

# **DETERMINANTS OF SUSTAINABILITY OF HOMESTEAD GARDENING IN SALINITY AFFECTED COASTAL ZONE**

**A Thesis**

**By**

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**MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND  
INFORMATION SYSTEM**

**AGRICULTURAL EXTENSION AND INFORMATION SYSTEM  
SHER-E-BANGLA AGRICULTURAL UNIVERSITY, DHAKA**

**DHAKA-1207**

**December-2021**

# **DETERMINANTS OF SUSTAINABILITY OF HOMESTEAD GARDENING IN SALINITY AFFECTED COASTAL ZONE**

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A thesis

Submitted to the Department of Agricultural Extension and Information System  
Sher-e-Bangla Agricultural University, Dhaka  
In partial fulfillment of the requirements  
for the degree of

**MASTER OF SCIENCE (MS)**

**IN**

**AGRICULTURAL EXTENSION AND INFORMATION SYSTEM**

**Semester: July-December, 2021**

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**CERTIFICATE**

This is to certify that the thesis entitled “**Determinants of Sustainability of Homestead Gardening in Salinity Affected Coastal Zone**” submitted to the 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 **PRASUN BISWAS**, Registration No. **19-10350** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

I wish his every success in life.

**Dated:**

**Dhaka, Bangladesh**

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*DEDICATED  
TO  
MY BELOVED  
Parents*

## **ACKNOWLEDGEMENT**

All praises are due to almighty the merciful God, who enabled the author to complete the study successfully. Guidance, help and co-operation have been received from several persons or authority during the tenure of the study; the author is immensely grateful to all of them. Although it is not possible to mention everyone by name, it will be an act of ungratefulness if some names are not mentioned here.

The author with a sense of respect, expresses his heart felt gratitude to his Supervisor Professor Dr. Ranjan Roy, Department of Agricultural Extension and Information System, Sher-e -Bangla Agricultural University, Dhaka for his untiring and painstaking guidance, innovative suggestions, continuous supervision, timely instructions and inspirations throughout the tenure of research work.

Heartfelt gratitude and profound respect are due to his Co-supervisor Prof. Dr. Mohammad Zamshed Alam, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for his constructive criticism, valuable suggestions and co-operation throughout the study period. The author also expresses his profound respect and sincere gratitude to all other teachers of the Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for their nicest co-operation and suggestions.

The author is especially grateful to Professor Dr. Mohammad Zamshed Alam, Chairman, Department of Agricultural Extension and Information System, Sher-e Bangla Agricultural University, Dhaka for his sincere co-operation in the completion of the study.

The author is grateful to Upazilla Agriculture Officer and Agriculture Extension Officer for rendering co-operation during the field work. Special thanks are due to farmers, who were the respondents of the study area and gave their valuable time for interview during collection of data.

The author takes the opportunity to express his indebtedness and profound respect to his beloved father Bidhan Chandra Biswas, mother Jharna Rani Biswas, sisters Supta Biswas, Antima Biswas and other relatives for their blessings, sacrifices, financial support and encouragement for higher study which can never be forgotten.

Last but not the least, author is also grateful to Kanij Farhana Nipu, Rocky, Tanvia, Humayun, Soroyer, Enamul, Ripon, Nahiyon, Kafi for their help and inspiration during the period of the study. Finally, author expresses his gratefulness to Sadia Afroze Mitu for her valuable inspiration, encouragement and cooperation for this research work.

The Author

## CONTENTS

	PAGE
<b>ACKNOWLEDGEMENT</b>	<b>i</b>
<b>CONTENTS</b>	<b>ii</b>
<b>LIST OF TABLES LIST OF</b>	<b>v</b>
<b>FIGURES</b>	<b>vi</b>
<b>LIST OF ABBREVIATIONS</b>	<b>vii</b>
<b>ABSTRACT</b>	<b>viii</b>
<b>CHAPTER 1</b>	
<b>INTRODUCTION</b>	<b>1</b>
1.1 Background of the Study.....	1
1.2 Statement of the Problem.....	2
1.3 Objectives of the Study.....	3
1.4 Justification of the Study.....	4
1.5 Assumption of the Study.....	4
1.6 Limitation of the Study.....	5
1.7 Definition of Related Terms.....	5
<b>CHAPTER 2</b>	
<b>REVIEW OF LITERATURE</b>	<b>10</b>
2.1 Concept and Importance of Sustainability.....	10
2.2 Homestead in Bangladesh.....	11
2.3 Concept and Importance of Homestead Gardening.....	12
2.4 Homestead Vegetable Cultivation on Food and Nutrition Security.....	13
2.5 Homestead Garden– A Platform for Employment and Economic Security...	14

## CONTENTS (Contd.)

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	<b>PAGE</b>
2.6 Employment Opportunity for Women by Homestead Gardening.....	15
2.7 Relationship between the Selected Characteristics of the Homestead Gardeners and Their Knowledge Involvement in Home Gardening.....	17
2.8 Research Gap of the Study.....	23
2.9 The Conceptual Framework of the Study.....	23
 <b>CHAPTER 3</b>	
 <b>MATERIALS AND METHODS</b>	 <b>25</b>
3.1 Local of the Study.....	25
3.2 Population and Sample.....	28
3.3 Preparation of Research Instrument.....	28
3.4 Period of Data Collection.....	29
3.5 Problem Faced During Data Collection.....	29
3.6 Measurement of Variables.....	29
3.7 Statement of Hypothesis.....	34
3.8 Data Processing.....	35
3.9 Statistical Procedure.....	35
 <b>CHAPTER 4</b>	
 <b>RESULT AND DISCUSSION</b>	 <b>36</b>
4.1 Selected Characteristics of Homestead Gardeners.....	36
4.1.1 Level of Education .....	37
4.1.2 Family Size .....	38
4.1.3 Homestead Garden Size .....	38
4.1.4 Annual Family Income .....	39

## CONTENTS (Contd.)

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	<b>PAGE</b>
4.1.5 Organizational Participation .....	39
4.1.6 Contact with Extension Agent .....	40
4.1.7 Knowledge in Homestead Gardening System.....	41
4.1.8 Access to ICTs .....	41
4.1.9 Access to Financial Institutions .....	42
4.1.10 Use of Climate Smart Agricultural Practices and Technologies.....	42
4.2 Measuring Sustainable Homestead Gardening .....	43
4.3 Contribution of the Selected Factors on Sustainable Homestead Gardening..	44
by Homestead Gardeners	
<b>CHAPTER 5</b>	
<b>SUMMARY OF FINDINGS, CONCLUSIONS AND</b>	<b>48</b>
<b>RECOMMENDATIONS</b>	
5.1 Summary of Findings.....	48
5.1.1 Characteristics of the Respondents.....	48
5.1.2 Measuring Sustainable Homestead Gardening.....	50
5.1.3 Factors Related to the Sustainable Homestead Gardening.....	50
5.2 Conclusion.....	50
5.3 Recommendations.....	51
5.3.1 Recommendations for Policy Implications.....	51
5.3.2 Recommendations for Further Study.....	51
<b>REFERENCES.....</b>	<b>53</b>
<b>APPENDIX.....</b>	<b>64</b>

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## LIST OF TABLES

TABLE		PAGE
3.1	Population and sample of the study area.....	28
4.1	Salient Features of the homestead gardeners.....	36
4.1.1	Distribution of the respondents according to their education.....	37
4.1.2	Distribution of the respondents according to their family size.....	38
4.1.3	Distribution of the farmers according to their garden size.....	39
4.1.4	Distribution of the farmers according to their annual income.....	39
4.1.5	Distribution of respondents as of their organizational participation.....	40
4.1.6	Distribution of the farmers according to their contact with extension agent.....	40
4.1.7	Distribution of the respondents according to their knowledge on homestead production system.....	41
4.1.8	Distribution of the respondent households according to their access to ICTs.....	42
4.1.9	Distribution of the respondent households according to their access to financial institution.....	42
4.1.10	Distribution of the respondent households according to their climate smart agricultural practices & technologies.....	43
4.2	Distribution of the respondent households according to their sustainable homestead gardening practices.....	43
4.3	Coefficients of multiple regression analysis of selected characteristics to sustainable homestead gardening.....	44

## LIST OF FIGURES

FIGURES		PAGE
1	Sustainability Venn Diagram	6
2	Commonly used schematics of the tripartite description of sustainability	11
3	Homestead in Bangladesh	12
4	Involvement of family members in the homestead production activities.	16
5	The conceptual framework of the study	24
6	A Map of Bagerhat District Showing Selected Upazila	26
7	A Map of Fakirhat Upazila Showing the Study Area (Fakirhat and Mulghar Unions)	27

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## LIST OF ABBREVIATIONS

AIS	Agriculture Information Service
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BARI	Bangladesh Agricultural Research Institute
BIRRI	Bangladesh Rice Research Institute
CARE	Cooperative for Assistance and Relief Everywhere
CI	Composite Indicator
DAE	Department of Agricultural Extension
DFID	Department for International Development
FAO	Food and Agriculture Organization
GIZ	German Cooperation for International Development
ICT	Information & Communication Technology
NGO	Non-Government Organisation
OECD	Organisation of Economic Cooperation and Development
PO	Private Organisation
SA	Sustainable Agriculture
SES	Social Ecological System
SDG	Sustainable Development Goals
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
WB	World Bank

## ABSTRACT

Sustainable homestead gardening provides economic profitability, social wellbeing and environmental soundness. The objectives of this study were to describe the socioeconomic characteristics of the coastal homestead gardeners, to measure the extent of sustainable homestead gardening, and to determine the contributory factors of sustainable homestead gardening in salinity affected coastal zone. Data were collected from 108 homestead gardeners of four villages under Fakirhat upazila of Bagerhat district, using a structured interview schedule. Multiple linear regressions were applied to examine the contribution of the selected factors of the homestead gardeners. 53.7 percent of the homestead gardeners belonged to medium sustainable category followed by low sustainable category (26.9 percent) and high sustainable category (19.4 percent). Around 76.3 percent ( $R^2 = 0.763$ ) of the variation in the respondents' sustainable homestead gardening can be attributed to their level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, access to ICTs, access to financial institutions, climate smart agricultural practices and technologies. Multiple linear regression indicates that knowledge in homestead gardening, access to ICTs, and organizational participation were significant contributing factors. It can be concluded that improving knowledge and access to ICTs and organizational participation are a key to achieving sustainable gardening in salinity affected coastal zone. DAE should invest in increasing education of the gardeners towards the sustainability of homestead gardening in this regard.

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the study

Bangladesh is an agricultural country. National and economic development of the country is dependent on agricultural development. 19.42% of country's GDP comes from agriculture (BBS, 2013). About 85% of the total population of Bangladesh live in rural areas and are directly or indirectly engaged in a wide range of agriculture (World Bank, 2015). People depend upon agriculture for their employment, poverty alleviation, human resource development and food security and they have the opportunity of growing a wide range of agricultural crops. Agriculture supplies raw materials for industrial production and food-stuff for human and animal consumption. Bangladesh is a thickly populated country with an area of 147,570 km<sup>2</sup> and the population is 142.3 million with the growth rate of 1.34% (BBS, 2013).

Approximately, 40 million residents of the coastal areas of Bangladesh (BBS, 2011) experience threats of frequent cyclone, flood and salinity intrusion (Islam and Ahmad, 2004). In this area, agriculture is the principal livelihood activity and plays a key role in tackling the challenges of the growing population, alleviating poverty (Azad et al., 2009), maintaining food security (Khan and Awal, 2009), achieving coastal development goals and adapting to climate change (Abedin and Shaw, 2013). To meet the demands of large number of populations a lot of crops are grown in our country both in the field and homestead areas. The country is proceeding toward self-reliance of food production. But out of this success many new issues have also appeared including rapid change of climate. Increasing agriculture production through expansion of cultivated area is no longer feasible, because practically all the available arable land is now being used for crop production. Instead of focusing on rice as a single crop, farmers are increasingly involved in homestead gardening. Homestead garden has been playing an important role in production of crops in Bangladesh. Demand of vegetables, fruits, are increasing in Bangladesh day by day. With the continuous increase in population, new houses are being built on the homesteads thereby reducing the land area available for agricultural activities. Homestead vegetable, fruits, spices cultivation are especially important in overcoming seasonal availability of foods and promotes household self-sufficiency.

A home garden is a micro-environment composed of a multi-species (annual to perennial, root crops to climbers etc.), multi-stored and multi-purpose garden situated close to the homestead (Eyzaguirre

et al., 2004). A home garden refers to the traditional land use system around a homestead, where several species of plants are grown and maintained by the household members and their products are primarily intended for family consumption. Several terms have been used to describe these garden production systems such as homestead garden, Kitchen Garden, mixed garden, garden culture etc. (Mitchell et al., 2004). Multiple social benefits of home gardens include enhancing food and nutritional security in many socio-economic situations, improving family health and human capacity, empowering women and preserving indigenous knowledge and culture (Mitchell et al., 2004). Collectively, home garden production system contributes about 70 percent fruit, 40 percent vegetable, 70 percent timber and 90 percent firewood and bamboo requirement of Bangladesh (Miah et al., 2003). Homestead gardening, especially vegetable production is an important household activity contributing to both economic welfare and family diets (Helen Keller International, 2001).

Different studies have revealed that, due to changes in climate, there have been positive impacts in terms of enhanced and diverse food production, but at the same time there has been serious actual and potential damage in the traditional agriculture (Ali, 2002). The growing concern about the effects of changing situation like increasing salinity, flooding, water logging, and cyclones have led to the question how to complement the traditional farming for achieving food security. Climate change is a statistically significant change in measurement of either the mean state or variability of the climate for a place or region over an extended period of time due to natural variability or as a result of different human interventions (Prevention consortium, 2007). Flood, drought, cyclonic storm surges, riverbank erosion, salinity intrusion and water logging cause large-scale loss of life, damage to infrastructure and economic assets, adversely impact on food, water, health and energy security, and affect the lives and livelihoods of rural people (Alam *et al.*, 2017; Alam, 2016; Jordan, 2015; Thomas *et al.*, 2013; Pouliotte *et al.*, 2009; Huq and Ayers, 2008). It is considered as one of the most serious threats to the country's environment with its potential negative aspects on homestead, human health, food security, agriculture, fisheries, biodiversity, water, economic activities and other natural resources (NCSA, 2007).

## **1.2 Statement of the problem**

Almost every sector of socio-economic life in Bangladesh is likely to be affected by climate change (IFAD, 2008). The impacts of climate variability, change and extreme events will lead to severe stress on overall development, environment and human well-being. The most threatening story is that the level of salinity is also changing rapidly, which is leading an uncertain future of both human and other living species of this region. The capacity of

households to adapt to the influence of climate change, which can affect households' resources and resilience, is uncertain due to poor socio-economic conditions (Wood *et al.*, 2014; Lobellet *et al.*, 2008; IPCC, 2007). Hence, Adaptation Strategies are crucial to help the local communities to cope with extreme weather conditions and associated climatic variations (Rosenzweig *et al.*, 2013; Adger *et al.*, 2003).

The adaptive capacities of the people need to be gradually increased to understand the probabilistic climate vulnerabilities and its consequences over the country agriculture and agriculturally based livelihoods (CEGIS, 2005). Though several government programs have sought to address climate risks in Bangladesh, new ways and methods need to be developed that better inform farmers and help them to identify alternative, technically viable options for farm adaptation practices to mitigate the consequences of climate change (Roy *et al.*, 2021). Utilization of climate information in a risk management framework could encourage farmers to adopt the diversified program including homestead production. Agricultural activities are largely hampered by different types of climatic hazard. So adaptation of farming practices is very much essential for this area for all the sectors of agriculture. Nevertheless, the farmers are very hopeful and enthusiastic in adapting various farming practices including homestead gardening system in response to climate change. In this situation, it is very necessary to conduct sort of research to find out whether the crop practices in sustainable homestead gardening system by the homestead owners due to climate change. In view of the above background and facts, the present study was undertaken with the following queries:

- ❖ What are the characteristics of the homestead gardeners?
- ❖ What extent of knowledge of family farmers possess about homestead gardening?
- ❖ What are the factors of sustainable homestead gardening in saline affected coastal zone?

For getting clarification of the above questions the researcher selected the following objectives of the study.

### **1.3 Objectives of the study**

1. To describe the socioeconomic characteristics of coastal families. The characteristics are:
  - i) Level of education
  - ii) Family size
  - iii) Homestead garden size
  - iv) Annual family income
  - v) Organizational participation

- vi) Contact with extension agent
  - vii) Knowledge in homestead gardening system
  - viii) Access to ICTs
  - ix) Access to financial institutions
  - x) Use of climate smart agricultural practices and technologies
2. To measure the extent of sustainable homestead gardening
  3. To determine the factors of sustainable homestead gardening in saline affected coastal zone

#### **1.4 Justification of the study**

Sustainable homestead gardening indicates economic profitability, social wellbeing and environmental soundness. This is important not only for the people directly impacted, but also for the country as a whole. Although sustainability of agriculture has become an important development issue, few studies in Bangladesh have addressed the issue of identifying factors of sustainable homestead gardening. In the policy sphere, there have been strong statements about the need for sustainable development by ensuring sound environmental management, implementation of diverse economic activities and provision for social needs (Roy *et al.*, 2014). With this growing emphasis, the study aimed here to determining key factors that influences sustainable homestead gardening in the coastal zone of Bangladesh to assist policy makers in identifying agricultural intervention that support food security.

#### **1.5 Assumptions of the study**

The researcher had the following assumptions in mind while undertaking this study:

1. The selected respondents were competent enough to reply the queries made by the researcher.
2. The responses furnished by the respondents were valid and reliable.
3. Information furnished by the respondents included in the sample was the representative opinion of the whole population of the study area.
4. The researcher who acted as interviewer was well adjusted to social and environment condition of the study area. Hence, the data collected from the respondents were free from bias.
5. All the data concerning the variables of the study were normally and independently distributed.



## **1.6 Limitations of the study**

In order to make the study manageable and meaningful from the point of view of research, it was necessary to impose some limitations as stated below:

1. The study was confined to selected union of Fakirhat upazila under Bagerhat district.
2. The characteristics of farmers in the study area were many and varied but only ten characteristics were selected for investigation in this study as stated in the objectives.
3. The researcher relied on the data furnished by the farmers from their memory during interview.
4. For some cases, the researcher faced 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 related terms**

A concept is an abstract of observed thing: events or phenomenon or in other words, it is a short hand representation of variety of a researcher needs to know the meaning and contents of every term that he uses. It should express the issue as well as explains the fact to the investigator and readers. However, for clarity of understanding a number of key concepts/terms frequently used throughout the study defined are interpreted as follows:

### **Homestead**

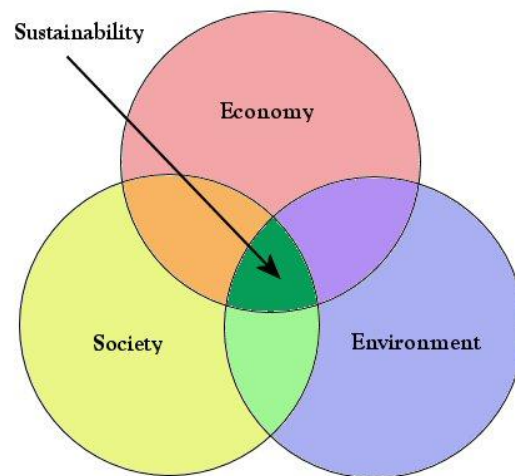
A homestead is a land owned or occupied by a dwelling unit of the household along with adjoining area, including garden, country yard and pond and threshing floor.

### **Homestead garden**

Homestead garden defined as the center where all vegetables and quick growing fruits are cultivated. A home garden refers to the traditional land use system around a homestead, where several species of plants are grown and maintain by the household members and their products are primarily intended to the family consumption. Several terms have been used to describe these garden production systems such as homestead garden, Kitchen Garden, mixed garden, garden culture etc. (Mictchell et al., 2004). Homestead gardening, especially vegetable production is an important household activity contributing to both economic welfare and family diets (HKI, 2001).

## **Sustainability**

Sustainability is a societal goal with three dimensions (also called pillars): the environmental, economic and social dimension. This concept can be used to guide decisions at the global, national and at the individual consumer level. A related concept is that of sustainable development. Both terms are often used synonymously. UNESCO formulated a distinction as follows: "Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (Roy, 2015).



**Figure 1:** Sustainability Venn diagram (where "sustainability" is thought of as the area where the three dimensions overlap).

## **Respondents**

Respondents are the people from whom a social research worker usually gets most data required for his research. In this study the respondents were the homestead gardeners of villagers of Fakirhat upazila of Bagerhat District.

## **Farmers**

The persons who were involved in farming activities are called farmers. They participated in different farm and community level activities like crops, livestock, fisheries, other activities etc.

## **Gardeners**

The persons who are involved in gardening activities are called gardeners. They participated in different planting activities like vegetables, fruits, other activities etc.

**Variable**

The characteristic that occurs in a number of individuals, objects', groups etc. and that can take on various values, for example the level of education of an individual.

**Dependent Variable**

Dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables.

**Independent Variable**

Independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon.

**Assumption**

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence.

**Hypothesis**

A proposition this can be put to a test to determine its validity. It may be true or false. It may seem contrary to or in accord with common sense. However, it leads to an empirical test.

**Null Hypothesis**

The hypothesis which we pick for statistical test is null hypothesis ( $H_0$ ). In this study the null hypothesis is stated that there is no relationship between the concerned variables.

**Level of education**

Empirically it was defined to the development of desirable changes in knowledge, skill and attitudes in an individual through reading, writing, observation and other selected activities. It was measured on the basis of classes a farmer has passed from a formal educational institution.

**Homestead garden size**

The term related to the decimal of land owned by family farmers in homestead areas on which he carried his homestead farming activities.

**Family size**

Family size refers to the number of member including the respondent himself, his wife, children and other permanent dependents, who live and live together in a family unit.

**Annual family income**

Annual family income of a respondent referred to the total earning by him and other members of his family from agricultural (field crop, fish, livestock, poultry, fruits and vegetables and timbers, etc.) and other non-agricultural sources (service, business. etc.) during a year. It was expressed in Taka.

**Organizational participation**

Organizational participation of the respondent is measured in two dimension status of his participation and duration of participation in different organizations during the time of interviewing.

**Contact with extension agent**

It is referred to the respondents becoming accessible to the influence of different extension agent through different extension teaching methods.

**Knowledge on homestead gardening**

It is the extent of basic understanding of the family farmers in different aspects of homestead gardening like soil, seed, fertilizer, irrigation etc. It includes the basic understanding of the use of different inputs and practices for homestead gardening.

**Access to ICTs**

GIZ (2015) defined ICTs as technologies that facilitate communication and the processing and transferring of information by electronic means to those that need them. This definition encompasses the full range of ICTs from Radio, and Television to Telephone (Fixed and Mobile), Computers and the Internet. It can be said that if information on improved farming systems are made available for the womenfolk with effective communication system, their productivity in agriculture will fully be enhanced and the cumulative effect will reduce or alleviate rural poverty (Islam, 2012).

**Access to financial institution**

FAO (2013) stated that access to financial institution is the ability of individuals or enterprises to obtain financial services, including credit, deposit, payment, insurance, and other risk management services. Accumulated evidence has shown that financial access promotes growth for enterprises through the provision of credit to both new and existing businesses. It benefits the economy in general by accelerating economic growth, intensifying competition, as well as boosting demand for labor. The incomes of those in the lower end of the income ladder will

typically rise hence reducing income inequality and poverty. The lack of financial access limits the range of services and credits for household and enterprises. Poor individuals and small enterprises need to rely on their personal wealth or internal resources to invest in their education and businesses, which limits their full potential and leading to the cycle of persistent inequality and diminished growth.

## **CHAPTER 2**

### **REVIEW OF LITERATURE**

In this chapter, reviews of the related literature to the study are presented. A good number of studies have been carried out in the agriculture extension sector in others country but only a few studies were conducted in Bangladesh, which were concerned with the topic of this research. The studies, which are relevant to the present study in terms of topic and methodology. Those have been conducted in five sections as follows:

Section I: Concept and importance of sustainability

Section II: Concept and importance of homestead gardening

Section III: Relationship between the selected characteristics of the homestead gardeners and their knowledge involvement in home gardening practices

Section IV: Research gap of the study

Section V: Conceptual framework of the study

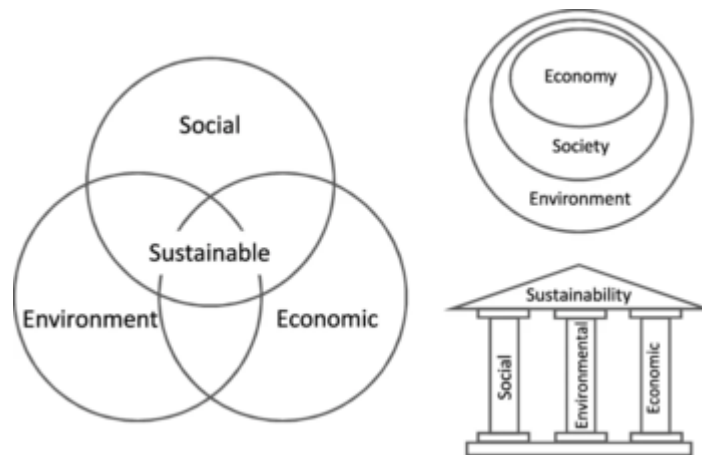
#### **2.1 Concept and importance of sustainability**

Sustainability is a societal goal with three dimensions (also called pillars): the environmental, economic and social dimension. This concept can be used to guide decisions at the global, national and at the individual consumer level. A related concept is that of sustainable development. Both terms are often used synonymously. UNESCO formulated a distinction as follows: "Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it.

For many people, especially those from the environmental movement, sustainability is closely linked with environmental issues. This is also called "environmental sustainability". The most dominant environmental issues since about the year 2000 have been climate change, loss of biodiversity and environmental pollution and land degradation.

The economic dimension of sustainability is as controversial as the concept of sustainability itself. This is partly because of the inherent contradictions between "welfare for all" and environmental conservation. To resolve this contradiction, the decoupling of economic growth from environmental deterioration needs to be considered. It is difficult to achieve because environmental and social costs are not generally paid by the entity that causes them, and are not expressed in the market price. Usually, externalities are either not addressed at all or are left to be addressed by government policy or by local governance. Some examples are: taxing the activity (the polluter pays); subsidizing activities that have a positive environmental or

social effect (rewarding stewardship); or outlawing the practice (legal limits on pollution). The social dimension of sustainability is the least defined and least understood dimension of sustainability. Some academics have proposed more dimensions of sustainability such as institutional, cultural, and technical dimensions.



**Figure 2:** Commonly used schematics of the tripartite description of sustainability: (Left, typical representation of sustainability as three intersecting circles. Right, alternative depictions: literal 'pillars' and a concentric circles approach).

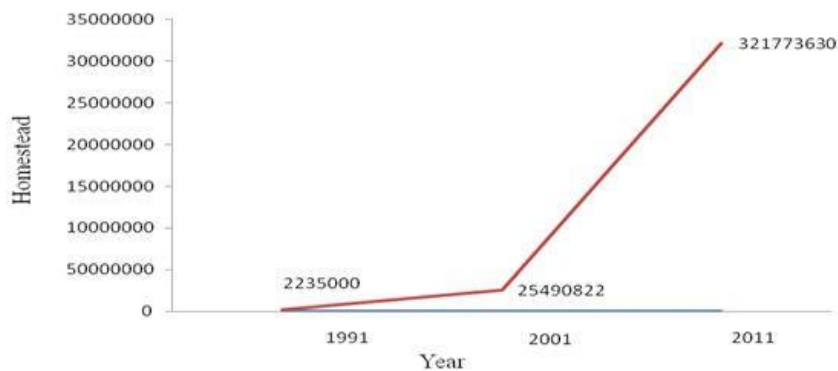
Sustainable agriculture has a significant role to play in feeding the growing worldwide population and reducing the impact of climate change. Today, agriculture accounts for up to 30% of the world's greenhouse gas emissions, according to the World Bank. The agriculture infrastructure churns out emissions through transportation; the planting, harvesting, and processing of crops; and the production of livestock. That's not to mention water pollution from pesticides, herbicides, and fertilizers.

Clearly, there's a need to reduce agriculture's impact on the environment, but at the same time, increase productivity to feed a growing world population.

## 2.2 Homestead in Bangladesh

Homestead is the center of socio-economic activities and traditional cultural heritage of villages in Bangladesh. The homesteads-in which the people live in are locally known as '*Bari*', which occur in linear, cluster or individual pattern (Hussain *et al.*, 2004). Homestead perhaps the most important production unit in Bangladesh, which accounted about 25.36 million in the country with 21.90 million in the rural areas (BBS, 2011). These homesteads occupied about 0.54 million hectares of land (BBS, 2011). The

average size of the rural homestead is very small (0.02ha), which varies widely according to region and socioeconomic status of the households (Basak, 2002).



**Figure 3:** Homestead in Bangladesh (Source: BBS 2011)

Depending on the locations, the homestead is raised above the flood level from the surrounding fields. Generally, a homestead possesses at least a living room, a kitchen room and few tree species. Besides, there are some vacant spaces for different production purposes.

A typical homestead accommodates a single or several houses of single or joint families and has space for vegetable gardens, yard for threshing ground and communal activities, cattle shed, ponds, trees, shrubs and bamboo (Haque, 1996). Homestead in Bangladesh is increasing day by day, during 1991 it was 22,35,000 (Figure 3) where as in 2001 it was 254,90,822 (Figure 3) and in 2011 it was 3217,73,630 (Figure 3).

### **2.3 Concept and importance of homestead gardening**

Homestead gardening is a low-cost production system, which can contribute significantly to the house hold economy and food security. The homestead owners themselves consume a large proportion of the products and the rest of the products are sold in the market.

The amount of income derived from homesteads is primarily determined by crop composition in the garden. Income derived from homestead range from 0.8 percent to 54 percent of family's total income (Abdullah *et al.*, 1983).

The homestead systems contribute about 70 percent fruit, 40 percent vegetables, 70 percent timber and 90 percent firewood requirement of the country. Due to shortage of agricultural land, homestead agroforestry practice may be a good strategy for survival and existence of the farmers by attaining food and income security (Miah and Hussain, 2001).



Halladay and Gilmour (1995) mentioned that the home gardens have multiple functions in relation to everyday human life and environment and also act as a bridge between all living beings and non-living environment. The main values derived from home garden are foods, energy for domestic use, source of nutrients, fodder for domestic animal, medicinal products, timber for house construction, and a pleasant environment for dwellers.

In the present context of Bangladesh, homestead agroforestry systems are most appropriate for resource poor farmers. They can earn immediate benefits from crops while waiting for long term benefits from trees. A unique combination of different species of fruit, timber and biomass yielding trees can generate high amount of earnings for the farmers of Bangladesh (Abedinet *al.*, 1990).

Hossain (1996) conducted a study which is based on information obtained from a field survey with 120 households in four selected villages in Bangladesh. The study showed that homestead forests were an important resource for the real poor to meet their contingency needs. The forests were facing increasing pressure from alternative uses, but their survival was crucial to the economic and social needs of the rural people, especially the poor.

The homestead enterprises such as vegetables and fruits cultivation, fish culture, forest, poultry rearing etc. can contribute to increased food availability and generate income of the rural farm families (Mazher, 1996).

Hasanet *al.* (2008) found most of the trees in homestead agroforestry system to be traditional varieties with less production potential. So, there is much scope to improve productivity of the system both in the homesteads and in the fields by replacing the existing tree species/varieties with the improved ones, planting trees in planned ways, using suitable tree-crop combination and by improving management practices.

#### **2.4 Homestead vegetable cultivation on food and nutrition security**

Nutrition problem is key issue along with food security in Bangladesh today. A small percentage of the people have access to nutritious food, whilst the majority is forced to survive on subsistence diets that are unbalanced and devoid of essential food ingredients (MoA-UNDP, 2000). Generally, landless and marginal farmers are at more risk nutritionally than larger households. These households have lower per capita grain availability and higher rates of child malnutrition (Talukderet *al.*, 1995). Of all the options available to tackle national malnutrition problem, the most practical and sustainable option would be to promote both cultivation and consumption of horticultural crops (fruits, vegetable and spices) that could provide basic requirement of the essential vitamins and minerals. Production of crops especially vegetable and fruits may well be the answer to the potential problems of hung

and malnutrition in Bangladesh (Ahmad, 1999). Daily intake of two spoonfuls – about 30 g of colored leafy vegetables can protect a child from vitamin A deficiency (Hussain, 1992). Homestead gardening in Bangladesh provides an excellent opportunity for farmers to produce a wide range of horticultural crops. These crops are ideal for the home garden (Talukder et al., 1995). All micro sites of homestead from home-yard to kitchen garden, and even roofs of houses help diversify household's diet through the production and consumption of the vegetables they produce (Miah and Hussain, 2003).

Dietary supplies from home gardens in studied areas in Bangladesh accounted for 3 to 44 percent of the total calorie and 4 to 32 percent of the protein intake (Torquebiau, 1992). Home garden programs of Hellen Keller international in Bangladesh has been found effective in increasing the production and consumption of vitamin A-rich plant foods and in increasing the diversity of the diet, while one half of pre-school-aged children and pregnant women of those countries are affected by micronutrient malnutrition (HKI, 2003). Therefore, it is imperative that effective efforts are to be made for producing more fruits and vegetables through intensification of their homestead production system if severe malnutrition's to be overcome. In Bangladesh, there are more than 150 fruits and vegetables are being cultivated in the homestead and farmer's fields, house availability is far behind from the requirement.

## **2.5 Homestead garden– a platform for employment and economic security**

Homesteads are multipurpose entities with dwellings, vegetables, spices, fruits and fuel wood/timber species. Historically, homesteads have been providing multiple products to the households and meet their diversified need through the production of a wide variety of fruits, Vegetables, spices and different tree products (Miah *et al.*, 2003). The prevailing climatic and edaphic conditions of Bangladesh are the key factors for providing such a unique opportunity of producing a wide range of products. It has been reported that homestead production system collectively contributes about 70 percent fruits, 40 percent vegetables, 70 percent timber and 90 percent firewood and bamboo requirement of the country (Miah and Ahmed, 2003).

A vast majority of rural people in Bangladesh who cultivate land for crop production remains unemployed for a considerable period of the year because of seasonality of production activities and labor requirements. Homestead farming is the best answer to such unemployment situation through both vegetable growing, and culture of quick growing fruits enabling the people to remain employed round the year (Ahmad, 2007). It has been found that over the decades, small-scale homestead activities have become the most significant income generating activities of poor households. For example, over 5 million

people in Bangladesh live in the revering sand and silt landmasses (known as char in Bengali). These areas are highly prone to sudden flooding and erosion of land, and makes living in the chars hazardous and insecure.

The Helen Keller International's homestead food production program was found to provide support to the fragile livelihood in the chars and improved the well-being of the entire household by promoting low cost technologies for gardening and livestock-raising, improving food security and dietary practices, providing employment for women and a source of income for the household (HKI, 2003). *Artocarpus heterophyllus* (Jackfruit) based system (a century old homestead production system in Bangladesh particularly in terrace ecosystem in the central part and hill ecosystem in east and southeast part) provides diversified outputs to the growers. The jackfruit is consumed almost as the main food during the main harvesting periods (July-August) and the seeds are used in various cooked forms (Miah and Ahmed, 2003).

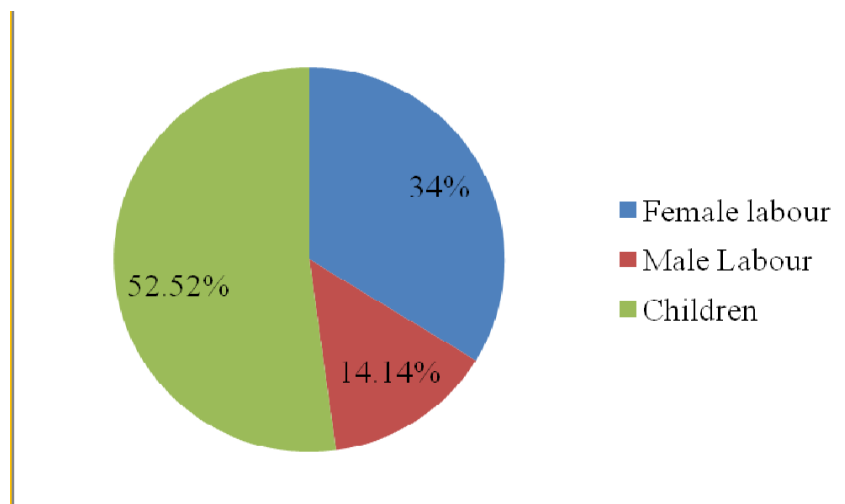
Homestead being the dwelling place, enables the women for efficient management of homestead activities. Use of family labour, especially women labour in the production process not only satisfies a wide range of domestic needs more economically but also ensures lowering of production costs and ultimately promotes more income. Average return per decimal of homestead land is far more than that of non homestead land, possibly due to the more intensive labor inputs on the part of women in poor households (Ahmad, 1995).

Therefore, homestead farming activities are keeping busy the entire households particularly the women who have minimum opportunities to be involved with other than homestead activities and ensuring the economic security especially to the poorer.

## **2.6 Employment opportunity for women by homestead gardening**

Women - the vulnerable group of the society and half of the population have the great opportunity for self-employment in the income-generation activities through the practice of vegetable and fruit production in the homestead. The possibility of gender equality for participating in home garden management and sharing of benefits is perhaps one of the major stimuli for continued household food security enjoyed by home gardeners (Kumar *et al.*, 2013). Family labour was mostly used in home garden and was managed mostly by the idle family labour of male, female, and children. Male farmers participated more in vegetables bed preparation, planting, weeding, staling, fencing, crop protection and marketing while female members participated more in applying irrigation, mulching and harvesting of vegetables. Children were also participated in all the works and helped their parents. (Islam *et al.*, 2003)

reported that participation of male and female labour was almost equal while (Khan *et al.*, 2009) reported more participation of male compared to female. The higher participation of women in agricultural activities made positive impact on equity issues within the family and also in the community as well. Almost 34% of gardening works were managed by women (Figure 4) and children and in fact, women were the main decision-makers regarding gardening practices. They used income to spend school fees, tiffin fees, buying pens and writing pads etc. for their children that were earned by selling garden produce.



**Figure 4:** Involvement of family members in the homestead production activities (Source: Shaheb *et al.*, 2014)

Although every member of the family has some contribution in homestead farming, the major labour input is contributed by women. Their roles vary widely depending upon the socioeconomic and religious factors. It has been shown that female labours of landless families gave the maximum time compared to other categories of families (Nessaet *et al.*, 1998). They spend about one-fourth of their total time in homestead production activities and increase family income. As women play significant role in homestead production and management, still there remains immense opportunity for improvement of homestead production by enriching their knowledge and skill. Women, therefore, need to be empowered in skills and knowledge that will enable them to more active and meaning participation in the homestead production activities. Homestead gardening plays vital role in income for small and marginal farmer. It increases family income.

## **2.7 Relationship between the selected characteristics of the homestead gardeners and their knowledge involvement in home gardening practices**

### **Level of education and knowledge**

Banerjee (1976) and Chandargi (1980) reported that farmers' education was significantly related with their knowledge.

Hossain (2000) found that the education of the respondents had significant positive relationship with their knowledge on Binadhan-6.

Islam (1993) found that the general education of the BSs had no significant relationship with their knowledge on modern agricultural technologies. However, the trend of relationship between general education and knowledge on modern agricultural technologies was negative.

Khan (1996) in his study found the formal education was related to both their initial rice knowledge ( $r=0.42$ ) and their final rice knowledge ( $r=0.33$ ) but also found that concerned variable was not related to their knowledge gain ( $r=0.02$ )

Rahman (2004) found in his study that level of education of the farmers had a significant and positive relationship with their knowledge on boro rice cultivation.

Rathore and Shaktawat (1990) reported in their study that farmers' education was significantly related with their knowledge.

Saha (2001) found that the education of the farmers had a positive significant relationship with their knowledge on improved practices of pineapple cultivation.

Saha (2003) found, among the six independent variables, only education was positively and significant related at 0.01 level of probability with poultry farming knowledge.

Sarker (2002) conducted a research on farmers' knowledge of and attitude towards BIRI Dhan29 variety of rice and found that education of the respondents had positive relationship with their knowledge of BIRI Dhan29.

Sarker (2002) found in his study education level of the farmers had significant and positive relationship with their knowledge on improved banana cultivation.

### **Family size and knowledge**

Akanda (1994) mentioned that family size of the rural women had significant positive relationship with their involvement in the cultivation of the fruit trees and vegetable cultivation.

Alam (2001) in his study showed that family size of the women had non-significant relationship with participation in agriculture, fisheries and poultry program of BAUEC'.

Auragozeb (2002) found that family size of the rural women had non-significant relationship

with their adoption of integrated homestead farming technologies.

Chowdhury (2000) in his study observed that family size of the rural women had no significant relationship with their opinion for involvement in development activities.

Islam (2002) in his study showed that family size of the women had non-significant relationship with their knowledge in income generating activities.

Pavin (1993) found that there was a significant positive relationship between family size of the women and their awareness and knowledge on environmental degradation.

### **Homestead garden size and knowledge**

Ahmed (1974) found that there is a significant relationship between farm sizes of the farmers and their agricultural knowledge.

Akter (2003) found in his study that farm size of the farmers had a significant and positive relationship with their knowledge on agricultural activities.

Ali (1984) found that farm size of the contact and non-contact farmers had significant positive contribution to their agricultural knowledge.

Hossain (2000) found that farm size of the farmers had no relationship with their knowledge of Binadhan-6.

Hossain (2001) in his study found that farm size of the farmers was related to farmers' knowledge of crop cultivation.

Khan (1996) in his study indicated that farm size of the respondent was not significantly related to their initial rice knowledge, final rice knowledge and knowledge gain.

Khan (2005) found in his study that farm size of the respondent had no relationship with their knowledge of maize cultivation

Rahman (2004) found in his study that farm size of the farmers had a significant and positive relationship with their knowledge on boro rice cultivation practices.

Sarker (2002) also found that there was a positive relationship between farm size of the farmers and their knowledge of BRI Dhan29.

Sharma and Sonoria (1983) found that both the contact and non-contact farmers were different in their size of operational holding. However, they found no significant differences in knowledge of both the contact and non-contact farmers with the size of their operational holdings.

### **Annual family income and knowledge**

Ali (1984) also found that income of the contact and non-contact farmers' differed significant positive contribution to both of their agricultural knowledge and adoption of innovations.

Hossain (2003) found that income of the rural women farmers had negative relationship with their knowledge of modern boro rice cultivation.

Nurzamman (2000) found that incomes of the rural women farmers had no relationship with their knowledge of the FFS and non-FFS farmers.

Roy R. (2015) stated that annual income refers to the total annual earnings of all family members of a respondent from agriculture, livestock, fisheries and other accessible sources (business, service, daily working etc.) during a year. Income is essential component of building resilience livelihood.

### **Organizational participation and knowledge**

Ahmed (2007) revealed that there was non-significant but positive relationship between organizational participation and their knowledge for capacity building and found that there was significant and positive relationship between organizational participation and their perception of benefit from agriculture model fun project of SUS.

Alam (2004) found that there was non-significant but positive relationship between organizational participation of rural element and their knowledge towards home state vegetables.

Bhowmik (2004) found that there was non-significant relationship between organizational participation and knowledge that helps to empowerment of the beneficiaries of a selected NGO in Narshingdi district.

Gazi (2009) revealed that there was significant and positive relationship between organizational participation of rural farmers and their knowledge in capacity strengthening in conducting post gardening activities.

Rahman (2008) revealed that there was non-significant and negative relationship between organizational participation of women and their knowledge to capacity strengthening in carrying output harvest activities.

Sarkar (2004) found that there was non-significant but negative relationship between organizational participation of rural farmers and their knowledge that use of selected crop technology in homestead garden.

Sharmin (2008) conducted that there was non-significant but positive relationship between organizational participation of the farmers and their knowledge in practicing post harvest activities.

### **Contact with extension agent and knowledge**

Ahmed (1974) found that there is a significant positive relationship between extension contact of the farmers and their agricultural knowledge.

Ali (1984) found that contact and non-contact farmers differed significantly in respect of their media exposure. He observed that media exposure of the contact and non-contact farmers had significant contribution towards their agricultural knowledge.

Hossain (2000) concluded that media exposure of the tanners had a significant relationship with their knowledge of Binadhan-6.

Islam (1991) in his study found that extension contact was significant related with their agricultural knowledge. Haque (1993) also found a positive relationship between extension contact and adoption of improved practices.

Khan (1996) found an insignificant relationship between extension contact of the farmers and their initial knowledge, final knowledge and also knowledge gain.

Naddiwal et al. (1999) conducted a research on knowledge and adoption level of the farmers about rice production technologies and concluded that extension contact of the farmers had significantly influenced farmers' knowledge.

Rahman (1995) studied farmers knowledge on improved practices on potato cultivation by the farmers of Kajipur upazilla under Sirajganj district. The study indicated a significant relationship between extension contact knowledge of improved practices on potato cultivation.

Rahman (2001) found in his research work that media exposures work that media exposure of farmers had a positive significant relationship with their knowledge of Alope 6201 hybrid rice.

Sarker (2002) in his study found that the media exposure of the farmers was significant related with their knowledge of BRRI Dhan29 variety of rice.

### **Knowledge on homestead gardening system and involvement in home gardening practices**

Akanda (1994) in his study found that knowledge of rural women had significant positive relationship with their involvement in the cultivation of the fruit trees and vegetable cultivation. But there was no significant difference in the participation of rural women in homestead vegetable cultivation and non-farming activities because of their difference in education.

Akhter (2000) in his study observed that agricultural knowledge of rural women had significant positive relationship with their involvement in decision making role in the family



with regard to development activities.

Parveen (1995) in her study observed that the level of existing knowledge of the farm women on the modern technologies revealed that 58% had moderate knowledge, 35% had high while 7% of the farm women possessed poor knowledge.

Parvin (1993) in her study recommended that knowledge played vital role in forming favorable attitudes towards the homestead agricultural production.

### **Access to ICTs and knowledge**

GIZ (2015) defined ICTs as technologies that facilitate communication and the processing and transferring of information by electronic means to those that need them. This definition encompasses the full range of ICTs from Radio, and Television to Telephone (Fixed and Mobile), Computers and the Internet. It can be said that if information on improved farming systems are made available for the womenfolk with effective communication system, their productivity in agriculture will fully be enhanced and the cumulative effect will reduce or alleviate rural poverty (Islam, 2012).

### **Access to financial institution and knowledge**

Ahmed (1977) indicated existence of a positive and significant relationship between access to finance and use of information sources in the adoption of three improved practices.

Alam (1997) studied use of improved farm practices of rice cultivation by the households of Anwara thana of Chittagong district. The study indicated no significant relationships with their use of resilience in rice cultivation. He conducted a study on households' knowledge and adoption of modern sugarcane cultivation practices. He found that access to finance of the growers had significant relationships with their adoption of modern resilience in seed cultivation.

FAO (2013) stated that access to financial institution is the ability of individuals or enterprises to obtain financial services, including credit, deposit, payment, insurance, and other risk management services. Accumulated evidence has shown that financial access promotes growth for enterprises through the provision of credit to both new and existing businesses. It benefits the economy in general by accelerating economic growth, intensifying competition, as well as boosting demand for labor. The incomes of those in the lower end of the income ladder will typically rise hence reducing income inequality and poverty. The lack of financial access limits the range of services and credits for household and enterprises. Poor individuals and small enterprises need to rely on their personal wealth or internal resources to

invest in their education and businesses, which limits their full potential and leading to the cycle of persistent inequality and diminished growth.

Rahman (2011) studied households' knowledge of improved practices in potato seed indicated a significant relationship between accesses to finance of improved practices.

### **Use of climate smart agricultural practices and technologies with knowledge**

FAO (2013) stated that Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible. CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions.

CSA is one of the 11 Corporate Areas for Resource Mobilization under the FAOs strategic objectives. It is in line with FAO's vision for Sustainable Food and Agriculture and supports FAOs goal to make agriculture, forestry and fisheries more productive and more sustainable". Transformations are needed in both commercial and subsistence agricultural systems, but with significant differences in priorities and capacity. In commercial systems, increasing efficiency and reducing emissions, as well as other negative environmental impacts, are key concerns. In agriculture-based countries, where agriculture is critical for economic development (World Bank, 2008), transforming smallholder systems is not only important for food security but also for poverty reduction, as well as for aggregate growth and structural change. In the latter group of countries, increasing productivity to achieve food security is clearly a priority, which is projected to entail a significant increase in emissions from the agricultural sector in developing countries (IPCC, 2012). Achieving the needed levels of growth, but on a lower emissions trajectory will require a concerted effort to maximize synergies and minimize tradeoffs between productivity and mitigation. Ensuring that institutions and incentives are in place to achieve climate-smart transitions, as well as adequate financial resources, is thus essential to meeting these challenges. In this context mitigation finance can play a key function in leveraging other investments to support activities that generate synergies.

## **2.10 Research gap of the study**

There are lots of researches on small-scale gardening in northern region of Bangladesh. Very few researches conducted on homestead gardening in southern coastal region. Mainly conducted on stress tolerant rice production, salt tolerant rice production, but homestead gardening production performance should be conducted. Smallholder family farmers make a huge contribution to our country's food production, but they are often overlooked. On these considerations, the present researcher felt necessity to conduct the present research to find out the determinants of sustainable homestead gardening in salinity affected coastal zone.

## **2.11 The conceptual framework of the study**

This study is concerned with determinants of sustainable homestead gardening. Thus, sustainable homestead gardening was the main focus of the study and 10 selected characteristics were considered as those might have contribution with the determinants of sustainable homestead gardening. Sustainable homestead gardening may be affected through interacting forces of many independent factors. It is not possible to deal with all the factors in a single study. Therefore, it was necessary to limit the independent variables, which included level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, access to ICTs, access to financial institutions, climate smart agricultural practices and technologies. The conceptual framework of the study has been presented in Figure. 5

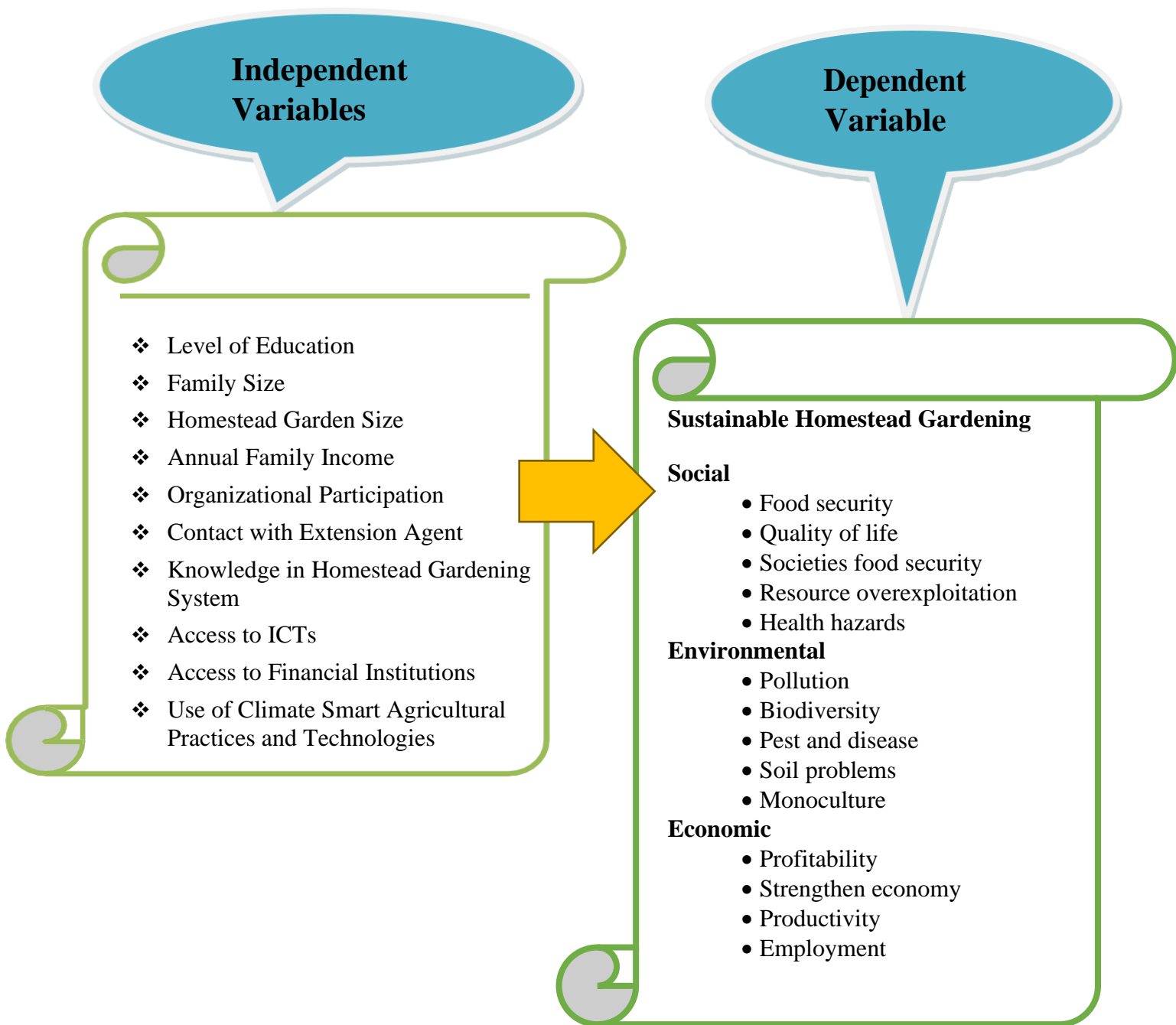


Figure 5: The conceptual framework of the study

## **CHAPTER 3**

### **MATERIALS AND METHODS**

This Chapter deals with the procedures for the collection of valid information as well as procedure of data coding and also data analysis. For conducting the research work smoothly, proper methodology is an obligatory one and it is very difficult to address the study objectives in a scientific manner without a define methodology. A sequential description of the methodologies that was followed in conducting this research work has been presented in this Chapter under the following headings-

#### **3.1 Locale of the Study**

The study was conducted in Fakirhat Upazila under Bagerhat District. Fakirhat Upazila (Bagerhat district) area 160.68 sq km, located in between 22°39' and 22°49' north latitudes and in between 89°34' and 89°47' east longitudes. It is bounded by Rupsa and Mollahat upazilas on the north, Rampal upazila on the south, Bagerhat sadar and Chitalmari upazilas on the east, Batiaghata and Rupsa upazilas on the west. Two unions were randomly selected for the study purpose. The reasons behind the selection of these unions were as follows:

- ❖ Selected area has high level of salinity.
- ❖ This area frequently affected by natural disaster (BBS, 2015).
- ❖ These unions have good level of homestead gardening.
- ❖ These unions have low level of extension activities.
- ❖ Easy accessibility of the researcher to this area.
- ❖ Familiarity of the researcher with the dialect and culture of the people of the research area.

Maps of Bagerhat district and Fakirhat Upazila showing the study areas are presented in figures 6 and 7, respectively.

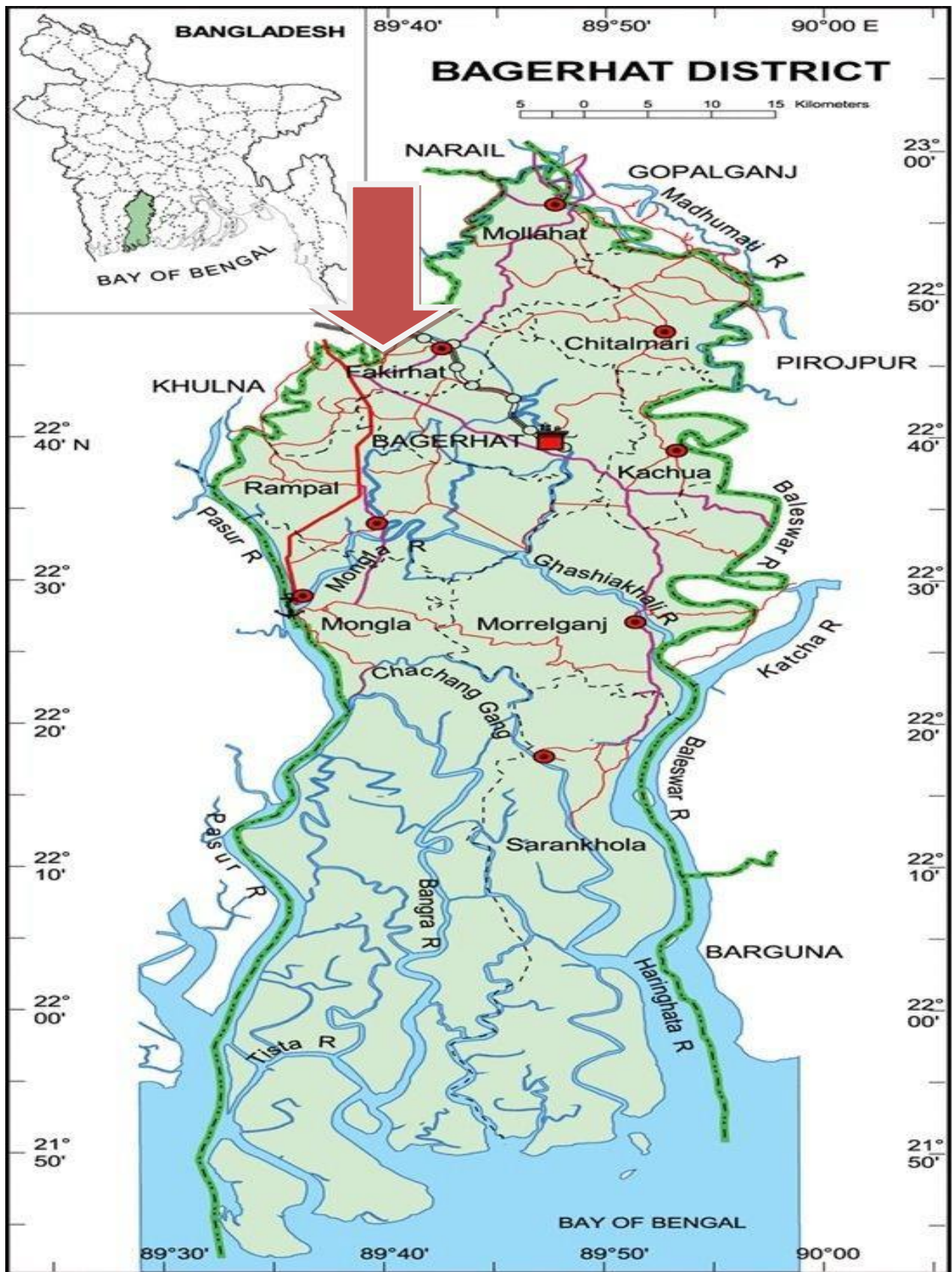


Figure 6: A Map of Bagerhat District Showing Selected Upazila

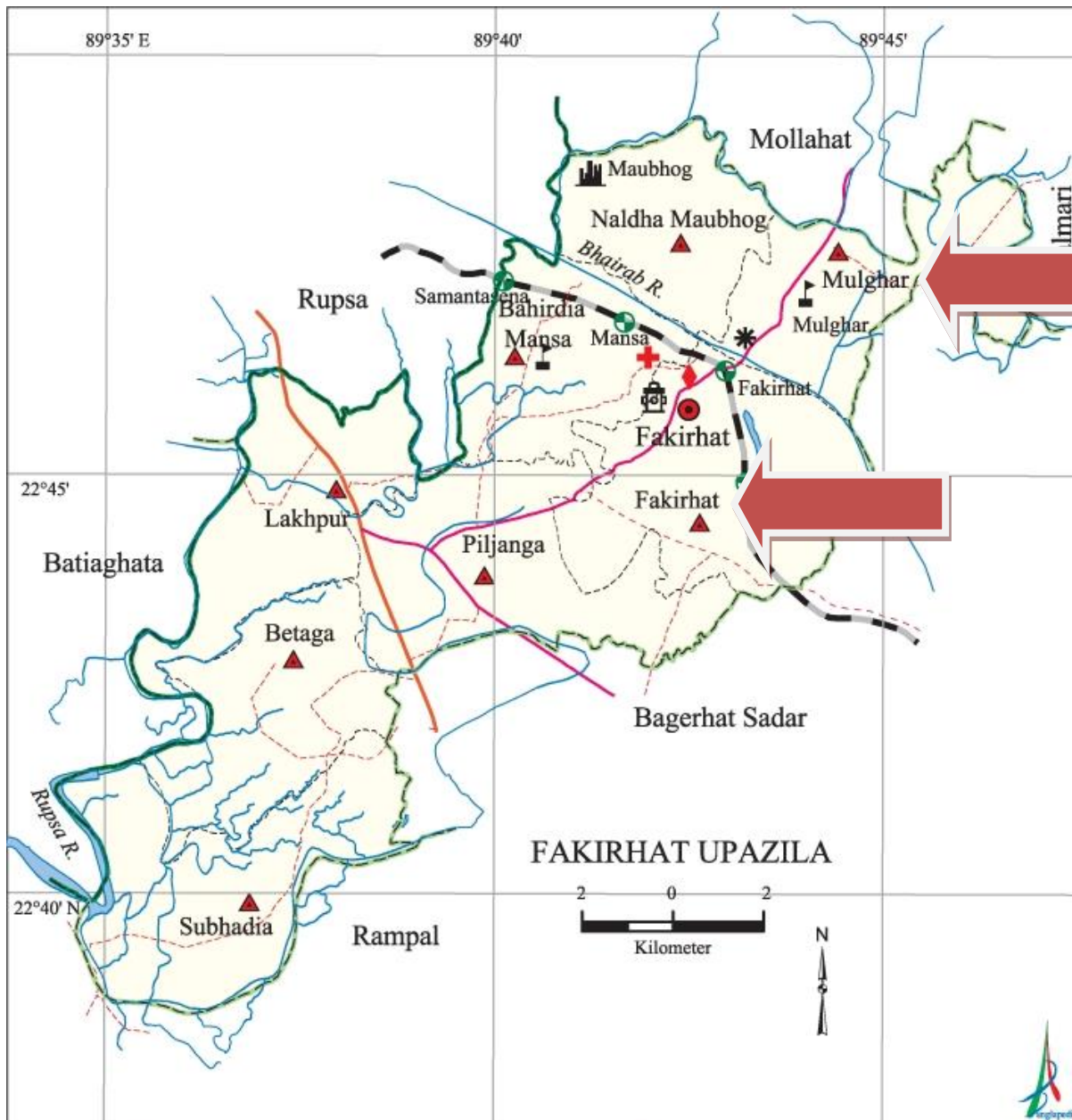


Figure 7: A Map of Fakirhat Upazila Showing the Study Area (Fakirhat and Mulghar Unions)

### 3.2 Population and sample

Homestead gardeners of selected four villages under Fakirhat upazilla of Bagerhat district were purposely considered as the population of the study. A list of smallholder farmers who are currently doing homestead gardening was prepared with the help of Upazila Agriculture Officer, Agriculture Extension Officer and their field staffs. The number of homestead gardeners of the selected four villages was 229 which constituted the population of the study. The sample size was distributed proportionally from the selected villages and respondents were finally chosen for data collection following random sampling method. The sample size was calculated using the following formula, (Yamane, 1967).

The formula,

$$n = \frac{N}{1 + Ne^2}$$

Where,

n= Sample size

N = Population size

e = Error (0.07)

Thus, the total sample size stood at around 108. The distribution of the population and sample of homestead gardener in study areas are showing below:

Table 3.1 Population and sample of the study area

<b>Name of Upazila</b>	<b>Name of Union</b>	<b>Name of Village</b>	<b>Number of Population</b>	<b>Number of Sample Size</b>
Fakirhat	Fakirhat	Attaki	70	33
		Kalthola	43	20
	Mulghar	Mansa	55	26
		Hochla	61	29
<b>Total</b>			<b>229</b>	<b>108</b>

### 3.3 Preparation of the research instrument

A well-structured interview schedule was designed in accordance with the objectives of the research. Both open and closed form questions were used in the questionnaire. The questionnaire was constructed containing direct and simple question in view the dependent and independent variables. Before preparing the final schedule, a preliminary schedule was developed. The draft schedule was pretested in the study areas. The interview schedule was then changed, modified



and rearranged according to the experience gathered and in the light of the objectives of the study. A copy of the interview schedule is presented into Appendix A.

### **3.4 Period of data collection**

The researcher himself collected data personally through face-to-face interview from the selected respondents. To familiarize with the study area and for getting local support, the researcher took help from the local leaders and the field staffs of Upazila Agriculture Office. The researcher made all possible efforts to explain the purpose of the study to the farmers. Data were collected during the period of 25<sup>th</sup> December, 2021 to 23<sup>th</sup> February, 2022.

### **3.5 Problem faced during data collection**

During the period of data collection, the researcher had to face some problems which are stated below:

1. Most of the farmers initially hesitated to answer the questions since the researcher was unknown to them.
2. Sometimes farmers were not available at home which needed even more than one-time visits to conduct a single interview.
3. In many occasions the researcher was asked by the respondents as to what benefit they might get from the researcher. They thought that the researcher was a government officer and he might supply necessary inputs such as seeds, financial facilities etc.
4. The farmers did not keep any records of their farm i.e., production, costs, return etc. and replied questions from their memory which sometimes needed verification and additional time.

### **3.6 Measurement of variables**

The variable is any characteristic, which can assume varying, or different values in successive individual cases (Ezekiel and Fox, 1969). A research work usually contains at least two important variables viz. independent and dependent variable. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). In the scientific research, the selection and measurement of variable constitute a significant task. In this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant in this research, also discussed with departmental teacher and concerned researchers of the related fields.

The various characteristics of the homestead gardeners might have influence on their homestead production. These characteristics were level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, access to ICTs, access to financial institutions, use of climate smart agricultural practices and technologies. The sustainable production from homestead garden was the main focus of the study.

### **3.6.1 Measurement of independent variables**

Measurement of all the independent variables is discussed in the following sub sections:

#### **3.6.1.1 Level of education**

Level of education was measured in terms of class passed by respondent homestead owner. If a respondent received education from the school, their education was assessed in terms of year of schooling, i.e., one score was given for one year of schooling. For example, if the respondent of a homestead owner passed the final examination of class V, their education score was taken as 5. If the respondent had education outside school and the level of education was equivalent to class V of the school than his education score was taken as 5. Each illiterate person was given a score of zero, while a score of 0.5 was given to can sign only.

#### **3.6.1.2 Family size**

The family size of a respondent of homestead owner was measured in terms of actual number of members in his family including himself, spouse, children, brothers, sisters, parents and other person who jointly live and ate together during the period of interviewing.

#### **3.6.1.3 Homestead garden size**

Homestead garden size of respondent referred to the area of his land according to use as homestead gardening operation and received full benefit for his family. It was measured in decimal for each respondent.

#### **3.6.1.4 Annual family income**

The term annual income refers to the annual gross income of respondent's homestead owner and the members of his family from different sources. It was expressed in taka. In measuring this variable, total earning in taka of an individual respondent was converted into score. A score of one was given for every one thousand taka. The method of ascertaining income form involved two phases. Firstly, the income from agricultural sector like the income from crops, livestock, poultry and fishery in the preceding year was noted and converted into taka. Secondly, non-

agricultural sector income included earning from small business, service, other family members' income, day labourer, fishing and others if any.

### 3.6.1.5 Organizational Participation

Organizational participation of respondent homestead gardener was measured on the basis of the nature of their participation in a selected organization. Score was computed by adding all the score of selected organization.

Following scores were assigned for nature of participation:

<u>Nature of participation</u>	<u>Scores assigned</u>
No participation	0
Participation as ordinary member	1
Participation as executive member	2
Participation as president/secretary	3

The organizational participation scores ranged from 0 to 3, where, 0 indicated no participation and 3 indicated very high organizational participation.

### 3.6.1.6 Contact with Extension Agent

Contact with extension agent by respondent (farmers was measured on the basis of frequency of her visit to the office) with a view to gather homestead gardening knowledge with live point scale in the last year. Use of each of the extension agent first ascertained by computing their using score. A point scale was used to compute the extension contact. In this regard weight was assigned to each of the live types of responses provided by the respondents in the following manner:

<b>Responses</b>	<b>Weight</b>
4 times and above	3
2 to 3 times	2
Once	1
No visit	0

Thus the extension media contact score of a respondent could range from 0 to 6 where '0' indicate no extension agent contact and '6' indicate very high contact with extension agent regarding homestead farming.

### 3.6.1.7 Knowledge on homestead gardening system

Knowledge of the homestead owners in homestead gardening system referred to the knowledge gained by the respondent in the different aspects of homestead production. Fifteen (15) questions on different aspect of homestead gardening were asked to the respondents to ascertain their knowledge score. The score was assigned as 2 for full correct answer and zero (0) for incorrect or no answer for each question. Partial score 1 was assigned for partial answers. Thus, knowledge on homestead production scores of the respondents could range from 0 to 30, where, zero (0) indicated no knowledge and 30 indicated very high knowledge in homestead gardening system.

### 3.6.1.8 Access to ICTs'

ICTs contact of a respondent was measured by his extent of contact for information from six ICTs media. Each item indicated his extent of contact with each selected communication media by checking any one of the 3 responses namely, "Sustained access", "Intermittent access", and "No access". Scores were assigned to the responses as follows:

<b>Response category</b>	<b>Score</b>
Sustained access	2
Intermittent access	1
No access	0

The scores obtained by all the 6 media were added together to compute his access to ICTs scores. The score of a respondent could range from 0 to 12, where 0 indicates no ICTs access and 12 indicates very high access of ICTs.

### 3.6.1.9 Access to financial institutions

Financial access of a respondent was measured by his extent of taking money from eight sources for production. Each items indicated his extent of taking money from others by checking any one of the 3 responses namely, "Sustained access", "Intermittent access", and "No access". Scores were assigned to the responses as follows:

<b>Responses category</b>	<b>Score</b>
Sustained access	2
Intermittent access	1
No access	0

The scores obtained by all the 8 items were added together to compute his access to financial institutions scores. These scores of a respondent could range from 0 to 16, where 0 indicates no access to financial institutions and 16 indicate very high access of financial institutions.

### **3.6.1.10 Use of climate smart agricultural practices & technologies**

Use of climate smart agriculture practices and technologies are measured based on 9 CSA practices and technologies as followings -

<b>Response category</b>	<b>Score</b>
Regularly	4
Often	3
Occasionally	2
Rarely	1
Never	0

The scores obtained by all the items were added together to compute his climate smart agriculture scores. These scores of a respondent could range from 0 to 36, where 0 indicates no climate smart agriculture and 36 indicates very high climate smart agriculture.

### **3.6.2 Measurement of dependent variable**

Measurement of the dependent variable is discussed in the following section:

#### **3.6.2.1 Quantifying sustainable homestead gardening**

Measurement of dependent variable empirical examination of determinants of sustainable homestead gardening was analyzed using stepwise multivariate regression analysis, for which the extent of sustainable homestead gardening is the dependent variable. Measurement of sustainability is always contested, and it is a relative and approximate quantification. We used proxy indicator to quantify this aspect. For that purpose, we reviewed several publications (e.g. Roy, 2015; Pretty, 2008; National Research Council, 2010) in order to find statements/indicators that describe sustainability properly. Accordingly, 14 items were selected under three categories. Statement of the economic pillar defines profitability, contribution of local economy, creation of employment and so on. Food security, standard living, extent of health hazard explains social dimension, and water pollution, erosion of soil and biodiversity, extent of pest and disease occurrence, etc. describes the environmental aspects of homestead gardening. An attitudinal scale was used to evaluate the sustainability of homestead gardening. Several positive and

negative statements were calculated where reverse scoring method used for negative statements. Hence, a five-point Likert scale was developed exclusively for this study. Besides, content and faces validity was evaluated by a panel of experts and a post-hoc reliability analysis was conducted to estimate the reliability of the dependent variable. It was observed that the Cronbach's alpha coefficient of reliability was 0.86, which indicated that the internal consistency was good (George and Mallery, 2003). Data was obtained from respondents on the five-point continuum, namely, strongly agree, agree, undecided, disagree, and strongly disagree with the corresponding weighting factor of 5, 4, 3, 2, and 1.

Following scores were assigned for nature of participation:

<b>Response category</b>	<b>Score</b>
Strongly Agree	5
Agree	4
Undecided	3
Disagree	2
Strongly Disagree	1

Sustainable homestead gardening scores of the respondents could range from 0 to 70, where, zero (0) indicated no knowledge and (70) indicated very high knowledge in sustainable homestead gardening.

### **3.7 Statement of hypothesis**

According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they relate either generally of specifically variables to sentence form and they relate either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories; namely, research hypothesis and null hypothesis.

#### **3.7.1 Research hypothesis**

Research hypothesis states a possible contribution of the variables being studied or a difference between experimental treatments that the researcher expects to emerge. The following research hypothesis was put forward to know the contribution on each of the 10 selected characteristics of homestead gardener. Each of the 10 selected characteristics in the homestead gardener will have significant contribution to sustainable homestead gardening.

### **3.7.2 Null hypothesis**

A null hypothesis states that there is no contribution of the concerned variables. The following null hypothesis was undertaken for the present study “There is no contribution to the dependent variable of the selected characteristics of the small hold farmers and their homestead gardening.” “The selected characteristics were level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, access to ICTs, access to financial institutions, climate smart agricultural practices and technologies”

### **3.8 Data processing**

After completion of data collection, all the data of the interview schedule were compiled, tabulated and analyzed by using excel sheet according to the objective of the study. Local units were converted into standard units. All the individual responses to questions of the interview schedule were transferred in to a master sheet to facilitate tabulation, categorization and organization. Appropriate scoring technique was followed to convert the qualitative data into the quantitative data. For describing the various independent and dependent variables, the procedures have been discussed in different sub-subsequent sections of next chapter.

### **3.9 Statistical procedure**

Statistical procedure gives the result of this study. The collected data were analyzed to follow the tabular technique in accordance with the objectives of the study. The statistical measures such as range, means, standard deviation, number and percentage distribution were used to describe the variables. SPSS (version 25) computer program were used for analyzing the data. Multiple regression coefficients were used in order to determining factors of sustainable homestead gardening. It's a method of analysis of the research.

## CHAPTER 4

### RESULTS AND DISCUSSION

Result and discussion chapter is a reflection of scientific research work. So, the detailed discussion of the findings and interpretation are presented in three sections in accordance with the objectives of the study. The first section deals with the selected characteristics of the homestead gardeners that affecting sustainable homestead production, the second section deals with quantification of sustainable homestead gardening and the third section deals with contribution of the selected determinants to sustainable homestead gardening.

#### 4.1 Selected characteristics of homestead gardeners

In the study, there were ten selected characteristics that affecting on the sustainable production of the homestead gardeners those are level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, access to ICTs, access to financial institutions, climate smart agricultural practices and technologies. The composite findings of the selected factors of homestead gardeners are presented and have been discussed in subsequent sections.

Data contained in the Table 4.1 reveal the salient features of the determinants of sustainable homestead gardening in order to have an overall picture of these factors at a glance. However, separate tables are provided for individual factors, discussing and/or interpreting results concerning each of the factors in this chapter.

Table 4.1 Salient features of the homestead gardeners (n=108)

Sl. No.	Selected Factors	Measuring Unit	Possible Range	Observe Range	Mean	Standard Deviation (SD)
01	Level of education	Year of schooling	Unknown	0-15	4.421	4.5494
02	Family size	Number of person	Unknown	2-9	6.34	1.523
03	Homestead garden size	Decimal	Unknown	4-24	11.21	4.567
04	Annual family Income	000" taka	Unknown	70-280	134.00	46.502
05	Organizational participation	Score	0-27	1-19	4.90	4.275



06	Contact with extension agent	Score	0-9	1-6	2.37	1.323
07	Knowledge in homestead gardening system	Score	0-30	9-26	15.34	4.263
08	Access to ICTs	Score	0-12	1-10	4.41	2.033
09	Access to financial institutions	Score	0-16	5-12	8.33	1.729
10	Climate smart agricultural practices and technologies	Score	0-36	5-21	10.12	3.893

#### 4.1.1 Level of education

Based on educational qualification, the respondents were classified into five categories such as ‘illiterate’ (0), ‘can sign only’ (0.5), primary (1-5), secondary (6-10), and above secondary (>10) education.

Table 4.1.1 Distribution of the respondents according to their education

Categories of the respondents	Respondents'		Mean	Standard Deviation
	Number	Percent		
Illiterate (0)	20	18.5	4.421	4.5494
Can sign only (0.5)	23	21.3		
Primary education (1-5)	35	32.4		
Secondary education (6-10)	18	16.7		
Above secondary (above 10)	12	11.1		
Total	108	100		

Data shows that 16.7 percent respondents had secondary level of education than 11.1 percent of above secondary, 32.4 percent of primary, 21.3 percent of can sign only and 18.5 percent of illiterate level of education. Education plays an important role in the acceleration of agricultural development. Education helps individual to become rational, conscious and to get useful information to solve their everyday working problem. Educated respondents may get useful information through reading leaflets, booklets, books and other printed materials. So, they get access to new techniques related to their farming activities. Education broadens the power of understanding and develops the ability of analyzing facts and situation to take accurate

decision. The findings indicate that maximum homestead gardeners are literate. So, they can understand the importance of sustainable homestead gardening.

#### 4.1.2 Family size

Family size of the respondent homestead owners ranged from 2 to 9 with the mean and standard deviation of 6.34 and 1.523 respectively. According to family size the respondents were classified into three categories viz. ‘small’, ‘medium’ and ‘large’ family. The distribution of the respondents according to their family size is presented in Table 4.1.2.

Table 4.1.2 Distribution of the respondents according to their family size

Category	Range (Number)		Respondents'		Mean	Standard deviation
	Score	Observed	Number	Percent		
Small family	Up to 4	2-9	4	3.7	6.34	1.523
Medium family	4-6		54	50.0		
Large family	Above 6		50	46.3		
Total		108	100.0			

Data in Table 4.1.2 indicate that the medium size family constitute the highest proportion (50 percent) followed by the small size family (3.7 percent). 46.3 percent respondents had large family size. Such finding is quite normal as per the situation of Bangladesh. The findings from Table 4.1.2 indicated that average family size of the study area was similar with the national average which is 4.85 (BBS,2014).

#### 4.1.3 Homestead garden size

Sustainable homestead gardening also depends on garden size. If respondents have a larger garden, he/she will be able to produce a greater number of vegetable and fruits. Based on their garden size, the respondents were classified into three categories as marginal (Up to 9 decimal), small (10 to 18 decimal) and medium (above 18 decimal).

Table 4.1.3 Distribution of the farmers according to their homestead garden size

Categories of the respondents	Respondents'		Mean	Standard Deviation
	Number	Percent		
Marginal (Up to 9 decimal)	42	38.8	11.21	4.567
Small (10 to 18 decimal)	64	59.4		
Medium ( above 18 decimal)	2	1.8		
Total	108	100		

Table 4.1.3 shows that the highest proportion of the respondents 59.4 percent belonged to small garden size while 38.8 percent belonged to marginal and 1.8 percent belonged to medium. Our land space and gardening plots fragment day by day for the growing population of Bangladesh. Thus, most of the gardeners had small farm size.

#### 4.1.4 Annual family income

Annual family income of the respondent homestead owners ranged from 70 to 280 thousand taka with a mean and standard deviation of 134.0 and 46.502, respectively. Based on annual income, the homestead owners were classified into three categories, viz. low, medium and high annual income. The distribution of the homestead owners according to annual income are presented in Table 4.1.4.

Table 4.1.4 Distribution of the respondents according to their annual income

Category	Range ('000 Taka)		Respondents'		Mean	Standard deviation
	Score	Observed	Number	Percent		
Low income	Up to 100	70-280	34	31.6	134.00	46.502
Medium income	101-200		63	58.3		
High income	Above 200		11	10.1		
Total		108	100			

Data revealed that the homestead owners having medium annual income constitute the highest proportion (58.3 percent), while the lowest proportion in low income (31.6 percent) followed by high income (10.1 percent).

#### 4.1.5 Organizational participation

Organizational participation score of the homestead gardeners ranged from 1 to 19 with a mean and standard deviation of 4.90 and 4.275, respectively. Based on their organizational

participation score, the respondent homestead owners were classified into three categories as low, medium and high participation. The distribution of the homestead owners as per their organizational participation is presented in Table 4.1.5.

Table 4.1.5 Distribution of respondents as of their organizational participation

Category	Range		Respondents'		Mean	Standard deviation
	Score	Observed	Number	Percent		
Low participation	Up to 7	1-19	87	80.5	4.90	4.275
Medium participation	8-14		15	13.9		
High participation	Above 14		6	5.6		
Total			108	100		

Data revealed that the highest proportion (80.5 percent) of the respondents had low organizational participation, while 13.9 percent had medium organizational participation and the lowest 5.6 percent had high organizational participation.

#### 4.1.6 Contact with extension agent

The scores of the farmers regarding Contact with extension agent ranged from 1 to 6 with a mean of 2.37 and standard deviation of 1.323. On the basis of their extension contact scores, the farmers were classified into three categories as low contact, medium contact and high contact.

Table 4.1.6 Distribution of the farmers according to their contact with extension agent

Categories of the respondents	Respondents'		Mean	Standard Deviation
	Number	Percent		
Low contact (Up to 2)	63	58.3	2.37	1.323
Medium contact (3 to 4)	33	30.6		
High contact (above 4)	12	11.1		
Total	108	100		

A proportion of 58.3 percent of the homestead farmers had low contact with extension agent compared to 30.6 percent of them having medium contact. There only 11.1 percent of farmers had high contact. Thus, majority of percentage of the respondents had low contact. Contact with extension agent is a very effective and powerful source of receiving information about homestead gardening. The status of low contacts might have significant impacts on homestead gardening of homestead gardeners.

#### 4.1.7 Knowledge in homestead gardening system

Knowledge on homestead production system scores of the homestead owners varied from 9 to 26 with the mean and standard deviation of 15.34 and 4.263, respectively. On the basis of knowledge on homestead production system scores, the respondents were classified into three categories namely, 'low, 'medium' and 'high' knowledge. The distribution of the respondents according to their knowledge on homestead production system is given in Table 4.1.7

Table 4.1.7 Distribution of the respondents according to their knowledge on homestead production system

Category	Range		Respondents'		Mean	Standard deviation
	Score	Observed	Number	Percent		
Low knowledge	Up to 14	9-26	60	55.4	15.34	4.263
Medium knowledge	15-22		39	36.2		
High knowledge	>22		9	8.4		
Total				100		

Table 4.1.7 revealed that the majority (55.4 percent) of the homestead owners fell in low knowledge category followed by 36.2 percent in medium knowledge category, whereas the lowest is 8.4 percent in high knowledge category. Most of the farmers have not adequate knowledge on gardening. On the other side they are used to traditional cultivation process. The findings of the present study reveal that around 91.6 percent of the homestead owners had low to medium knowledge on homestead production system.

#### 4.1.8 Access to ICTs

The access to ICTs of the sample households ranged from 1 to 10 scores with an average of 4.41 and standard deviation of 2.033. The households of the study area were classified into three categories on the basis of their access to ICTs. On the basis of access to ICTs scores, the respondents were classified into three categories namely, low access, medium access and high access. Distribution of the households according to their access to ICTs has been shown in the Table 4.1.8.

Table 4.1.8 Distribution of the respondent households according to their access to ICTs'

Categories	Respondents'		Mean	Standard Deviation
	Number	Percent		
Low access (Up to 4.0)	65	60.2	4.41	2.033
Medium access (5.0 to 8.0)	39	36.1		
High access (above 8.0)	4	3.7		
Total	108	100		

Data presented in table 4.1.8 indicates that the highest proportions 60.2 percent had low access to ICTs" of households compared to 14.17 percent medium and 3.7 percent high access to ICTs of households.

#### 4.1.9 Access to financial institutions

The access to financial institution of the sample households ranged from 5 to 12 scores with an average of 5.32 and standard deviation of 2.40. The households of the study area were classified into three categories on the basis of their Access to financial institution. Distribution of the households according to their Access to financial institution has been shown in the Table4.1.9.

Table 4.1.9 Distribution of the respondent households according to their Access to financial institution

Categories	Respondents'		Mean	Standard Deviation
	Number	Number		
Low financial access (Up to 7)	39	36.2	8.33	1.729
Medium financial access (8 to 10)	51	47.2		
High financial access (above 10)	18	16.6		
Total	108	100		

Data presented in table 4.1.9 indicates that the highest proportion (47.2 percent) had medium access to financial institution of households compared to 36.2 percent low and 16.6 percent high access to financial institution of households.

#### 4.1.10 Use of climate smart agricultural practices and technologies

The use of climate smart agricultural practices & technologies of the sample households ranged from 5 to 21 scores with an average of 10.12 and standard deviation of 3.893. The households of

the study area were classified into three categories on the basis of their use of climate smart agricultural practices & technologies. Distribution of the households according to their Climate smart agricultural practices & technologies has been shown in the Table 4.1.10.

Table 4.1.10 Distribution of the respondent households according to their use of climate smart agricultural practices & technologies

Categories	Respondents'		Mean	Standard Deviation
	Number	Number		
Low practice (Up to 10))	70	64.7	10.12	3.893
Medium practice (11 to 16)	28	26		
Highly practice (above 16)	10	9.3		
Total	108	100		

Data presented in table 4.1.10 indicates that the highest proportion (64.7 percent) had low use of climate smart agricultural practices & technologies of households compared to 26 percent medium and 9.3 percent high use of climate smart agricultural practices & technologies of households.

#### 4.2 Measuring sustainable homestead gardening

Sustainable homestead gardening scores of the sample households ranged from 39 to 50 with an average of 42.69 and standard deviation of 2.783. The households of the study area were classified into three categories on the basis of their sustainable homestead gardening. Distribution of the households according to their sustainable homestead gardening has been shown in the table 4.2.

Table 4.2 Distribution of the respondent households according to their sustainable homestead gardening

Categories	Respondents'		Mean	Standard Deviation
	Number	Number		
Low sustainable (Up to 40)	29	26.9	42.69	2.783
Medium sustainable (41 to 45)	58	53.7		
Highly sustainable (above 45)	21	19.4		
Total	108	100		

Data presented in table 4.2 indicates that the highest proportion (53.7 percent) had medium

sustainable homestead gardening practices of households compared to 26.9 percent low and 19.4 percent high sustainable homestead gardening.

### 4.3 Contribution of the selected factors on sustainable homestead gardening by homestead gardeners

The purpose of this section is to explore the contribution of the selected factors on sustainable homestead gardening. The result of the multiple regression analysis is presented in Table 4.3.

Table 4.3 Coefficients of multiple regression analysis of selected characteristics to sustainable homestead Gardening

Dependent Variable	Independent Variables	$\beta$	$\rho$	$R^2$	Adj. $R^2$	F statistic	$\rho$
Sustainable homestead gardening	Level of education	0.210	0.396	0.763	0.738	31.157	0.000**
	Family size	-0.056	0.344				
	Homestead garden size	-0.083	0.190				
	Annual family Income	0.098	0.274				
	Knowledge in homestead gardening system	0.576	0.008**				
	Contact with extension agent	0.064	0.606				
	Access to ICTs	0.516	0.001**				
	Organizational participation	0.120	0.000**				
	Access to financial institutions	-0.047	0.683				
	Use of climate smart agricultural practices and technologies	0.011	0.927				

\*\* Significant at  $p < 0.01$  &

\* Significant at  $p < 0.05$



The multiple regression analysis was used for determining how and which determinants of the respondents affecting on sustainable homestead gardening of homestead gardeners. Table-4.3 shows that organizational participation, knowledge in homestead gardening system, assesses to ICTs are more important contributing factors (at 1% level of significant). Seventy six point three percent ( $R^2 = 0.763$ ) of the variation in the respondents' sustainable homestead gardening production performance can be attributed to their level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, assess to ICTs, access to financial institutions, use of climate smart agricultural practices and technologies (Table 4.3). The F value indicates that the model is significant ( $p < 0.000$ ).

However, each predictor may explain some of the variance in respondents' sustainable homestead gardening simply by chance. The adjusted R-square value penalizes the addition of extraneous predictors in the model, but values of 0.738 still show that the variance in respondents homestead gardening can be attributed to the predictor variables rather than by chance, and this is the suitable models (Table 4.3). In summary, the model suggests that the respective authority should consider organizational participation, knowledge in homestead gardening system and assess to ICTs.

#### **4.3.1 Significant Contribution of knowledge to sustainable homestead gardening**

From the multiple regressions, it was concluded that the contribution of knowledge in homestead gardening system to the homestead gardeners' perception of sustainable homestead gardening was measured by testing the following null hypothesis;

“There is no contribution of knowledge in homestead gardening system to the homestead gardeners' perception on sustainable homestead gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the knowledge in homestead gardening system was significant at 1% level (0.008)
- b. So, the null hypothesis could be rejected
- c. The  $\beta$ -value of knowledge on climate change is (0.576). So, it can be stated that as knowledge in homestead gardening system increased by one unit, homestead gardeners' perception of sustainable homestead gardening increased by 0.576 units. Considering the effects of all other predictors are held constant.

Based on the above finding, it can be said that homestead gardeners' had more knowledge in

homestead gardening system increased homestead gardeners' perception on sustainable homestead gardening. So, knowledge in homestead gardening system has highly significantly contributed to the homestead gardeners' perception of sustainable homestead gardening. This implies that with the increase of knowledge in homestead gardening system of the homestead gardeners' will increase their perception of sustainable homestead gardening. This finding is supported by the study conducted by Parvin (1993) in her study recommended that knowledge had played vital role in forming favorable attitudes towards the homestead agricultural production.

#### **4.3.2 Significant contribution of access to ICTs to sustainable homestead gardening**

From the multiple regressions, it was concluded that the contribution of access to ICTs to the homestead gardeners' perception of sustainable homestead gardening was measured by testing the following null hypothesis;

“There is no contribution of access to ICTs to the homestead gardeners' perception on sustainable homestead gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the access to ICTs was significant at 1% level (0.001)
- b. So, the null hypothesis could be rejected
- c. The  $\beta$ -value of access to ICTs is (0.516). So, it can be stated that as access to ICTs increased by one unit, homestead gardeners' perception of sustainable homestead gardening increased by 0.410 units. Considering the effects of all other predictors are held constant.

Based on the above finding, it can be said that homestead gardeners' access to ICTs increased homestead gardeners' perception on sustainable homestead gardening. So, access to ICTs has highly significantly contributed to the homestead gardeners' perception of sustainable homestead gardening. This implies that with the increase of access to ICTs of the homestead gardeners' will increase their perception of sustainable homestead gardening because more cosmopolite people meet more people and gain knowledge which increases perception. This finding is supported by the study conducted by (Islam, 2012) which says that access to ICTs has a significant contribution.

### **4.3.3 Significant contribution of organizational participation to sustainable homestead gardening**

From the multiple regressions, it was concluded that the organizational participation of the homestead gardeners' perception on sustainable production was measured by testing the following null hypothesis;

“There is no contribution of organizational participation of the homestead gardeners' perception on sustainable homestead gardening”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of organizational participation was significant at 1% level (0.000)
- b. So, the null hypothesis could be rejected
- c. The  $\beta$ -value of organizational participation is (0.120). So, it can be stated that as organizational participation increased by one unit, homestead gardeners' perception on sustainable homestead gardening increased by 0.120 units, considering the effects of all other predictors are held constant.

Based on the above finding, it can be said that homestead gardeners' organizational participation increased gardeners' perception of sustainable homestead production. So, organizational participation has significantly contributed to the homestead gardeners' perception on sustainable homestead gardening. This implies that with the increase of organizational participation of the homestead gardeners' will increase their perception on sustainable homestead production. This finding is supported by the study conducted by Gazi (2009) which revealed that there was significant and positive relationship between organizational participation of rural farmers and their knowledge in capacity strengthening in conducting post gardening activities. Several empirical studies substantiated education has a strong association with awareness, knowledge, adoption of management practice, access and right to information etc. these are also important aspects for sustainability.

## **CHAPTER 5**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

Agricultural sector in Bangladesh plays an important role for improving human nutrition and national income. This sector provides nutritious food to our diet in the form of vegetable, fruits etc. Some changes have been taken place in homestead gardening in Bangladesh. Gradually quite a significant number of homestead gardenerhas adopted sustainable homestead gardening to their supplement family income.

The study would conduct to Fakirhat and Mulghar Union of Fakirhat Upazilla under Bagerhat district. Among the total homestead gardener's population of two unions, 108 were selected as a sample size of the study from four villages. A well-constructed structured interview schedule was developed based on objectives of the study for collecting information. The researcher himself was collected data from the sample respondents through personal contact. The independent variables are level of education, family size, homestead garden size, annual family income, organizational participation, contact with extension agent, knowledge in homestead gardening system, assess to ICTs, access to financial institutions, use of climate smart agricultural practices and technologies. The dependent variable of the study was sustainable homestead gardening. Data collected from the respondents were compiled, coded, tabulated and analyzed in accordance with the objectives of the study. In order to determine determinants of sustainable homestead gardening, multiple regression analysis was used. The major findings of the study are summarized below:

#### **5.1 Summary of findings**

##### **5.1.1 Characteristics of the respondents**

###### **5.1.1.1 Level of education**

16.7 percent respondents had secondary level of education compared to 11.1 percent of above secondary, 32.4 percent of primary, 21.3 percent of can sign only and 18.5 percent of illiterate level of education.

###### **5.1.1.2 Family size**

Medium size family constitute the highest proportion (50 percent) followed by the small size family (3.7 percent). 46.3 percent respondents had large family size.

#### **5.1.1.3 Homestead garden size**

Highest proportion of the respondents (59.4 percent) belonged to small garden size while 38.8 percent belonged to marginal and 1.8 percent belonged to medium. Our land space and gardening plots destroy day by day for the growing population. Thus, most of the gardeners had small farm size.

#### **5.1.1.4 Annual family income**

Homestead owners having medium annual income constitute the highest proportion (58.3 percent), while the lowest proportion in low income (31.6 percent) followed by high income (10.1 percent).

#### **5.1.1.5 Organizational participation**

The highest proportion (80.5 percent) of the respondents had low organizational participation, while 13.9 percent had medium organizational participation and the lowest 5.6 percent had high organizational participation.

#### **5.1.1.6 Contact with extension agent**

A proportion of 58.3 percent of the homestead farmers had low contact with extension agent compared to 30.6 percent of them having medium contact. There only 11.1 percent of farmers had high contact.

#### **5.1.1.7 Knowledge in homestead gardening system**

Majority (55.4 percent) of the homestead owners fell in low knowledge category followed by 36.2 percent in medium knowledge category, whereas the lowest is 8.4 percent in high knowledge category. The findings of the present study reveal that around 91.6 percent of the homestead owners had low to medium knowledge on homestead production system.

#### **5.1.1.8 Access to ICTs**

The highest proportions (60.2 percent) had low access to ICTs compared to 14.17 percent medium and 3.7 percent high access to ICTs.

#### **5.1.1.9 Access to financial institutions**

Highest proportion (47.2 percent) of households had medium access to financial institution compared to 36.2 percent low and 16.6 percent high access to financial institution.

#### **5.1.1.10 Use of climate smart agricultural practices and technologies**

Highest proportion (64.7 percent) had low use of climate smart agricultural practices & technologies of households compared to 26 percent medium and 9.3 percent high use of climate

smart agricultural practices & technologies of households.

### **5.1.2 Measuring sustainable homestead gardening**

The highest proportion (53.7 percent) had medium sustainable homestead gardening practices of households compared to 26.9 percent low and 19.4 percent high sustainable homestead gardening practices of households.

### **5.1.3 Factors related to the sustainable homestead gardening**

There was a significant contribution of respondents organizational participation, knowledge in homestead gardening system and access to ICTs are the most important factors in sustainable homestead gardening.

## **5.2 Conclusions**

Homestead gardening in Bangladesh has been practiced for a long time at a small scale. Primitive cultivation supply very low amount of vegetable and fruits however falls for short of our demand and for thus a huge malnutrition problem particularly among the children. However, with the change of knowledge & technology, farmers have been seen to reduce the ancient homestead cultivation system and increase production performance. On the basis of the findings of this study and their interpretation in the light of other relevant factors the following conclusions are drawn:

1. Around 80.6 percent of the homestead gardeners had low to medium production practices. It is therefore, concluded that the overall sustainability was not satisfactory in the study area and need to more development in homestead production performance.
2. Organizational participation had significant contribution on sustainable homestead gardening. The highest proportion of the farmers had low to medium participation. It is concluded that farmers organizational participation need to develop, so their homestead production performance will increase.
3. Knowledge in homestead gardening system had positive and significant contribution to the determination of sustainable homestead gardening. It presents that knowledge of the homestead gardeners play an important factor on sustainable homestead production.
4. Access to ICTs had significant contribution in sustainable homestead gardening and also for sustainable production. The highest number 96.3 percent of the homestead gardeners had low to medium access to ICTs. It is therefore, concluded that the result was not satisfactory in the study area and need to increase access to ICTs by the homestead gardeners.

## **5.3 Recommendations**

### **5.3.1 Recommendations for policy implications**

If proper remedial measures could be taken, homestead gardening could be more sustainable enterprise which in turn would play a vital role to overcome the problems of low income, unemployment and under nutrition of our country. Based on the findings and conclusions the recommendations of the study have been presented below:

1. Organizational participation had significant contribution on sustainable homestead gardening. The highest proportion of the farmers had low to medium participation. So, the DAE and respective NGO's workers should contact more steps to increase gardener's organizational participation.
2. Knowledge in homestead gardening of the homestead gardeners was an important factor to determine sustainable homestead gardening. So, the DAE should arrange more seminar and training program on sustainable homestead gardening to improve gardener's knowledge level.
3. Access to ICTs had significant contribution in homestead gardening and also for sustainable production. A vast majority (96.3 percent) of the homestead gardeners had low to medium access to ICTs. It is therefore, concluded that the result was not satisfactory in the study area and need to more access to ICTs. So, the DAE and respective NGO's workers should arrange easy access to ICTs.

### **5.3.2 Recommendations for further study**

A small and limited research work cannot provide unique and universal information related to determine sustainable homestead gardening. Further studies should be undertaken on related matters. On the basis of scope and limitations of the present study and observations made by the researcher, the following recommendations are made for further study:

1. The study was conducted in only two unions under Fakirhat upazila in Bagerhat district. Similar studies should be conducted in other upazila and district of south region in the country to get a clear picture of the south region in our country which will be helpful for establishing effective agricultural development policy formulation.
2. The study investigated the contributions of the 10 selected factors of the farmers with their sustainable homestead gardening. Sustainability of homestead gardening might be affected by other various personal, social, psychological, cultural and situational factors. It is, therefore, recommended that further study should be conducted involving other

factors of the farmers.

3. In the present study farmers' level of education, family size, homestead garden size, annual family income, contact with extension agent, access to financial institutions, use of climate smart agricultural practices and technologies had no significant contribution their sustainable homestead production. In this connection, further verification is much necessary.



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## Appendix-A:

### Questionnaire

Department of Agricultural Extension and Information System  
Sher-e-Bangla Agricultural University  
Sher-e-Bangla Nagar  
Dhaka-1207

An interview questionnaire on the study of

#### Determinants of Sustainability of Homestead Gardening in Salinity Affected Coastal Zone

Date: .....

Serial No.: .....

Name of the respondent: .....

Village: ..... Upazila/Thana: ..... District: .....

(Please answer the following questions. Your information will be used only for academic purpose)

#### 1. Level of Education

What is the level of your education?

A. Illiterate..... B. Can sign only..... C. Have passed class..... D. Did not read in School/Madrasha but can read and write and level of education is equivalent to class.....as non-formal education

#### 2. Family Size

State the number of your family members.....

#### 3. Homestead garden size

Please mention the area of your land according to use as

Homestead garden..... (Decimal)

#### 4. Annual Family Income:

Please mention the income of your family in last year

Sl. No	Source of income	Total Income (Tk.)/Year
A	<b>Agricultural Sector</b>	
	Crops	
	Livestock	
	Poultry	

	Fishery	
	Sub-Total (A)	
B	<b>Non-agricultural Sector</b>	
	Small Business	
	Service	
	Other family members' income	
	Day labourer	
	Fishing	
	Others (if any, please specify)	
	Sub-total (B)	
	Total (A+B)	

## 5. Organizational Participation

Please mention the nature of your participation with the following organizations (Tick mark in right place)

<b>Organizations</b>	<b>No participation (0)</b>	<b>Participation as ordinary member (1)</b>	<b>Participation as executive member (2)</b>	<b>Participation as president/ secretary (3)</b>
NGO Organized Group				
Ansar/VDP				
School Committee				
Madrasha/Temple Committee				
Farmer Co-operative Society				
Mosque/Puja Committee				
Hat/Bazaar Committee				
Youth Club/Committee				
Others (Please specify)				

## 6. Contact with extension agent

Please mention the extent of extension contact in the last year:

Query	Extent of extension contact in the past year			
	4 times and above (3)	2 to 3 times (2)	Once (1)	No visit (0)
Extension officers visit to farmers				
Farmers visits to extension officers				
Others (specify)				

## 7. Knowledge in homestead gardening system

Please answer the following questions:

Sl. No.	Questions	Score	
		Full	obtained
01	Give a list of 4 homestead cultivable vegetable crops in present climatic condition?	2	
02	Give a list of 4 homestead cultivable fruit crops in present climatic condition?	2	
03	Give a list of 4 homestead cultivable spice crops in present climatic condition?	2	
04	Mention 2 cultivation practices of homestead vegetable crops	2	
05	Mention 2 cultivation practices of homestead fruit crops	2	
06	Mention 2 cultivation practices of homestead spice crops	2	
07	State 2 ways of value addition in crop production	2	
08	State 2 examples of crop diversification	2	
09	Mention 2 benefits of the crop diversification	2	
10	State 2 ways of control insects of your homestead species	2	
11	Mention 2 examples of balanced fertilizer for crop cultivation	2	
12	Mention 2 methods of application of fertilizers	2	
13	Mention 2 methods of application of irrigation	2	
14	Mention 2 major methods of control insect infestation	2	
15	Mention 2 components/practices of IPM?	2	
Total		30	

**8. Assess to ICTs:**

Item	Sustained Access (2)	Intermittent Access (1)	No Access (0)
Mobile Phone/Smart Phone			
Television			
Radio			
Dish connection/ Internet connection			
Computer/Tab			
Digital Information Centre (DIC)			

**9. Access to financial institutions:**

Types	Sustained access (2)	Intermittent Access (1)	No access (0)
Family members			
Friends/ Neighbors			
Cooperative			
Government Programme (PKSF)			
NGO's/Microfinance			
Loan company			
Local Leader			
Remittances			

**10. Climate smart agricultural practices and technologies:**

Do you use the following resource-conserving practices and technologies?

	Adequately (4)	Moderately (3)	No Opinion (2)	Rarely (1)	Never (0)
Cultivation of saline and flood resistant crop varieties					
Stress tolerant seed use					
Mixed fruit cultivation					
Cow dung and crop residue as fertilizer					
Vermicompost					
Sex pheromone					
Light trap					
Use of ash					
Use neem pata					

**11. Measuring sustainable homestead gardening:**

Dimension	Statements	Strongly Agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Strongly Disagree (1)
Social	Homestead gardening provides food security					
	It enhances the quality of life of societies as a whole					
	It provides societies food security					
	It improves natural resources base					
	It reduces health hazards					
Environmental	Homestead gardening reduces pollution					
	It improves agro-biodiversity					
	It reduces diseases in families					
	It improves soil by adding organic manure					
	It discourages input base monoculture					
Economic	Your homestead gardening is profitable					
	It strengthens local economy					
	It provides high productive fruit and vegetable					
	It creates employment for family members					

Thank you for your information, time, and patience.

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Signature of the interviewer



