soil salinity on food production.

1.5 Assumption of the Study

Assumptions are things that are accepted as true or at least plausible by researcher and peers who will read the thesis. According to Good (1945), an assumption is the supposition that an apparent fact or principle in true in the light of the available evidence. Assumptions generally refer to the characteristics of the data, such as distributions, co-relational trend, variable type etc. violating these assumptions can be drastically invalid results though this often depends on sample size and other considerations. The researcher made the accompanying suspicions while undertaking this study:

i. The responses furnished by the respondents were reliable. The truth about their opinion and interest were expressed by them.

ii. The researcher who acted as interviewer adjusted to social and environmental conditions of the study area. Hence, the collected data by him from the respondents were free from bias.

iii. The respondents included in the sample for the study were competent enough to furnish proper responses to the queries included in the interview schedule.

iv. The findings of the study would give a clear concept on Farmers perception towards harmful effects of soil salinity on food production.

1.6 Limitations of the Study

Considering the time, money and other necessary resources available to the researcher and

also to make the study meaningful and manageable the researcher had to impose certain limitations as follows:

1. Few specific unions and villages in Taltali upazila under Barguna district selected as the study area southern region of Bangladesh.

2. The study was confined mainly to harmful effects of soil salinity on food production.

3. The characteristics of farmers in the study area were many and varied but only eleven characteristics were selected for investigation in this study as stated in the objectives.

4. For information about the study, the researcher was depended on the data furnished by the selected respondents during data collection.

5. The respondents for data collection were kept limited within the heads of farm families.

6. No secondary data input there.

7. For some cases, the researcher faces unexpected interference from the over interested side talkers while collecting data from the target populations. However, the researcher tried to overcome the problem as far as possible with sufficient tact and skill.

1.7 Definition of the used Terms

The terms which have been frequently used throughout the research work are defined and interpreted bellow:

Perception

Perception is also discussed at length in psychology. A general internet search for the keyword "perception" directs the reader to numerous psychology and cognitive websites where awareness and understanding of sensory information is discussed. These sites address the mechanics of vision and hearing, touch, taste, and smell. All of these are stimuli that are presented to an individual and interpreted in a specific and personal way. Perception of objects in the visual world is influenced by features such as shape and color as well as the meaning and semantic relations among them (Hwang, Wang, & Pomplun, 2011).

Soil salinity

Soil salinity is the salt content in the soil; the process of increasing the salt content is known as salinization. Salts occur naturally within soils and water. Salinization can be caused by natural processes such as mineral weathering or by the gradual withdrawal of an ocean. It can also come about through artificial processes such as irrigation and road salt.

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Income security

Income security is important for both society and the economy. If people have secure incomes it helps to prevent them from falling or remaining in poverty. They are also less likely to be subject to inequality. In addition secure incomes facilitate people to contribute to the economy. At an individual level income security greatly enhances everyone's ability to live a life of dignity.

Climate change

"Climate" is the average of the weather conditions at a particular point on the Earth. Typically, climate is expressed in terms of expected temperature, rainfall and wind conditions based on historical observations. "Climate change" is a change in either the average climate or climate variability that persists over an extended period.

Food Security

Food security is the measure of the availability of food and individuals' ability to access it. According to the United Nations' Committee on World Food Security, food security is defined as meaning that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life.

Crop productivity

Crop productivity is the quantitative measure of crop yield in given measured area of field. The use of new crop varieties and the efficient application of agrochemicals, immensely contributed to increased plant productivity. Rising temperature, altered rainfall patterns, and more frequent extreme events will increasingly affect crop production, often in those places that are already most vulnerable (Morton, 2007).

CHAPTER II
REVIEW OF LITERATURE

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing researcher to identify relevant theories, methods and gaps in the existing research. Conducting a literature review involves collecting, evaluating and analyzing publications (such as books and journal articles) that relate to research questions. The researcher made an elaborated search of available literature for this research. However, no study was found to be specially undertaken in this direction. This present chapter has portrayed some reviews of interlinked knowledge on this aspect that is endeavored. The interlinked reviews easily portrayed basic objectives of the study as far as possible. All the reviews in this chapter are from secondary sources and no new or original experimental work is reported there. . Review of Literature of this study is presented in (5) sections.

Section 1: Concept of soil salinity and its harmful effect on soil salinity on food production
Section 2: Farmers perception towards agricultural technology
Section 3: Relationship between farmer's socio-economic characteristics and perception
Section 4: The research Gap of the Study
Section 5: Conceptual Framework of the Study

2.1 Concept of soil salinity and its harmful effects of soil salinity on food production

Soil salinity is a worldwide problem that threatens the growth and yield of crops and prevents the sustainable development of modern agriculture. More than one-third of irrigated lands in the world are affected by salinization. The major causes of soil salinity are rising levels of groundwater with high salt content and poor-quality drainage and irrigation systems. Soil salinity is a major global issue owing to its adverse impact on agricultural productivity and sustainability. Salinity problems occur under all climatic conditions and can result from both natural and human-induced actions. Generally speaking, saline soils occur in arid and semi-arid regions where

rainfall is insufficient to meet the water requirements of the crops, and leach mineral salts out of the root-zone. Soil salinity undermines the resource base by decreasing soil quality and can occur due to natural causes or from misuse and mismanagement to an extent which jeopardizes the integrity of soil's self-regulatory capacity. Soil salinity is dynamic and spreading globally in over 100 countries; no continent is completely free from salinity. Soil salinization is projected to increase in future climate change scenarios due to sea level rise and impact on coastal areas, and the rise in temperature that will inevitably lead to increase evaporation and further salinization. There is a long list of countries where salt-induced land degradation occurs.

The Southwest (SW) region of Bangladesh is facing salinity intrusion both environmentally and anthropogenically. In that circumstance, the dominating livelihood agriculture is affected severely including soil and ground water degradation, health problems and long term effect on ecosystem. Study from the Soil Resource Development Institute (SRDI) found that, from 2000 to 2009, saline water intrusion increased up to 15 km north of the coast and in the dry season reached up to 160 km inland, entering into other interior coastal districts as well due to low flow from upstream rivers. In line with that, this article explored local people's experience with salinity intrusion in interior coast of SW region. Along with semi-structured & open ended questionnaire five focus group discussions and eight interviews were conducted to outlines the relationship between food security and salinity intrusion in regards of crop production and examines the impact of salinity on the crop production. Interventions to help residents cope with salinity in soil and water—including projects related to freshwater infrastructure and modified agricultural practices and inputs—are being tried by government and non-governmental organizations, but the magnitude of the problem remains significant. The Bangladesh government estimates that between 2015 and 2030, $3 billion USD and $8 billion USD will be needed for adaptation measures specifically targeting "salinity intrusion and coastal protection" and "food security and livelihood and health protection (including water security)," respectively (Bangladesh Ministry of Environment and Forests, 2015).

Rahman & Bhattacharya, (2014) stated that Situated in the heart of the Ganges River Delta, Bangladesh's southwest coastal region faces profound impacts on food

production from salinity. For the region's largely rural communities, food security and overall welfare depend on the ability to use land productively. Bangladesh's coastal population engages in commercial agricultural livelihoods including crops, horticulture, and fisheries while also relying on subsistence homestead food production activities. During the driest months of the year (roughly January through May), much of the region's arable land becomes too saline for crops to grow.

Salehin *et al.*, (2018) stated that at the same time, there is a lack of quality irrigation water. The surface waters found in canals and rivers become too saline for irrigation use and contribute to soil salinity as they seep into surrounding land, while aquifer water quality also becomes compromised from the exchange of shallow groundwater and saline surface water, groundwater pumping and lateral saltwater intrusion, and a lack of precipitation that would recharge the aquifer with fresh rainwater.

R. Rahman *et al.,* (2014); Salehin *et al.*,(2018) found that Over recent decades, saltwater shrimp aquaculture has rapidly proliferated in the region due to its apparent profitability and suitability for salinity-affected areas. Yet this type of aquaculture entails the deliberate retention of saltwater through a system of sluice gates and embankments and itself drives further salinization of land and water resources, highlighting the complexity of adapting agriculture to rising salinity.

Fiorella *et al.*, (2016) conducted that with human and environmental factors projected to drive salinity upward, a better understanding of how to safeguard the food security of communities living in this climate sensitive region is urgently needed. Rather than focusing on a single sector or type of industry, what is required is more nuanced knowledge of community-level experiences with salinity, its impacts on household food security, and communities' own assessment of adaptation strategies.

IPCC (2013) revealed that Soil salinity can in turn have a negative effect on production of agricultural crops. Globally, it is expected that incidence of increase and magnitude of extreme high sea level is very likely to continue in the late twenty-first century thus exacerbating the existing threats to human livelihoods.

Islam et al (2011) stated that Given the risk of food insecurity linked to salinization, farmers in the coastal Ganges Brahmaputra delta have needed to adopt innovative approaches resulting in changing cropping patterns. According to a recent study investigating changing livelihood strategies in the costal delta region, 70 % of interviewed farmers from Patuakhali district stated that their shifts to different crop production were motivated by the potential for increased food security.

Nicholls (2011) Climate change, in particular sea level rise, constitutes a threat to agricultural activities in delta regions because of salinization of surface and ground waters leading to greater soil salinity.

Afroz and Alam, (2010) noted that The South West region of Bangladesh is dominated by an extensive network of water systems forming the largest delta in the world. As the Brahmaputra, Ganges and Meghna rivers converge they generate a huge potential for the local population to engage in agricultural activities. As such, approximately 49% of the population is engaged in farming crops, livestock or aquaculture. Both environmental and anthropogenic issues have had a significant impact on local livelihood decisions. Salinity intrusion in rivers and canals has limited the access people have to freshwater bodies, reducing agricultural productivity.

Belton *et al.* (2014) revealed that Food security is a principle concern in poor underdeveloped countries, and with rice and fish considered staple foods within Bangladesh, fish consumption trends provide interesting scope when considering livelihood changes. He also showed that within all wealth classes people are becoming more reliant on farmed fish as a source of dietary protein, and as populations put pressure on capture fisheries the reliance on farmed fish species becomes even more necessary. This reliance is further highlighted by salt water intrusion, which lowers the indigenous fish diversity that the poorer classes rely on.

Mondal *et al.* (2001) showed that dry season soil salinity was over three times higher than during the rainy season, but through increasing crop production during this time top soil salinity levels can be lowered. The study also indicated that groundwater, although slightly saline, was still adequate for use during the dry season for agriculture and productivity levels would be adequate. However, continued use of

groundwater throughout the dry season does not allow for the aquifer to reload with freshwater and the area becomes increasingly more saline and unusable for agriculture.

Rasel *et al.*, (2013) stated that Three factors significantly impact soil salinity and its related impacts: direct contamination with salt water, tidal flooding during the wet season (June-October), and upward or lateral movement of saline spring water due to evaporation.

Rabbani *et al.* (2013) reported that, after Cyclone Aila in 2009, farmers experienced high salinity on their land, which consequently impacted their livelihoods. Farmers were unable to grow their regular crops due to high salinity and crop production was reduced. Low-income countries, particularly the least developed countries, have lesser capacity to adapt and are more vulnerable to other stresses (Intergovernmental Panel on Climate Change.

Panigrahi and Mohanty (2012); Dagdeviren(2007) found that Present salinity concentration has already put a threat to the crop production and a significant yield loss has already been observed in the dry season. In the changing scenario of sea level rise, it has been predicted that the increasing concentration of salinity will create more pressure to the farmer by reducing yield on one hand and threatening livelihood, income generation and food security on the other hand. Recently, the government has taken some initiatives for saving agricultural lands. But the initiatives are very limited. Mitigation and adaptation practise are not well identified in this study area so that it would be more effective for prioritizing to cope with alternative mitigation strategies.

Banerjee *et al.*(2012) noted that Soil salinity decreased with increasing distance from the tidal coast but no such trend was noticed in soil pH. Frequency of tidal inundation too seemed to affect soil salinity. An increase of soil salinization, organic carbon and pH due to anthropogenic activities in this part of the Sundarbans was identified, which if continued may decrease the potential of Sundarban soil as a carbon sink and make the soil highly unproductive.

Karim(2008);Soboll *et al.*(2011) stated that governments worldwide struggle to supply their citizens with freshwater, they will be forced to contend with saltwater intrusion along their coastlines Agriculture, forestry, and fisheries might face severe adverse effects due to increase water and soil salinity. The extent of increase in soil

salinity in a particular area within the coastal zone would determine the extent of crop loss.

Dearing *et al.*(2014) ;Alam (1996)reported that Deltas are subject to adverse environmental changes principally through human modifications of land use over the past century, notably through rapid deforestation, urbanization and agricultural development. Moreover, human interventions at a local level, such as dam-induced changes of river flow regime, oil extraction and groundwater extraction, influence the rate of subsidence which in turn contributes to the sinking of deltas. These changes are likely to have negative environmental and social consequences thereby putting human populations at risk of food insecurity.

Ericson *et al.* (2006); Syvitski *et al.*(2005); Wong *et al.*(2014) stated that Some of the deltas (e.g., Ganges–Brahmaputra and Yangtze River basin) are already facing the problems of Stalinization and water quality degradation which not only affects the land use and agriculture productivity of the region, but also the health and well-being of populations and the integrity of socio-ecological systems of deltas. Furthermore, soil and water salinity are projected to increase because of upstream water diversions, sea level rise and climate change.

SRDI (2010) Around 450,000 ha of coastal land were affected by salinity ingress where soil salinity exceeds 8 dS/m . Considering the salt tolerance of rice varieties, this area is likely to be marginally productive, unless good irrigation and land management practices are in place to mitigate the effect of such soil salinity levels.

Dasgupta *et al.* (2014); Ahsan and SDRI Team (2010) found that Due to sea level rise, over extraction of groundwater, upstream diversion of surface water and shrimp farming, the coastal Ganges Brahmaputra delta has been experiencing a relatively rapid increase in groundwater salinity, river salinity and soil salinity.

Shameem *et al.* (2014); Uddin *et al.*(2013)stated that There is certainly evidence from Bangladesh that many ecosystem services from agriculture and delta ecosystems such as mangroves are directly affected by short-term stresses, including cyclones and storms, which interact with longer term processes, such as salinity intrusion.

2.2 Farmers' perception towards agricultural technology

Farmers' subjective perceptions of new technologies in light of prevailing socioeconomic environment condition their adoption behavior. The concept of adopter perception can now be found in varied agricultural economics literature .Quantitative studies that have considered farmers' perception in context of adoption decisions have included farmers' perception of new technology (Oladele and Fawole, 2017). The study showed that farmers are well aware of agricultural technologies, for instance snailery (99.17%), fadama development (75.00%),improved variety of cassava (95.83%), and soyabean thresher (95.83%). Correlation analysis was used to test the significant relationship of awareness and perception. It was discovered that machinery equipment fabrication ($r = 0.38$ $p < 0.05$ improved varieties of arable crops ($r = 0.42$, $p < 0.05$) and agro-forestry technologies ($r = 0.62$, $p < 0.05$) are significantly related to their perception. However, the awareness, the land evaluation techniques was not significant ($r=0.003$, $p>0.05$).

Aphunu and Otoikhian (2008) mentioned that respondents perceived extension agents to be vast in knowledge of subject matter and they integrated theories with practical well. However, respondents were not impressed with extension agents in regards to teaching and communication skills.

Akanda and Howlader (2015), in their study identifies the relationship between the characteristics of the farmers and their perception of climate change effects on coastal agriculture at Patuakhali district of Bangladesh. Majority (80.20 percent) of the farmers has low to medium perception and 19.80 percent high perceptions were found in this area.

Farouqueet. al (2007), found that farmers indicated landless, marginal and small farmers had a low level of awareness when compared with medium and large farm holders. The overall perception of farmers in the study areas revealed that a significant proportion (78%) had either a low or a very low level of perception while 22% had a medium to high level of perception. Findings from individual interviews with farmers indicated that they perceived themselves as having a low perception of preparation of farm yard manure and the role of organic matter as well as the beneficial aspect of ISF and NM for sustainable crop production.

Md. Monirul Islam (2020), showed that perception index demonstrated that most of the respondents experienced climatic changes having negative impacts on agricultural activities. Agreement index depicted that natural calamities caused stern damage to

respondents 'cultivable land, assets ,agricultural enterprises and basic livelihood necessities. From the result of Logic model It was found that farming experience, disaster loss, farmer's educational level, annual income, access to credit, farmer' sage and saline water intrusion were the significant determinants of changing land use decision in the study areas.

Rahman (2020),examined that farmers' perception of IPM and determinants of IPM adoption in vegetables production in Bangladesh .A total of 350 vegetable farmers were surveyed. Approximately one-third of the farmers agreed that the implementation of IPM is beneficial for farmers' health. Overall knowledge regarding various IPM practices was low.

2.3 Relationship between farmers socio-economic characteristics and perception

2.3.1 Age and farmers' perception.

Isalm, M. S. (2017) found there is no significant relationship between age and farmers perception towards harmful effects of climate change on agriculture. However, another study conducted by Adeola (2012) on perceptions of environmental effects of pesticides use in vegetable production by the farmers in Ogbomoso, Nigeria. He found that age had a significant influence on the farmers‟ perception.

Pal (2009) conducted a study on the perception of organic farmers regarding introduction of ICT inorganic farming .Pal found that age had no significant relationship with farmers perception. Another researcher Majlish (2007) conducted a study regarding perception of participant women on social forestry program of BRAC. The study revealed that the relationship between age and perception of social forestry program was negatively significant.

Islam (2005) found that age of the farmers had no significant relationship with their perception of causes and remedies of Monga in Kurigram district. At the same time Sharmin (2005) stated that age of the rural women had no significant relationship with the perception of benefits of involvement in IGAs under a NGO. Uddin (2004) conducted a study on perception of sustainable agriculture. The findings revealed that age of the respondents had negative significant relationship with their perception of sustainable agriculture. Sayeed (2003) found that age had negative relation with farmers‟ perception of benefit from using manure towards INM for sustainable crop

production by the farmers. Ismail (1979), Chowdhury (2001) and Alom (2001) obtained similar type of findings in their respective studies.

Kabir (2002) studied perception of farmers on the effects of integrated area development project towards environmental up gradation .The study revealed that there was no significant relationship between age and perception of environmental up gradation. Similar finding was obtained by Fardous (2002) in his study. Islam (2000) stated that age of farmers had no significant relationship with their perception of the harmful effect of agro-chemical with regard to environmental pollution. Hossain (2000) and Parveen (1995) obtained similar result in their studies.

2.3.2 Education and farmers' perception

Isalm, M. S. (2017) found there is no significant relationship between education and farmers perception towards harmful effects of climate change on agriculture. Kabir and Rainis (2012) conducted a study on farmers‟ perception on the adverse effects of pesticides on environment: the case of Bangladesh. They found that education had a significant influence on the farmers‟ perception. At the same time conducted a study by Adeola (2012) on perceptions of environmental effects of pesticides use in vegetable production by farmers in Ogbomoso, Nigeria. The study revealed that education had a significant influence on the farmers‟ perception.

Pal (2009) conducted a study on the perception of organic farmers regarding introduction of ICT in organic farming. The study revealed that education had a positive significant influence on the farmers‟ perception. Sharmin (2005), found that personal education of the rural women had significant positive relationship with their perception of benefits of involvement of IGAs under NGO.

Majlish (2007), Found that the relationship between education of participant women and their perception of social forestry program of BRAC was positively significant. Afique (2006) mentioned negatively significant relationship between personal education of the rural women and their perception of benefits of involvement in agricultural model farm project activities of Sabalamby Unnayan Snmity (SUS).However, Uddin (2004), concluded that the level education of the farmers had a significant positive relationship with their perception of sustainable agriculture. Further, Sayeed (2003), revealed that the education of the respondents had significant positive relationship with their perception from using manure towards Integrated Nutrient Management (INM) for sustainable crop production.

2.3.3 Farm size and farmers' perception

Adeola (2012) conducted a study on perceptions of environmental effects of pesticides use in vegetable production by farmers in Ogbomoso ,Nigeria .The study revealed that household size had a non-significant influence on the farmers" perception. Another conducted a study by Pal (2009 on the perception of organic farmers regarding introduction of ICT inorganic farming .The study revealed that farm size had no significant relationship with farmer's perception.

Majlish (2007) revealed from her study that the relationship between farm size of participant women and perception of social forestry program of BRAC was non-significant and followed a positive trend. Afique (2006) stated that there was no significant relationship between family farm size of the rural women and their perception of benefits of involvement in agricultural model farm project activities of Sabalamby Unnayan Samity (SUS). Islam (2005) found that farm size of farmers had no significant relationship with their perception of both causes and remedies of Monga in Kurigram district. Sharmin (2005) found in her study that farm size of the rural women had no significant relationship with their perception of benefits of involvement in IGAs under a NGO. Uddin (2004) found that farm size of the farmers had significant and positive relationship with their perception of sustainable agriculture. Sayeed (2003) observed that farm size of the farmers had a significant positive relationship with their perception of benefit from using manure towards Integrated Nutrient Management (INM) for sustainable crop productions. Fardous (2002) found that there was no significant relationship between farm size of the farmers and their perception of Village and Farm Forestry Program (VFFP) toward sustainable forestry development. Hossain (2001), Hossain (1999) and Majydyan (1996) found similar findings in their respective studies.

2.3.4 Land under soil salinity and farmers' perception

Kruger (2006); and Wickham *et al.* (2006), Understanding the perception of farmers on the causes and effects of soil salinity makes room for policymakers to decide on the best measures that safe guide the farmers' production within a given location. They reported that farmers' perceptions could be a good entry point for any intervention on the environmental conservation either by changing their perception through practical demonstrations or by building on what they already know.

Mamba *et al.*, (2015) Most farmers' who perceive salinity as a problem might employ local adaptation options in response to salinity symptoms such as, planting of tolerant varieties, crop diversification and water management. Furthermore, farmers' perception of stress condition and weather variability might influence their investment decision and the resulting crop yield and food insecurity .Rahman, (2009) and Ngigi, 2009) Farmer's perception can be influenced by socio-demographic characteristics Furthermore, perception on salinity is shaped by individuals' background and nature and degree of engagement with the environment .Farmers perceived as being the ultimate factors responsible for the problem of salinity in their fields.

Kielen, (1996) Farmers' perceptions on salinity are defined by their understanding of factors influencing salinity and the consequences for crop production, and the way they judge the severity of the soil salinity for the fulfillment of their farming objectives in the light of the possibilities and constraints of their farming system .Nederlof and Dangbegnon, (2007); Kassaetal.,(2013) Farmers' perceptions of salinity issues are critical in the development of solutions to soil management problems. The challenge is to listen and to learn from the knowledge of farmers, because the knowledge of farmers on soils problems offers a completely different set of scales with regard to land use, which has important implications for sustainable agriculture.

2.3.5 Number of crops grown and farmers' perception

Adeola (2012) conducted a study on perceptions of environmental effects of pesticides use in vegetable production by farmers in Ogbomoso, Nigeria. The study revealed that number of crops grown had a significant influence on the farmers‟ perception. At the same time conducted a study by Kabir and Rainis (2012) on farmers‟ perception on the adverse effects of pesticides on environment: the case of Bangladesh. They found that number of crops grown had a significant influence on the farmers ‟perception.

Majlish (2007) conducted a study regarding perception of participant women on social forestry program of BRAC. She found her study that the relationship between number of crops grown on tree plantation and perception of social forestry program of BRAC was positively significant. However ,Fardous (2002) found that there was significant positive relationship between number of crops grown of farmers and their perception of VFFP towards sustainable forestry development.

Uddin (2004) conducted a study on perception of sustainable agriculture. He found that number of crops grown had significant and positive relationship with their perception of sustainable agriculture. He further conduct environment friendly farming had higher perception of sustainable agriculture

2.3.6 Annual family income and farmers' perception

Pal (2009) conducted a study on the perception of organic farmers regarding introduction of ICT inorganic farming .The study showed that annual family income had no significant relationship with farmers perception. Majlish (2007) found that the relationship between family income of participant women and perception of social forestry program of BRAC was non-significant but followed a negative trend. Moreover, Islam (2005) found that annual income of the farmers had positive significant relationship with their perception regarding causes and remedies of Monga in Kurigram district.

Uddin (2004) concluded that annual family income of the farmers had significant and positive relationship with their perception of sustainable agriculture. Sayeed (2003) found that annual family income of the farmers had a significant relationship with their perception of benefit from using manure towards Integrated Nutrient Management (INM) for sustainable crop production. Kabir (2002) found that there was non-significant relationship between annual family income of the farmers and their perception of the effects of BIADP towards environmental up gradation.

2.3.7 Knowledge on soil salinity effects and farmers' perception

Kabir and Rainis (2012) conducted a study on farmers‟ perception on the adverse effects of pesticides on environment: the case of Bangladesh. They found that experience of farmers had a significant influence on the farmers‟ perception. At the same time conducted a study by Adeola (2012) on perceptions of environmental effects of pesticides use in vegetable production by farmers in Ogbomoso, Nigeria. The study revealed that farming knowledge had a significant influence on the farmers‟ perception.

Majlish (2007) conducted a study regarding perception of participant women on social forestry program of BRAC. She found her study that the relationship between knowledge on tree plantation and perception of social forestry program of BRAC was positively significant

Uddin (2004) conducted a study on perception of sustainable agriculture. He found that knowledge of environment friendly farming had significant and positive relationship with their perception of sustainable agriculture. He further conduct environment friendly farming had higher perception of sustainable agriculture. Moreover Fardous (2002) found that there was significant positive relationship between knowledge of forestry of farmers and their perception of VFFP towards sustainable forestry development.

2.3.8 Training on climate change and farmers' perception

Kabir and Rainis (2012) conducted a study on farmers' perception on the adverse effects of pesticides on environment: the case of Bangladesh. They found that training had a significant influence on the farmers‟ perception. Another conducted a study by Pal (2009) on the perception of organic farmers regarding introduction of ICT inorganic farming. The study showed that training received had a positive significant relationship with farmers‟ perception.

Majlish (2007) found that the relationship between training experience of participant women and perception of social forestry program of BRAC was positively significant .Sharmin (2005) found in her study that training exposure of the rural women had no significant relationship with their perception of benefits of involvement in IGAs under a NGO. Uddin (2004) from his study concluded that farmers' training exposure had a significant positive relationship with their perception of sustainable agriculture

Kabir (2002) found that training experience of the farmers had a significant positive relationship with their perception of the effects of BIADP towards environmental up gradation. At the same time Fardous (2002) observed that training exposure of the farmers that was significantly correlated with the perception of the respondents of VFF towards sustainable forestry development.

2.3.9 Time spend in farms and farmers' perception

Pal (2009) conducted a study on the perception of organic farmers regarding introduction of ICT inorganic farming. The study showed that time spend in farms had a positive significant relationship with farmer's perception. Another study showed by Majlish (2007) that the relationship between time spend in farms of participant women and perception of social forestry program of BRAC was positively significant

Sharmin (2005) found in her study that time spend in farms of the rural women had no significant relationship with their perception of benefits of involvement in IGAs under a NGO. Uddin (2004) from his study concluded that farmers' time spend in farms had a significant positive relationship with their perception of sustainable agriculture

Kabir (2002) found that time spend in farms of the farmers had a significant positive relationship with their perception of the effects of BIADP towards environmental upgradation. Contemporary time Fardous (2002) observed that time spend of the farmers that was significantly correlated with the perception of the respondents of VFF towards sustainable forestry development.

2.4 Research gap of the Study

Most studies focused on overall climate change effects in agriculture. Few studies focused on specific climate change parameters. Moreover, those studies conducted with lab experiment. The present study has been taken to assess the specific climate change parameters (soil salinity) harmful effects on food production as perceived by the farmers. To the best of my knowledge no study has so far been conducted on this specific issue in Bangladesh context.

2.5 Conceptual Framework of the Study

A conceptual framework may be defined as the framework illustrates what one expect to find through a research. It defines the relevant variables for a study and maps out how they might relate to each other. This study tried to focus on farmers' perception towards harmful effects of soil salinity on food production. A dependent variable may be influenced and affected through interacting forces of many characteristics in its surroundings. It is possible to deal with all characteristics in a single study.

According to Rogers and Havens (1960) the conceptual framework is kept in mind while framing the structural arrangement for the dependent and independent variables. This study was expected that farmers' perception towards harmful effects of soil salinity as a dependent variable, which was influenced by selected characteristics of the farmers as independent variables. Such as Age, Education, farm size, Land under soil salinity, Number of crops grown, Annual family income, Knowledge soil salinity effects, Training on climate change , Time spends in farm, Farmers" perception towards negative effects of soil salinity on food and income security . The conceptual framework or model of the study has been presented) (figure 2.1

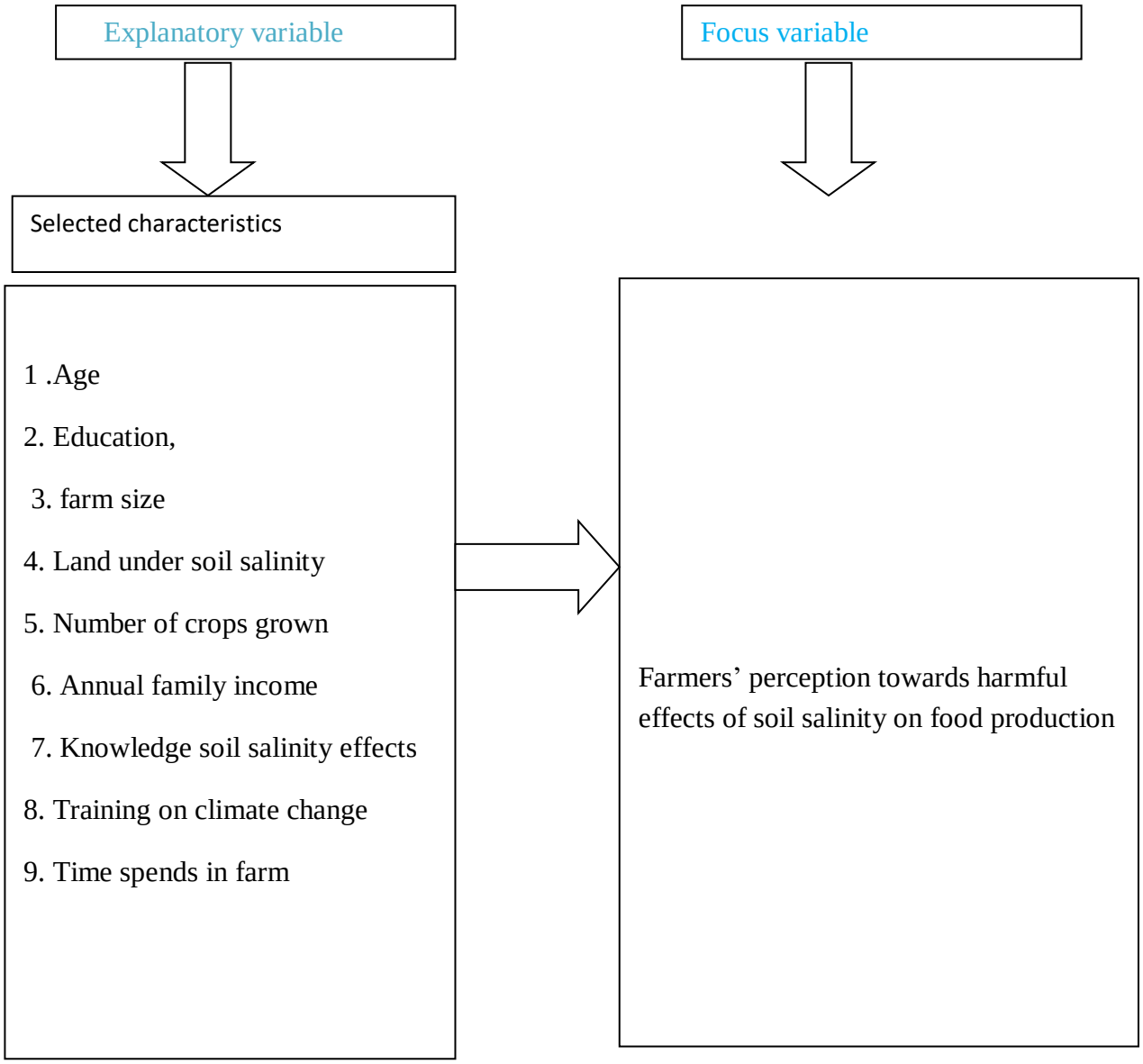

Figure 2.1: A Conceptual Framework of the study

CHAPTER III
METHODOLOGY

In any scientific research, methodology and procedures play an important role. To perform a research work systematically, careful consideration is a must. It should be such that it would enable the researcher to collect valid and reliable information to arrive at correct decisions. The methods and procedures followed in conducting this study have been described in below:

3.1 Study area

The study was conducted in Taltali upazila under Barguna district. The area was also prominent rice growing upazila under greater Barguna district.Taltali upazila is consisted of 7 unions. An up to date list of all the rice growers of the Three villages was prepared with the help of local Upazila Agricultural Office (UAO), Agricultural extension officer (AEO) Sub-Assistant Agriculture Officer (SAAO) and helped the researcher in this respect. Out of seven unions of this Upazila, three villages were randomly selected in Taltali upazila under Barguna district. The physical, social and cultural heritages of the people of the study areas were almost similar in many cases with other areas of the upazila. Figure 3.1 showed the map of the study.

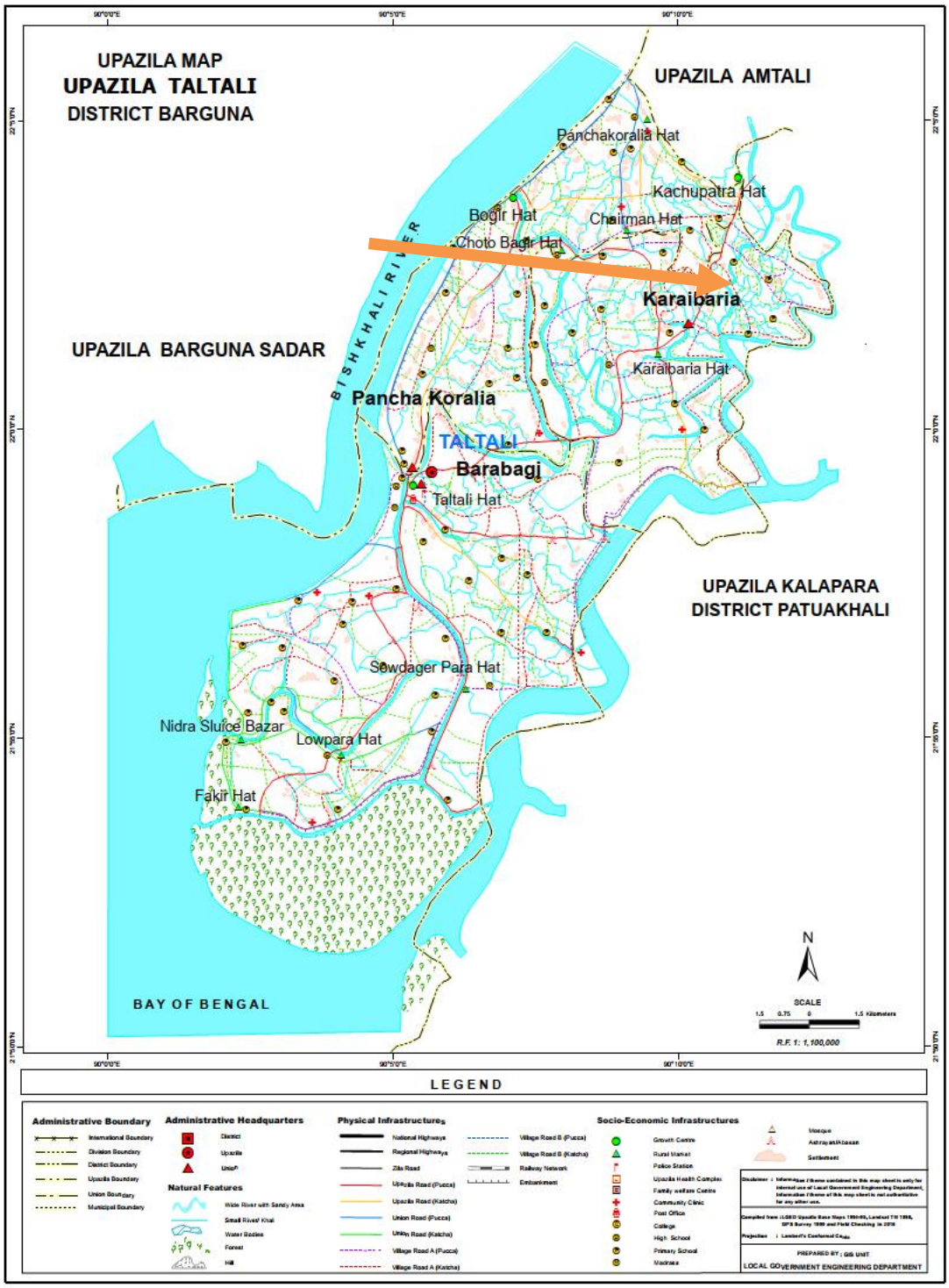

Figure:3.1 A map of Taltali upazila under Barguna District

3.1.2 Population and sampling techniques

The survey area was selected purposively. Farmers operating within the Barguna district were taken into account for this study. To assess the perception of farmers towards harmful effects of soil salinity on food production 3 villages from 1 union in Taltali upazila were covered. Farmers' from 3 villages were selected random sampling method used for collecting information about their socioeconomic condition. One hundred and six (106) farmers were selected as sample for the study considering 15% of the population.

Table 3.1 Population and sampling procedure

SI. No.	Village name	Population	Sample size
1	Gendamara	263	39
2	Behala	300	45
3	Jharakhali	150	22
	Total	713	106

3.1.3 Variables of the study

In a descriptive social research, selection and measurement of the variable is a momentous task. An organized research usually contains at least two identical elements viz. independent and dependent variable. Variables are important for social research on which the statistical analysis was done by obtained score on these variables. The following 10 (ten) characteristics of farmers were considered as independent variables in this study and these are:

I. Age
II. Education
III. farm size
IV. Land under soil salinity
V. No. of crops grown
VI. Annual family income
VII. Knowledge on soil salinity effects
VIII. Training on climate change
IX. Time spends in farms

X. Farmers' perception towards harmful effects of soil salinity on food Production

In the study the dependent variable was farmers' perception towards harmful effects of soil salinity on food production.

3.2 Measurement for Variables

Variables are measured in different parameter. The measuring processes or methods for the variables of this study are given below

3.2.1 Measurement for independent variables

As different parameters are used to measure different variables for the study, they are described separately below:

3.2.1.1 Age

Age of the respondent farmers was measured by the period of time from her/his birth to the time of conducting interview. It was measured in terms of actual year(s) on the basis of their responses. A score of one (01) was assigned for each year. For example, if a farmer age was 40 years then her/his age score was assigned as 40.

3.2.1.2 Education

The educational background of a respondent was measured on the basis of her/his year(s) of schooling completed in any educational institute, which was measured by her/his response. A score of one (01) was given for each complete year of schooling. For example, if a respondent passed class Five (V) his education score was given as 05. If a respondent passed the final examination of class IX, his score was taken as 09. A score of 0.5 was given to that respondent who could sign her/his name only. A score of zero (0) was assigned to the illiterate respondents who cannot read and write. The educational background was categorized into following level.

Category	Score
Illiterate	0
Can sign only	.5
Primary level	1-5
Secondary level	6-10
Higher Secondary level	11-12
Above Higher secondary	Above 12

3.2.1.3 Farm size

The total land area possessed by the farmer under farm and homestead either his own or taken from other as Borga or lease was the basis of measuring the total farm size. It was measured in hectare scale by using the following formula for each farmer.

Total Farm Size = A + B + ½ (C + D) +E

Where, A1 = Homestead area including pond;

B 2 = Own land under own cultivation;

C 3 = Land given to others as Borga ;

D 4 = Land taken from others as Borga ;

E 5 = Land taken from others as lease.

Data was first gathered in local measurement units such as decimal, Katha, bigha etc. and then converted into hectare. Thus, the total farm size was obtained by the above mentioned formula (giving a score of one point for each hectare of land).

3.2.1.4 Land under soil salinity

Land under soil salinity refers to how much land do they have under soil salinity condition .Due to harmful effects of soil salinity most of the land in this area not able to proper utilize by the farmers in their cultivated land area. Find out how much land actually affected in case of intrusion soil salinity.

3.2.1.5 Number of crops grown

Number of crops grown referred to how many crops did they cultivate on a year. This number of crops from including homestead, own land under own cultivation ,land taken from others as borga ,land taken from others as lease.

3.2.1.6 Annual family income

Annual family income of a respondent referred to the total earning by her/him and other members of her/his family from agriculture, livestock, poultry, fisheries, and other sources (service, business, daily wages by working, etc.) during a year. It was expressed in Taka. In measuring this variable, total earning of an individual respondent was converted into score. A score of one (01) was given for every one (01) thousand ('000') taka.

3.2.1.7 Knowledge on soil salinity effects

Knowledge of soil salinity effects of a respondent referred to check knowledge by asking question relevant to the effects of soil salinity such as salinity, reasons of soil salinity, problem faced by the farmers due to soil salinity, effects of soil salinity on

productivity, effects of soil salinity on production cost, increase barren land and biodiversity etc.

3.2.1.8 Training on climate change

Training on climate change referred to learning activities regarding climate change effects on Agriculture. Through this training program by different organization including government and NGO to farmers become aware about climate change and become expert in the field of modern Agriculture. If they received any training on climate change effects on Agriculture here denotes YES otherwise No. If YES by the respondent included name of the training course, sponsoring organization and duration.

3.2.1.9 Time spends in farms

Time spends in farms referred how much time did they spend in their farm hour/day. Proper utilization and better outcome from the farm spending time is significant. Management of farm In a daily basis can bring better result for the farmers to be self-sufficient.

3.2.2 Measuring farmers 'perception towards harmful effects of soil salinity on food production

Farmers' perception towards harmful effects of soil salinity on food production was the focus variable of the study. This was measured based on the basis of 11 statements relevant to the soil salinity problem such as soil salinity decrease agricultural productivity, Soil salinity diminish economic opportunity, soil salinity increase cost of production , Soil salinity makes difficult to allocate resources , prevents the adoption of high profit crops , creates irregular shape of land ,Increase barren land ,Imbalance biodiversity of the ecosystem, Decrease soil nutritional status ,Problem in crop rotation and increase soil erosion. A five point like as scale such as 'strongly agree, 'agree , 'no opinion , 'disagree, strongly disagree were applied to get response. Scores were assigned to those alternative responses as 4, 3, 2, 1, and 0 respectively. So, the possible range of perception score was 0 to 44 where 0 indicates highly unfavorable perception and 44 indicates highly favorable perception.

3.3 Hypothesis of the Study

According to Kerlinger (1973), "a hypothesis is a conjectural statement of the relation between two or more variables". It represents a declarative statement of the relations between two or more variables. Hypothesis is not meant to be haphazard guesses, but should reflect the depth of knowledge, imagination and experience of the researcher. In the process of formulating the hypothesis, all variables relevant to the study must be identified.

There are two types of hypothesis used in social science: these are

i. Research Hypothesis; and

ii. Null Hypothesis.

3.3.1 Null hypothesis

The null hypothesis reflects that there will be no observed effects of a research or it states that there is no contribution between the concern variables. Therefore, in order to conduct tests, the previously formed research hypothesis was converted into null form as given below:

"There is no relation of the selected characteristics (age, education, farm size, land under soil salinity , number of crops grown ,annual family income, Knowledge on soil salinity effects, Training on climate change ,Time spends in farms, Farmers' perception towards harmful effects of soil salinity on food production.

3.4 Data Collecting instrument

In order to collect valid and reliable information from the farmers , an interview schedule was carefully designed and prepared keeping the objectives of the study in mind. Simple and direct questions and different scales were used to obtain information. Direct questions were included to collect information like age, education, farm size, land under soil salinity, annual family income, number of crops grown, knowledge on soil salinity effects, training on climate change and time spends in farms. The schedule was pre-tested during 15 to 21th February 2022 through interviewing farmers of taltali upazila. Open and Closed forms of questions were used in maximum time .Necessary corrections additions and alterations were made in the questionnaire on the basis of the results of the pre-test. The questionnaire was then printed in its final form. An English version of the interview schedule attached in the Appendix.

3.5 Summarization, Tabulation and Analysis of Data

The collected data will be coded, tabulated and analyzed in accordance with the objectives of the study. To explore the relationship between each of the selected characteristics of the farmers and their perception towards harmful effects of soil salinity on food and income security Pearsons Product Moment Correlation Co-efficient analysis will be used. One and five percent level of probability will be used as the basis for rejection acceptance of any null hypothesis.

CHAPTER IV
RESULTS AND DISCUSSION

The results of this study and its explanation or illustration have been presented here in this chapter. According to the objectives of the study, collected data were surveyed, analyzed, tabulated and statistically Tested and are presented in three sections. The first section deals with the farmers perception towards harmful effects of soil salinity on food production. The second section describe selected characteristics of the farmers and third section deals with the relationships between the farmers' selected characteristics and their extent of perception on harmful effects soil salinity on food production has been discussed

4.1 The salient feature of the selected characteristics of the farmers

This section deals with the classification of the farmers according to their various characteristics. Perception of an individual largely depends on these characteristics. These characteristics of an individual contribute largely in the matter of shaping negative effects of soil salinity on food and income security. Ten selected characteristics have been discussed from the findings in this chapter. These selected characteristics were age, education, farm size, land under soil salinity, number of crops grown , annual family income, knowledge on soil salinity effects, training on climate change , time spends in farms, farmers' perception towards harmful effects of soil salinity on food production. Therefore, the major hypothesis was perception of the farmer that would also be influenced by various characteristics of the farmers. Measuring unit, range, mean and standard deviations of these characteristics of the farmers have been described in the following sub-sections.

Table 4.1 The salient features of the selected characteristics of the farmers.

Categories	Minimum	Maximum	Mean	SD
Age	28	83	53.09	12.57
Education	.5	12.0	5.81	4.03
Farm size	.15	7.52	1.78	1.51
Land under soil salinity	1	40	2.50	1.64
No. of crops grown	1	6	2.02	1.04
Annual family income	15	580	91.10	79.60
Knowledge on soil salinity effects	10	27	14.11	2.23
Training on climate change	0	4	1.43	1.67
Time spends in farms	1	5	2.64	1.08
Harmful effects of soil salinity on food production	27	42	35.56	2.45

4.1.1 Age

The age of the farmers has been varied from 28 to 83 years with a mean and standard deviation of 53.09 and 12.574, respectively. Based on their age, the farmers were classified into three categories namely young ; middle and old aged. The distribution of the farmers in accordance of their age is presented in Table 4.2.

Table 4.2 Distribution of the farmers according to their Age

Category	Range (Years)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Young aged	Up to 35	28-83	10	9.4	53.09	12.57
Middle aged	36-50		36	34.0		
Old aged	Above 50		60	56.6		
Total			106	100		

Data presented in table 4.2 indicated that the highest proportion (56.6 percent) of the respondents was in old aged category compared to (9.4 percent) young aged and (34.0 percent) middle aged category. The findings indicate that a large proportion (56.6

percent) of the farmers were old aged. It also found that, old aged farmers are proportionately higher than two other categories. Kalam (2018) also found that, middle aged farmers are proportionately higher than two other categories. It may be concluded that old aged farmers are more aware than young and old aged about harmful effects of soil salinity on food production

4.1.2 Education

The level of educational scores of the farmers ranged from .5 to 12 with a mean and standard deviation of 5.811 and 4.0370 respectively. Based on the educational scores, the respondents were classified into four categories such as Illiterate (0.5), primary education (1 to 5), secondary education (6 to 10), higher secondary (above 10). The distributions of the respondents according to their level of education are presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their Education

Category	Range (School Years)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
		.5-12			5.81	4.037
Illiterate	0.5		28	26.4		
Primary education	1-5		30	28.3		
Secondary Education	6-10		36	34		
Higher secondary	> 10		12	11.3		
Total			106	100		

Table 4.3 shows that respondent under secondary education category constitute the highest proportion (34 percent) secondary education followed by primary education (28.3 percent), Illiterate (26.4 percent) higher secondary (11.3 percent).It is found that majority of the respondents in this area were secondary educated. It may be concluded that the respondents of higher educated had more perception towards harmful effects of soil salinity than Illiterate and primary educated. Conducted a study by Adeola (2012) on perceptions of environmental effects of pesticides use in vegetable

production by farmers in Ogbomoso, Nigeria. He revealed that education had a significant influence on the farmers' perception.

4.1.3 Farm size

The farm size of the farmers' scores ranged from .15 ha to 7.52 ha with a mean and standard deviation of 1.7875 and 1.51548 respectively. This farm size average was higher than the national average of 0.91 hectare (BBS, 2013).Based on their farm size, the respondents were classified into three categories which is presented in Table 4.4.

Table 4.4 Distribution of the farmers according to farm size

Category (Mean ±SD)	Range (Hector)		Respondents		Mean	S.D
	Score (Ha)	Observed	Number	Percent		
Small farmer	Below 1	0.15-7.52	41	38.7	1.78	1.51
Medium farmer	1-3		48	45.3		
Large farmer	Above 3		17	16		
Total			106	100		

Table 4.4 indicates that the medium farm holder constitutes the highest proportion (45.3 percent) followed by large farm holder (16 percent), whereas (38.7 percent) was small farm holder. The findings of the study reveal that majority of the farmers were medium to small sized farm holder. It seems that majority of the respondents in this conducted area had perception towards harmful effects of soil salinity were medium farmers. It may be concluded that it would be better if large scale farmers were aware of the harmful effects soil salinity. Uddin (2004) found that farm size of the farmers had significant and positive relationship with their perception of sustainable agriculture.

4.1.4 Land under soil salinity

The Computed scores of the farmers about land under soil salinity ranged from .13 to 5.33 hectare with a mean of 2.50 and standard deviation of 1.64. On the basis of land under soil salinity, the respondents were classified into three categories as follows in Table 4.5.

Table 4.5 Distribution of the farmers according to land under soil salinity

Category (Mean ±SD)	Range (land under soil salinity)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low area	Up to 1	.13- 5.33	14	13.2	2.50	1.64
Medium area	>1-3		76	71.7		
High area	Above 3		16	15.1		
Total			106	100		

Data contained in Table 4.5 showing that (71.7 percent) of the farmers had medium land area under soil salinity, whereas (15.1 percent) had higher land under soil salinity and (13.2 percent) had low land under soil salinity. It seems that majority of the respondents of this conducted area had perception towards harmful effects of soil salinity on food production were medium area. It might be better if high area of farmers were aware of the harmful effects of soil salinity. Generally, this perception helps to cope up any problematic situation. Therefore, the higher awareness might be increased the risk bearing ability and divert to modern technology of agriculture to escape harmful effects of soil salinity. Salinity affected land in our coastal belt was recorded 102 million hectares, which were increased to 105.6 million hectares in 2009 (SRDI , 2010). Over the last 35 years, salinity has increased by around 26% in the coastal region of Bangladesh (Mahmuduzzaman *et al.*, 2014).

4.1.5 Number of crops grown

The Computed scores of the farmers number of crops grown ranged from 1 to 6 with a mean of 2.02 and standard deviation of 1.042. On the basis of number of crops grown, the respondents were classified into three categories as follows in Table 4.5

Table 4.6 Distribution of the farmers according to their number of crop grown

Category (Mean ±SD)	Range (No. of crops grown)		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Low number	1-2	1-6	40	37.7	2.02	1.04
Moderate number	3		36	34.0		
High number	> 3		30	28.3		
Total			106	100		

Data contained in Table 4.5 showing that (37.7 percent) of the farmers had grown low number crop on last year whereas (34 percent) had grown moderate number crops and (28.3 percent) had grown high number crops on last year. It showed that majority the respondents were grown low number of crops because of harmful effects of soil salinity. According to farmers perception due to increasing soil salinity growing number of crops decreasing year after year. It may be concluded that the number of crops grown will be increase if necessary steps are taken to reduce soil salinity. Excessive salt above what plants need limits plant growth and productivity and can lead to plant death. About 20% of all irrigated land is affected by soil salinity, decreasing crop yields (Kader, 2010 March). Salinity stress limits crop yield affecting plant growth and restricting the use of land.

4.1.6 Annual family income

Annual family income of the respondent ranged from 15 to 580 thousand taka. The mean was 91.10 thousand taka and standard deviation was 79.60. On the basis of annual income , the respondents were categorized into three groups as shown in Table 4.7

Table 4.7 Distribution of the farmers according to their Annual family income

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score (000 tk.)	Observed	Number	Percent		
Low income	Up to 190	15-580	70	66.0	91.10	79.60
Medium income	>190-380		29	27.4		
High income	Above 380		7	6.6		
Total			106	100		

Data shown in the Table 4.6 indicated that (66.0 percent) of the farmers had low income where (27.4 percent) farmers had Medium and (6.6 percent) had high family income from saline affected area. It represented that majority of the respondents in this conducted area bearing low family income rather than medium and high income due to harmful effects of soil salinity. Generally they did not get multiple feedback from their under cultivated land. Despite of having enough land in this area, in case of excessive salinity farmers did not able to bring better outcome from the field. It may be concluded that family annual income will be increase if soil salinity decreased and crop rotation increased. Qadir et al (2014) presented global annual cost of salt-induced land degradation in irrigated areas. World is losing 2,000 hectares of farm soil daily to salt-induced degradation. Salt-spoiled soils worldwide are 20% of all irrigated lands, extensive costs include US$27 billion + in lost crop value per year.

4.1.7 Knowledge on soil salinity effects

Knowledge on soil salinity effects of the respondent ranged from 10 to 27. The mean was 14.11 and standard deviation was 2.231. Table4.8 shown that the standard deviation was very lower than mean value. It also shown that their moderate knowledge (73.6 percent) higher and followed to poor knowledge (17.9 percent) and high knowledge (8.5 percent) of the farmers . On the basis of knowledge on soil salinity the respondents were categorized into three groups as shown in Table 4.8.

Table 4.8 Distribution of the farmers according to knowledge on soil salinity effects

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Poor knowledge	< 12	10-27	19	17.9	14.11	2.23
Moderate knowledge	12 to 16		78	73.6		
High knowledge	Above 16		9	8.5		
Total			106	100		

Table 4.8 indicates that higher knowledge on soil salinity effects is comparatively very lower than moderate and poor knowledge that would be difficult for the saline affected farmers to cope with the salinity problem. It revealed that Majority of the respondents of this conducted area had moderate knowledge towards harmful effects of soil salinity . It is proven that the more knowledge of soil salinity the more perception developed among the respondents .Proper knowledge is needed to farmers to adopt modern technology of agriculture. It may be concluded that if they had a higher knowledge of soil salinity their perception would be better. The farmers had medium mass media exposure by which they might have come to know about severity of salinity. Because of these reasons, majority of the farmers had high knowledge about saline soils management practices, Jadhav *et al.* (2010) and Kale *et al.* (2012)

4.1. 8 Training on climate change

Training on climate change received scores of the respondents were found to be varying from 0 to 4 days there with the average of 1.43 and the standard deviation was 1.67. The farmers on the basis of training received score were classified into four categories namely, training zero days , training one days, training two days ,training greater than two days as shown in Table. 4.9.

Table 4.9 Distribution of the farmers according to Training on climate change

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
No training	0	0 - 4	68	64.4	1.43	1.67
Low training	1-2		37	34.9		
Medium training	>2		1	0.9		
Total			106	100		

Data presented in the Table 4.8, showed that the highest proportion (64.4 percent) of the respondents belonged to no training received category as compared to (34.9 percent) , and (0.9 percent) having low , medium training received category, respectively. Overwhelming majority (64.4 percent) farmers had zero days training received. It showed that two-third of the respondents in this conducted area had no training climate change. Those who received effective training base they are more conscious about climate change and harmful effects soil salinity. It might be concluded that it would be better for the respondents to form perception towards harmful effect of soil salinity if they got proper training on climate change. World agriculture is facing a lot of challenges like producing 70% more food for an additional 2.3 billion people by 2050 while at the same time fighting with poverty and hunger, consuming scarce natural resources more efficiently and adapting to climate change (FAO 2009).

4.1.9 Time spends in farms

The score of time spends in farms of the farmers ranged from 1-5 with a mean and standard deviation of 2.64 and 1.080. On the basis of time spends in farms the respondents were classified into three categories namely, Up to three, three to five, greater than five. The scale used for computing the use of modern technology score is presented in the Table 4.11

Table 4.10 Distribution of the farmers according to time spends in farms

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Less	Up to 2	1-5	49	46.2	2.64	1.080
Moderate	3 - 4		36	34		
High	> 4		21	19.8		
Total			106	100		

Data presented in Table 4.10 indicate that the highest proportion (46.2 percent) of the farmers up to three hour had worked per day compared to (34 percent) had worked four to six and (19.8 percent) had worked greater than six hour per day. It is found that majority of the respondents of this conducted area were spend less time in the farms. Despite having tried they did not get expected production from their cultivated land .It may be concluded that the amount of time spent on farmers' farms will increase if necessary steps are taken to reduce soil salinity which will increase food production. Fardous (2002) observed that time spend in farms of the farmers that was significantly correlated with the perception of the respondents of VFF towards sustainable forestry development.

4.2 Farmers' perception towards harmful effects of soil salinity on food production

Scores Perception towards harmful effects of soil salinity on food production of the respondents could range from 27 to 42. The mean score was 35.56 with the standard deviation 2.450 as shown in Table 4.12. Based on their perception scores, the respondents were classified into two categories namely favourable and unfavorable perception as shown in Table 4.11. The basis of such categorization was mean. The farmers having score greater than mean considered favourable perception group and less than mean score considered unfavorable group (Mishuk and Kabir, 2021).

Table 4.11 Distribution of the farmers according to their perception towards harmful effects of soil salinity on food production.

Category (Mean ±SD)	Range		Respondents		Mean	S.D
	Score	Observed	Number	Percent		
Unfavorable	< Mean	27-42	16	15.1	35.56	2.45
Favorable	> Mean		90	84.9		
Total			106	100		

Data contained in the table 4.11 indicate that the highest proportion (84.9 percent) of the farmers had favorable perception towards harmful effects of soil salinity on food and income security while 15.1 percent had unfavorable perception towards harmful effects of soil salinity. Though majority of the farmers belonged to favorable perception still about one-sixth farmers are not agree with them. This indicates there is a need to take steps to aware the farmers about harmful effects of soil salinity.

4.3 Relationship between the selected characteristics of the farmers and their perception on harmful effects of soil salinity on food production

The purpose of this section is to explore the relationships of the selected characteristics of the farmers with their perception on harmful effects of soil salinity on food production. Pearson's Product Moment co-efficient of correlation (r) was used to test a null hypothesis concerning the relation between any two variables. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis. Results of the test of co-efficient of correlation between each of the selected characteristics of the farmers and their perception on harmful effects of soil salinity on food production are shown in table 4.12

Table 4.12 Correlation co-efficient showing relationship between selected characteristics of the farmers' and their perception towards harmful effects of soil salinity on food production

Focus Variable	Selected characteristics of the farmers	Correlation coefficient value(r) with 104 d.f	Table value	
			At 0.05 level	At 0.01 level
Farmers' perception towards negative effects of soil salinity on food and income security	Age	-.080NS	0.179	0.237
	Education	0.445**		
	Farm size	0.314**		
	Land under soil salinity	0.262 **		
	Number of crops grown	-.030 NS		
	Annual family income	0.165		
	Knowledge on soil salinity effects	0.473**		
	Training on climate change	.014		
	Time spends in farms	0.112		

NSNot Significant

* Significant at 0.05 level of probability

**Significant at 0.01 level of probability

4.3.1 Significant relationship of education to the farmers' perception towards harmful effects of soil salinity on food production

"There is no relationship between education of the farmers with their perception on harmful effects of soil salinity on food production. The coefficient of correlation between Education of the harmful effects of soil salinity on food production by them is presented in Table 4.12.

The coefficient of correlation between the concerned variables was found to be 0.445. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

The relationship showed a positively significant trend between the concerned variables.

The observed value of 'r' (0.445) between the concerned variables was found to be bigger than the tabulated value (r = 0.179) with 104 degrees of freedom at 0.05 level of probability.

The null hypothesis could be rejected.

The relationship between the concerned variables was statistically significant at 0.05 level of probability.

Based on the above findings, it was concluded that education of the famers had positively significant relationships with their perception on harmful effects of soil salinity on food production. This represent that education of the respondent farmers was an important factor on harmful effects of soil salinity on food production.

4.3.2 Significant relationship of farm size to the farmers' perception towards harmful effects of soil salinity on food production

"There is relationship between farm size of the farmers with their perception on harmful effects of soil salinity on food production. The coefficient of correlation between farm size of the harmful effects of soil salinity on food production by them is presented in Table 4.12.

The coefficient of correlation between the concerned variables was found to be 0.314.

The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

The relationship showed a positive trend between the concerned variables.

The observed value of 'r' (0.314) between the concerned variables was found to be greater than the tabulated value (r = 0.237) with 104 degrees of freedom at 0.01 level of probability.

The null hypothesis could be rejected.

The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that effective farm size of the famers had significant relationships with their perception towards harmful effects of soil salinity on food production. This represent that farm size of the respondent farmers was an important factor on harmful effects of soil salinity on food production

4.3.3 Significant relationship of land under soil salinity to the farmers' perception towards harmful effects of soil salinity on food production

"There is relationship between land under soil salinity of the farmers with their perception on harmful effects of soil salinity on food production. The coefficient of correlation between land under soil salinity of the harmful effects of soil by them is presented in Table 4.12.

The coefficient of correlation between the concerned variables was found to be 0.262.

The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

The relationship showed a positive trend between the concerned variables.

The observed value of 'r' (0.262) between the concerned variables was found to be greater than the tabulated value (r = 0.237) with 104 degrees of freedom at 0.01 level of probability.

The null hypothesis could be rejected.

The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that land under soil salinity of the famers had significant relationships with their perception on harmful effects of soil salinity on food production. This represent that land under soil salinity of the respondent farmers was an important factor on harmful effects of soil salinity.

4.3.4 Significant relationship of knowledge on soil salinity effects to the farmers' perception towards harmful effects of soil salinity on food production

"There is relationship between knowledge on soil salinity effects of the farmers with their perception on harmful effects of soil salinity on food production. The coefficient of correlation between knowledge on soil salinity effects of the harmful effects of soil salinity by them is presented in Table 4.12.

The coefficient of correlation between the concerned variables was found to be 0.473.

The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

The relationship showed a positive trend between the concerned variables.

The observed value of ‘r’ (0.473) between the concerned variables was found to be greater than the tabulated value (r = 0.237) with 104 degrees of freedom at 0.01 level of probability.

The null hypothesis could be rejected.

The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that knowledge on soil salinity effects of the famers had significant relationships with their perception on harmful effects of soil salinity on food production.

CHAPTER V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted in the Karaibaria union of Taltali Upazila under Barguna district to find out the farmers' perception towards harmful effects of soil salinity on food production .Total 713 farmers were selected from the study area as the population and according to Yamane,s formula the respondents comprised of 106 constituted the sample of the study. A well structured interview schedule was developed based on objectives of the study for collecting information. The independent variables were: age , education , farm size ,land under soil salinity ,number of crops grown ,annual family income , knowledge on soil salinity effects ,Training on climate change ,time spend in farms. Various statistical measures such as frequency counts, percentage distribution, mean and standard deviation were used in describing data. In order to estimate the contribution of the selected characteristics of the respondents to their perception towards harmful effects of soil salinity on food and income security, correlation co-efficient analysis was used. The major findings of the study are summarized bellow:

5.1 Major Findings

5.1.1 Selected characteristics of the farmers

Age: Overwhelming majority (56.6 percent) of the farmers were old aged to young. This means that farming in the study area is being managed by comparatively old aged to younger aged owner.

Education: The highest proportion of (34 percent) of them had education up to secondary. Thus, the overwhelming majority (34 percent) of the farmers had at least some education ranging from above primary level to Secondary level Education.

Farm size: The highest proportion (45.3 percent) of the farmers had medium farm size, while (38.7 percent) and (16 percent) belonged to the small farm and large farm respectively.

Land under soil salinity: The highest proportion (71.7 percent) of the farmers had medium land area under soil salinity, whereas (15.1 percent) had higher land under soil salinity and (13.2 percent) had low land under soil salinity.

Number of crops grown: Showing that the highest proportion (37.7 percent) of the farmers had grown one crop on last year whereas (34 percent) had grown two crops and (28.3 percent) had grown greater than two on last year.

Annual family income: The highest proportion (66.0 percent) had low annual family income compared with 27.4 percent having medium income and 6.6 percent having high annual family income.

Knowledge on soil salinity effects: It also shown that their moderate knowledge (73.6 percent) higher and followed to poor knowledge (17.9 percent) and high knowledge (8.5 percent) of the farmers

Training on climate change: Showed that the highest proportion (64.4 percent) of the respondents belonged to zero training received category as compared to (34.9 percent) and (0.9 percent) having low training , medium training received category, respectively.

Time spends in farms: Findings revealed that the highest proportion (46.2 percent) of the farmers up to three hour had worked per day compared to (34 percent) had worked four to six and (19.8 percent) had worked greater than six hour per day.

5.1.2 Farmers' perception towards harmful effects of soil salinity on food production:

Indicate that the highest proportion (84.9 percent) of the farmers had possessed favorable perception and (15.1 percent) of the farmers had unfavorable perception towards harmful effects of soil salinity on food production. The study showed that most of the farmer of the study area was favorable perception. Finally different mass media as well as training received from the training center increased their perception level for harmful effects of soil salinity on food production.

5.1.3 Significant relationship of the farmers selected characteristics and their perception towards harmful effects of soil salinity on food production

Education, farm size, land under soil salinity, knowledge on soil salinity effects had significant positive relationship to their perception towards harmful effects of soil salinity on food production

Characteristics of the farmers like age, number of crops grown ,annual family income , training on climate change and time spends in farms had no significant relationship to their perception towards harmful effects of soil salinity on food production

5.2 Conclusions

Findings of the present study and the logical interpretation of other relevant facts prompted the researcher to draw the following conclusions:

Though majority of the farmers have favorable perception towards harmful effects of soil salinity, still some farmers are not aware about the issue. Therefore, still there is a scope to increase the number of farmers having favorable perception towards harmful effects of soil salinity.

Knowledge of soil salinity is an important factor to form favorable perception of the farmers towards harmful effects of soil salinity on food production. The farmers who had higher knowledge possess favorable perception towards harmful effects of soil salinity. Thus, initiative to increase farmers knowledge would be better to aware them soil salinity and food productivity.

Education of the farmers had significant relationship with their perception towards harmful effects of soil salinity on food production. It was thus proved that the farmers who had higher educated are more aware about harmful effects of soil salinity. In other words it may be concluded that the education of the farmers helped them to form favorable perception towards harmful effects of soil salinity on food production.

Farm size of the grower showed positive and significant relationship with their perception on harmful effects of soil salinity on food production. It's concluded that's farmers who have larger farm size were more aware than small farm owner regarding aware of soil salinity effect.

Land under soil salinity had a positive and significant relationship with their perception on harmful effects of soil salinity on food production. Findings showed that the highest (71.7%) of the respondents medium land area under soil salinity of the cultivated land. Therefore, it may be concluded that, farmers having larger salinity prone area were more aware about harmful effects of soil salinity on food production.

5.3 Recommendations for policy implications

On the basis of the observation and conclusions drawn from the findings of the study following recommendation is made:

DAE and other related private organizations should take initiative to increase the educational level of the farmers. In the content, they may add the effects of soil salinity in crop production.

The extension agent should contact more with the farmers having small farm so that they can form favorable perception towards harmful effects of soil salinity on food production.

The extension agent and NGO workers should work more with the farmers having less soil salinity prone area so that they can aware about the effects of soil salinity on food production and can take measure to reduce the effects.

To increase farmers knowledge on soil salinity effects, more field day, training, demonstration program should be made by the DAE.

5.4 Recommendations for further study

The study was conducted on the farmers of only one selected area of Taltali upazila. Finding of the study need verification by similar research in other areas of the country including areas where soil salinity is not yet aware of harmful effects of soil salinity.

Contributions of 10 characteristics of farmers with their perception towards harmful effects of soil salinity on food and income security have been investigated in this study. Further research should be conducted to explore contribution of the other personal characteristics of the farmers with their perception towards harmful effects of soil salinity on food production.

Age, training on climate change, time spends had no significant relationship with their perception towards harmful effects of soil salinity on food production. So, further investigation may be taken to verify the result.

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APPENDIX

Department of Agricultural Extension and Information System

Sher-E-Bangla Agricultural University, Dhaka-1207

An interview schedule for a research

study entitled

: Farmers' perception towards harmful effects of soil salinity on food production

Sl.No…….

Name ofthe respondent:

Village: Union:

Upazila: District:

Mobile number:

(Please answer the following questions)

1. Age

How old are you? Years

2. Education

a. Illiterate……

b. I can sign only……..

c. I read up to class……

3. Farm size

Please furnish information about your firm size:

Sl. No.	Land type	Area	
		Local unit (Decimal)	Hectare
1.	Homestead area including pond(A)		
2.	Ownland under own cultivation(B)		
3.	Land given to others as borga(C)		
4.	Land taken from others as borga (D)		
5.	Land taken from others as lease(E)		
Total=A+B+1/2(C+D) +E			

4. Land under soil salinity

Please mention the amount of land you have under soil salinity

Q. How much land do you have under soil salinity condition ?

Ans: ……..

No. of crops grown

Q. How many crops did you cultivate on last year ?

Ans: …….

6. Annual family income

Please state the income from different sources during the last year:

Sl. No.	Sources of income	Total price(Tk)
A.On farm income		
1	Agriculture	
2	Fisheries	
3	Livestock	
B.Off farm income		
1	Business	
2	Services	
3	Daily labour	
4	Remittance	
5	Others(ifany)	
Total=(A+B)		

Total annual income=A+B= Tk

7. Knowledge on soil salinity effects.

Questions	FA (2)	PCA (1)	WA(0)
1.What do you mean by soil salinity ?			
2. What are the reasons of soil salinity ?			
3.What are the problems may face by a farmer due to soil salinity ?			
4. Which area generally occurs soil salinity under your cultivated lands ?			
5.Do you agree that soil salinity effects soil productivity ?			
6.Do you think soil salinity increase the production cost ?			
7.Do you realize that soil salinity diminish crop quality ?			
8.What should we do to escape soil salinity ?			
9.How soil salinity gradually increase barren land every year ?			

8. Training on climate change

Q. Did you receive any training on climate change effects on Agriculture ?

A. Yes B. No

If yes please mention the following Information

SI NO:	Name of the training course	Sponsoring Organization	Duration (Days)
1			
2			
3			

9.Time spend in farms

Q. How much time do you spend in your farm hour/day ?

10. Farmers' perception towards harmful effects of soil salinity on food production

SL NO	Statements	Strongly agree	agree	No opinion	Disagree	Strongly Disagree
1	Soil salinity decrease Agricultural productivity					
2	Soil salinity diminish economic opportunity					
3	Soil salinity increase cost of production					
4	Soil salinity makes difficult to allocate resources					
5	Prevents the Adoption of high profit crops					
6	Creats irregular shape of land					
7	Increase barren land					
8	Imbalance biodiversity of the ecosystem					
9	Decrease soil nutritional status					
10	Problem in crop rotation					
11	Increase soil erosion					

Thank you

Signature of the interviewer ……..