REDUCTION OF FOOD INSECURITY THROUGH HOMESTEAD VEGETABLE PRODUCTION IN MYMENSINGH DISTRICT

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CERTIFICATE

This is to certify that the thesis entitled, **"REDUCTION OF FOOD INSECURITY THROUGH HOMESTEAD VEGETABLE PRODUCTION IN MYMENSINGH DISTRICT"** 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 **SADIA AFRIN**, Registration No. 08-02739 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Place: Dhaka, Bangladesh

(Assoc. Prof. Md. Abul Bashar)

Supervisor

Dedicated to

My Beloved Parents

and My Husband

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ABSTRACT

The Government of Bangladesh has identified food security as an important factor contributing to its socio-economic stabilization and development. Bangladesh has made a steady progress in the expansion of food production. But because of the increasing population pressure there has been an extensive use of land to meet the growing demand for food. The purpose of the study was to determine the extent of reduction of food insecurity through homestead vegetable production. The study was conducted with randomly selected 100 rural household farm farmers in the Bhaluka, Trishal and Gaforegaon unions of Mymensingh district. Data were collected through personal interview by using an interview schedule during the period of 2nd March to 11th April, 2015. Pearson's product moment correlation co-efficient (r) was computed to examine relationship between the variables. Five vegetable crops i.e. brinjal, cabbage, amaranth, bottle gourd, bean were introduced in to the existing cropping pattern. Farm size, annual family income, cosmopoliteness, extension contact, agricultural training, knowledge on homestead agriculture, attitude towards homestead agriculture showed significant positive relationship with their reduction of homestead vegetable production. Other two variables namely, age and education of the farmers had no significant relationship with their reduction of homestead vegetable production. Reduction of food insecurity through homestead vegetable production was the dependent variable and nine selected characteristics of the respondents constituted the independent variables of this study. Findings revealed that highest proportion (73 percent) of the farmers had moderately food insecure after homestead vegetable production compared to 20 and 7 percent having low and high food insecure condition respectively. On the basis of descending order of the Problem Confrontation Index (PCI) inadequate agricultural land, Lack of capital or fund and Lack of quality seed were major problems faced by the farmers in homestead vegetable production.

CHAPTER 1

INTRODUCTION

1.1 General background

Food insecurity remains a reality for the millions of poor people in Bangladesh, including small and landless farmers in rural areas. Farmer's access to food is mainly obstructed due to the purchasing power and several other factors including climate variability, imperfect functionality of market and gender discrimination. The poorest upazilas are in the northwest, the coastal belt, Mymensingh, Netrakona, Bandarban and Rangamati. Districts with more than one million people living in extreme poverty include Sirajganj, Naogaon, Bogra, Mymensingh and Chittagong. Poverty can be a cause and an outcome of food insecurity. Households that are poor lack the means to acquire sufficient and nutritious food, and are likely to be food insecure; people who are food insecure may have to sell or consume their productive assets to satisfy their immediate food needs. This undermines their longer-term income potential and they may become poor. Although Bangladesh has achieved progress in poverty reduction, there remains widespread poverty and hunger at national and regional levels. There are also marked variations in poverty incidence between rural and urban Bangladesh.

Ensuring food security for all is one of the major challenges that Bangladesh faces today. Despite of significant achievement in food grain production and food availability, food security at national, household and individual levels remains a matter of major concern for the Government mainly due to natural calamities. The food production of the country both rice and wheat, was 10.46 million metric tons in the year 1971-72. Bangladesh attained self-sufficiency in food production in 2010-2011 with a gross production of rice and wheat of 35.0 million metric tons (World Bank, 2011) which marginally met the country's requirement of 24.62 million metric tons for the population of 148.69 million, taking 453.6 gm per capita per day requirement. Food availability is one of the three conditions of food security as defined in the World Food Summit, 1996. The other two conditions are access and utilization. This thesis focuses firstly on the availability of food as an essential element of the concept of food security and secondly role of government to achieve food self-sufficiency. Today, though people are not dying, they are going hungry and becoming

stunted with reduced mental and physical capacity. The hungry population of over 60 million people is larger than most other global cases- the third largest poor population in any country after China and India (UNDP, 2005). Nearly half of Bangladesh's children are underweight, making it one of the most severe cases of malnutrition in the world. While poverty is an overall denominator of this food insecurity in the country, the additional intensifiers are disability (gender, age, and physical challenge) and location (disaster proneness, access to the market, etc) as well as other aspects related to utilization (education, awareness, cultural practices, etc).

1.1.1 Food security status

Food security situation in Bangladesh has improved, especially on average per capita dietary energy supply has improved from 1800 Kcal in 70s to 3055 in 2009 (BBS 2010), and further improvements on access and utilization, to be sustainable and large-scale, needs renewed efforts from the government, civil society (including media) and the development partners. Records say in 70s', 70% people were under the food consumption poverty line. Today this is down and 35% of the population under food consumption poverty line. Food security at household level is closely linked with poverty. These poverty and food security problems are massive, with approximately half of the population lacking the resources to acquire enough food and consequently remaining below the poverty line. Two approaches are generally used for measuring the incidence of poverty: direct calorie intake (DCI) method and cost of basic need (CBN) method. The Bangladesh Bureau of Statistics (BBS) has estimated the extent of poverty using the DCI method through its successive Household Expenditure Surveys (HES). In addition, the CBN method of estimation has also been introduced in the household expenditure surveys.

Table 1.1: Poverty situation in Bangladesh as measured by the cost of basic need (CBN) method

Location	**Percent of population below poverty line**					
	Upper poverty line			**Lower poverty line**		
	1991	**2000**	**2010**	**1991**	**2000**	**2010**
National	58.80	48.90	31.50	42.70	33.70	17.60
Rural	61.20	52.30	35.02	46.00	37.40	21.10
Urban	44.90	35.30	21.30	23.30	19.10	07.70

Source: Household Income and Expenditure Survey, 2010, Bangladesh Bureau of Statistics, upper and lower line means the interval of percent

1.1.2 Per capita availability:

In estimating the per capita availability of food items, BARC based its calculation on the population size of 119, 130 and 148.69 million for the year 1994-95, 2004-05 and 2010-11 respectively and the per capita food intake figure published by BBS in 2010 (Household Income and Expenditure Survey, 2010). Accordingly, per capita availability of cereals (rice and wheat) has been found to increase from 374 g/day in 1994-95 to 647 g/day in 2010-11 (Table 1.2). Sharp increase in per capita availability of potato and vegetables is seen in the last four years, while the per capita availability of pulses and oilseeds has remained stagnant or declined. Availability of meat, milk and egg has also increased as shown in Table 1.2 Per capita fish availability increased from 27 g in 1994-95 to 56 g in 2010-11.

Table 1.2: Production and availability of major food items (1994-2011)

Food Items	**Production (Million tons)**			**Availability (gm/capita/day)**		
	1994-95	**2004-05**	**2010-11**	**1994-95**	**2004-05**	**2010-11***
Cereal	18.08	26.13	35.0	374	464	647
Potato	1.50	5.95	8.30	32	108	153
Pulses	0.53	0.31	0.72	11	10	13
Oilseed	0.48	0.56	0.84	10	10	15
Vegetable	1.21	6.50	11.19	21	108	207
Fruit	1.41	4.60	3.56	24	68	65
Fish	1.17	2.10	2.89	27	41	53
Meat	0.48	1.06	1.90	11	21	35
Milk	1.52	2.14	2.95	35	42	54.60
Egg (million)	2400	5623	6078	19**	41**	41

Source: BBS 2011, DAE, DLS, DOF, BARC * Population 148.69 million in 2011,

** per year

1.1.3 Concept of Causes of food insecurity

Food insecurity is chronic when a population has a long-term inability to acquire sufficient food. Transitory or current food insecurity exists when a population suffers a temporary decline in food consumption. Transitory food insecurity can be due to seasonal factors or unexpected external events such as natural disasters. Transitory food insecurity can lead to chronic food insecurity. It is argued that, as a result of fluctuations in food prices and wage

income, which in turn are determined by the production cycle, food consumption varies according to season. To determine the risk of becoming food insecure, it will be necessary to agree on a scale against which to measure an outcome and to agree on a threshold.

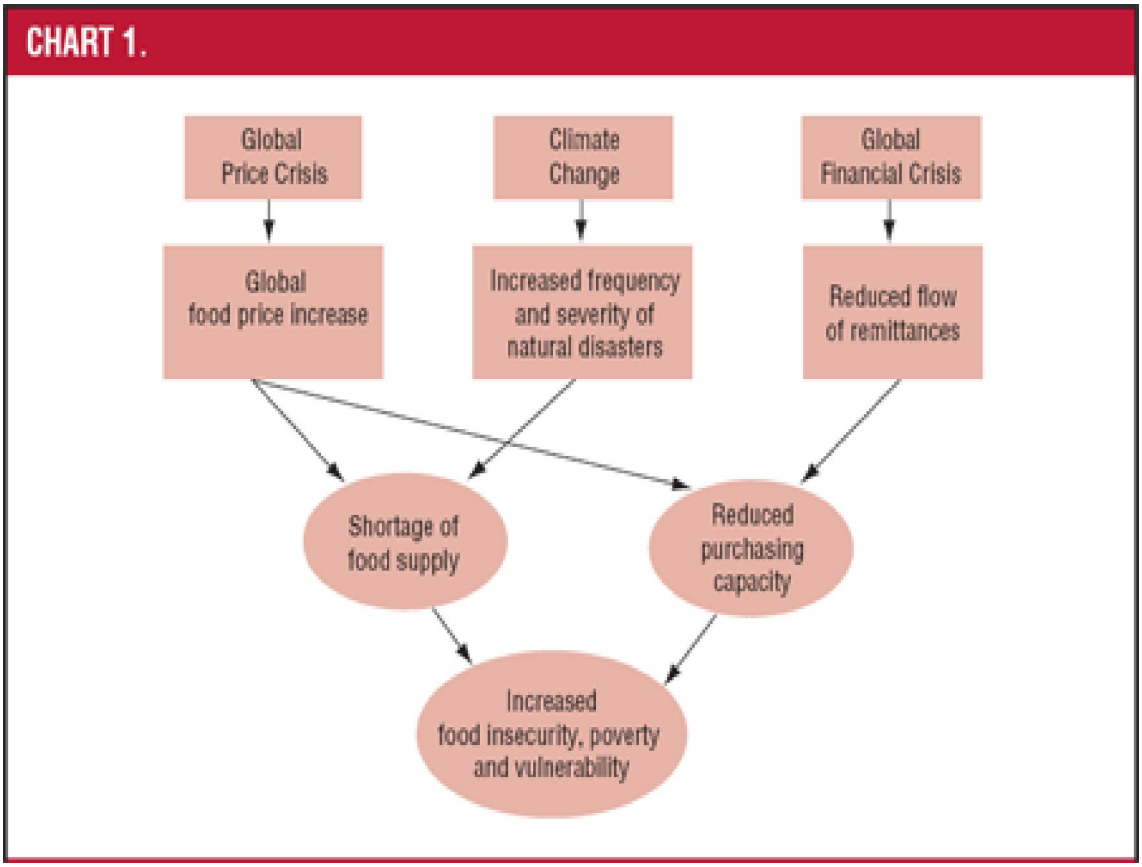

Figure 1.1: Causes of food insecurity

1.1.4 Homestead agriculture

From the ancient tie when human being started cultivating land homestead agriculture has been playing a pioneering role. Most horticulturists believe that ancient housewives had starting cultivating the homestead land in a systematic way in order to collect seeds and to meet up financial family needs (Hossain, 2000)

Home gardening is one of the world's most ancient food production practices and is commonly practiced throughout the word (Landauer and Brazil, 1990). Traditional gardens often vary in size; bio-diversity and products are adapted to local resources and cultural preferences. Home gardens, sometimes referred to as mixed, backyard, kitchen, roof top

garden, compound or homestead gardens can be grouped into two basic categories- "traditional gardens" –those cultivated independent of any intervention and "promoted gardens" –those receiving support from an outside organization (Marsh,1996).

1.1.5 Physical characteristics of the homesteads of Bangladesh

The word homestead means a piece of land where a family builds its home including the land house and outbuildings. However different authors have used word like kitchen gardening, backdate gardening, household gardening etc. to mean basically the same thing (Hossain, 2000).

The physical features of the homesteads vary a lot from region. In the flat highlands, crop fields are almost at the same level and continuous with the homesteads. There is no difference between the homestead land and the crop fields. In the areas that are subject to annual flooding, houses are built on raised lands. Consequently, homesteads are small but well defined. Homesteads of the hilly areas are characterized by sloping long, often strip (Rashid, 1999).

1.1.6 Home gardening in contribution to food security and improving micronutrient

Home gardening contributes to household food security by providing direct access to food that can be harvested, prepared and fed to family members, often on a daily basis. Even very poor, landless people practice gardening on small patches of homestead land, vacant lots, roadsides or edges of a field, or in containers. Gardening provides a diversity of fresh foods that improve the quantity and quality of nutrients available to the family (Rashid, 2001). Households with gardens typically obtain from them more than 50 percent of their supply of vegetables and fruits (including such secondary staples as plantains, cassava, taro and sweet potato), medicinal plants and herbs; those households having garden systems that include animal raising also obtain their primary and often only source of animal protein (soleri, Cleveland and Frankenberger, 1991; Marsh and Talukder, 1994).Very small mixed vegetable gardens can provide a significant percentage of the recommended dietary allowance for protein (10 to 20 percent), iron (20 percent), calcium (20 percent), vitamin A (80 percent) and vitamin C (100 percent) (Marsh and Talukder, 1994). Home gardening has been showed to be a source of additional income for the household through the sale of a percentage of the garden produce. Finally, home gardening is especially important in overcoming seasonal availability of food and promotes household self-sufficiency.

1.1.7 Human nutrition situation of Bangladesh

Several surveys have been concluded from time to time to know the nature and extent of malnutrition. Rashid (2001) compiled these surveys.

The first such survey was carried out in 1959 by Dr. Mohammad Ibrahim (founder of BIRDEM, Dhaka) on the school students. He found that the students were malnourished and devoid of the capability to carry out normal physical and mental activities.

The second nutrition survey was conducted during 1961-62 by the govt. of East Pakistan in collaboration with the US department of health. The results of the survey are contained in the report. "Nutrition Survey of East Pakistan" published by the Ministry of Health, Labor and Social Welfare. It was found that the diet of both rural and urban people was deficient in protein, vitamin A, riboflavin, calcium and iron.

The 3rd nutrition survey was conducted by Department of Biochemistry of the University of Dhaka in 1975-76. Results of the survey are given in the report "Nutrition Survey of Rural Bangladesh". Although limited in scope of the survey revealed that the existence of widespread malnutrition in the country.

1.1.8 Importance of vegetables in human nutrition

Vegetables are important sources of vitamins and minerals in the diet. Leafy vegetables are particularly rich in these nutrients. Vegetables assume greater importance in Bangladesh in view of the scarcity and high prices of foods of animal origin. It is possible to remove the deficiencies of vitamins and minerals in the Bangladeshi diet by increasing the consumption of vegetables. The present estimated per capita daily intake of fruits and vegetables (root crops+ leafy vegetables + spices) in Bangladesh is around 35 and 75 grams, respectively.

1.2 Statement of the Problem

Stunting affects the cognitive ability and the immunity of the children from diseases. The prevalence of wasting, an indicator of current nutritional status, remains at an alarming level of 15 to 17 percent, with very little improvement over time. Low birth weight among Bangladeshi infants is among the highest in the world, ranging between 20 and 22 percent. The nutritional status of women shows a better trend. The proportion of women with

chronic energy deficiency has declined from 52 percent in 1997 to 25 percent in 2011. But the prevalence of obesity among women is also emerging as a public health issue. The hidden hunger, the insufficiency of vitamin A, iron and zinc in the diet that causes major diseases such diarrhoea and anaemia and poor eye sight is still a major health issue.

The relationship between poverty and food insecurity is a complex one where several key dimensions could be found. For many reasons, such as ill health, disability, loss of job, lower level of education and employment and higher cost of living etc. are the factors. The risk of food insecurity in low-income families is associated with lack of access to land, single-parent families, and lack of alternative occupation, unstable income level and having a poor family head. The most important issue facing by the most people is inadequate access to food which is fundamentally an outcome of poverty (European Commission, 2000). Food security of Bangladesh is adversely affected by higher food prices; since income may be increased but not sufficient for poor people to adjust with high prices compared to lower income. Inadequate domestic production, lack of food imports, aid and national food stocks causes food unavailability at national and household level. Though total food supplies are adequate in Bangladesh, poor people are restricted and vulnerable in accessing food. This is because, poverty includes lack of education, employment, land access, microcredit issues, income imbalances, huge differences between the rural and urban areas, intra household disparities and gender discriminations and all these features are responsible for vulnerability to access in food security.

Analyzing the issues from food insecurity perspective, this study was designed to find out the following research questions regarding reduction of food insecurity through homestead vegetable production:

i. What is the extent of reduction of food insecurity through homestead vegetable production in Mymensingh district?
ii. Is homestead vegetable production of farmers affected by the selected characteristics?
iii. What extent do the relationships have between selected characteristics of the farmers and their?
iv. To What extent the farmers confronted the problems in reducing food insecurity through homestead vegetable production?

1.3 Specific Objectives of the Study

In order to give proper direction to the study the following specific objectives are formulated:

1. To assess the extent of the reduction of food insecurity through homestead vegetable production
2. To determine and describe some selected characteristics of the respondents. The selected characteristics are:
    - Age
    - Education
    - Farm size
    - Annual income from homestead
    - Cosmopoliteness
    - Extension contact
    - Agricultural Training
    - Knowledge on homestead agricultural activities
    - Attitude towards homestead agriculture
3. To explore relationships between the selected characteristics of the respondents and their extent of the reduction of food insecurity through homestead vegetable production
4. To identify the problems confronted by the respondents in reducing food insecurity through homestead vegetable production

1.4 Justification of the Study

Malnutrition and demand of vegetables are increasing day by day. Food security in Bangladesh is characterized by considerable regional variations. Factors such as tendency to natural disasters, distribution and quality of agricultural land, access to education and health facilities, level of infrastructure development, employment opportunities, and dietary and caring practices provide possible explanations for this. The fundamental goal of food security is the improvement of the human condition. At the national level, food security means having sufficient food to meet the food needs of all citizens. Household food security is the application of this concept at the family level.

According to the World Food Summit (1996), “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life”. Food security encompasses many issues ranging from food production and distribution to food preferences and health status of individuals. Bangladesh is said to be one of the poorest countries in the world. If the poverty line is taken as US$ 1, 29 of the populations are found to be income poor, and when poverty line is less than US$ 2, the percentage of the poor people becomes 78 (Ahmed and Ninno, 2004). People are affected by flood, river bank erosion and drought which create seasonal unemployment in the area. In Bangladesh rural households suffer from food insecurity for four months roughly from mid August to November. A study shows that people suffer a lot from poverty since mid October to mid November (Rahman and Khan, 2009). As during these months, there is seen a huge lack of agricultural work. So, poor people are often in vulnerable condition. Among the vulnerable people, members of the households that have no male earners suffer a lot.

As there is a great shortage in employment, unskilled women laborers do not get work or they have to sell their labor at a very cheap rate. Even, when governmental and non-governmental organizations provide relief, the amount is very little, and both political and gender powers matter to get the grant. The consequences of hunger and malnutrition are adversely affecting the livelihood and well being of a massive member of people and inhibiting the development of many poor countries (Gebremedhin, 2000).Therefore, the finding of the study are expected to be of great value of researchers, extension service provider, students and particularly planners in formulating and designing extension approach for maintaining the natural balance. It is also expected that the finding of the study will be particularly applicable to the rural poor people of Bhaluka, Trishal and Gafargaon village of Mymensingh district. In view of this situation, present study was an attempt to analyze and find out the homestead utilization system, utilization of family labor, vegetable production situation, nutrition and calorie contribution status. It will provide valuable insights in to problems and prospects of homestead vegetable gardening and thus the policy makers will be benefited from the study. It will also provide valuable information to the researchers as well as extension workers.

1.5 Scope of the Study

Since gaining independence in 1971, food security issues in Bangladesh have been amongst the highest priorities on the government's agenda. This is because Bangladesh faces a number of demographic, social and ecological challenges, which make it particularly vulnerable to food insecurity. These challenges are further exacerbated by climate change, including the consequences of sea level rise. Silent threats such as soil and river salinity and arsenic contamination have direct and indirect effects on agricultural production and households' access to food. In order to target the continuing food security threats the Government of Bangladesh has developed a number of high level policy initiatives, including Vision 2021 and the related Perspective Plan. Achieving food security is also a key objective of the country's poverty reduction strategy and has been recognized to be the highest risk in the Bangladesh Climate Change Action Plan. Strategic objectives include realizing universal food security, which implies that the country needs to be not only self-sufficient in terms of food production but also manage equitable distribution of nutritious food. Ensuring universal food security is particularly challenging given the multidimensional nature of the food security concept which comprises food availability, physical and financial access to food, food utilization and food stability.

Today, food availability in Bangladesh remains an enduring problem. Rice constitutes the main crop in the country accounting for around 80 per cent of the land area. Despite the fact that rice production has been increasing, Bangladesh has recently extended its ban on non-fragrant rice varieties. The analysis of the most recent 2010 Household Income and Expenditure Survey (HIES) shows that approximately 41 per cent of population fall below the nutritional requirement of 2,122 kcal. The situation is particularly alarming amongst the poorest segments of the society, where around 57 per cent of individuals do not meet their nutritional needs. Food access relates to both physical and financial access. At the macro level, the ILO's LABORSTA index suggests that between 2002 and 2010, food prices almost doubled. Complementary analysis of the HIES data shows that around 60 per cent of the Bangladeshi households spend 75 per cent or more of their total expenditure on food.
Thus this research will act as a push to the government, the general public, donor organizations and other interested parties in the domain in the intervene in one way or the in seeking appropriate solutions to the problem. As indicated above, the country in general and the study area in particular have been facing food insecurity. Identifying and understanding factors that cause or influence the problem as well as its intensity at farm

family level deserves rigorous empirical research where food shortage has been pronounced and has great importance for policy implications and interventions. The results of the study will provide policy related information that helps to prioritize among the many possibilities depending on the relative extent of influences of its determinants. Furthermore, this study will attempt to make further contribution to the previous studies and can be used as a source material for further studies. Finally, the researcher believed that the finding and recommendations of the study would be helpful in formulating extension programs for reducing risk of production, health and environment.

1.6 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in light of the available evidence (Goode and Hatt, 1952). The following are made by researcher while undertaking the present study:

1. The subjects selected for the study were able to reply adequately to queries designed by the researcher.
2. The responses furnished by the respondents were valid and reliable.
3. Views /opinions provided by the selected respondents included in the sample are the representative of the population.
4. The researcher who acted as interviewer was well adjusted to the social and cultural environment of the study area.
5. The respondents include in the sample were competent for providing proper responses to the items included in the interview schedule.
6. The data collected by the investigator were free from bias and prejudice.
7. The characteristics of the rural people as well as the indicator of the causes of food insecurity were normally and independently distributed with their respective means and standard deviation.
8. The environment conditions of the rural people were more or less similar throughout the study area.
9. The findings of the study were expected to be helpful for planning and execution of various programs in connection with the rural food insecurity of the country.

1.7 Limitations of the Study

Considering the time, money and other resources available to the researcher and to make the research meaningful and manageable from the practical point of view, the study was limited by the following constraints:

1. The study was confined to only homestead vegetable gardening demonstration farmers.
2. The study focused on reduction of food insecurity through homestead vegetable production.
3. There were many respondents in the study area but only selected numbers of respondents were considered for this area.
4. There were many and varied characteristics of the respondents who face food insecurity but only few characteristics of them were selected for examining the relationship with dependent variable of the study.
5. While collecting data the researcher depended on the data and information furnished by the respondents and extension personnel.
6. All data and information were collected within short possible time.

1.8 Definition of the Important Terms

In order to avoid confusion and misunderstanding, certain terms used throughout the study are defined as follows:

Food insecurity

Food insecurity is the most broadly used measure of food deprivation in the United States. The USDA defines food insecurity as measured by adequate food is limited by a lack of money and other resources at times during the year. Acceptable shorthand terms for food insecurity are “hungry, or at risk of hunger,” and “hungry or faced the threat of hunger.”

Poverty

Poverty is general scarcity or dearth, or the state of one who lacks a certain amount of material possessions or money. It is a multifaceted concept, which includes social, economic, and political elements. Poverty seems to be chronic or temporary, and most of the time it is closely related to inequality.

Nutrition

Nutrition is the science that interprets the interaction of nutrients and other substances in food (e.g. phytonutrients, anthocyanins, tannins, etc.) in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion.

Household food insecurity

All household members have affordable access at all time to the food they need for a healthy life. Household food insecurity include shortage of food markets, isolation from markets, lack of capacity to produce food or earn income to purchase food, lack of a reliable source of potable water, sanitation, and inadequate health services.

Agricultural knowledge

It refers to extent of comprehension of a respondent of rural people about different facts, information, causes and effects related to crop, livestock and fisheries.

Farming Enterprises

Farming Enterprises referred to the individual crops, livestock, fisheries and fruit item which are cultivated or produced by the small farmers.

Age

Age of a respondent is defined as the period of time in years from his/her birth to the time of interview. Age was measured in terms of years on the basis of her response.

Education

It refers to the complete years of schooling by the respondents at the time of interview.

Farm size

Farm size of a respondent refers to the area of homestead, cultivated land, fruit family owned or obtained.

Annual Income

It is defined as the total earning of the respondent from agricultural, non agricultural and other sources during the previous year.

Agricultural Training Received

It refers to the total number of days attended by the farmers in his life to the various agriculture related training courses.

Cosmopoliteness

Cosmopoliteness of farmers refers to his frequency of movement to a distant place from his village.

Extension Contact

Extension Contact of farmers refers to his capability of becoming accessible to the influence of extension education through different extension teaching methods.

Homestead

The homestead areas of farmers for this study was defined as the raised lands of three villages of the study area under Mymensingh district in which the households had entire dwelling including living rooms, kitchen, cattle shed, sheep or goat shed, poultry house, front yard, courtyard and the area under vegetables, fruit trees, timber trees, bamboo bunches etc.

Homestead Agricultural Activities

Homestead agricultural activities refer to the works done by the farmers of the households to participate in agricultural activities in their homestead.

Assumption

An assumption is the supposition on the current situation or a presupposition on the future course of events, either or both assumed to be true in the absence of positive proof, necessary to enable the commander in the process of planning to complete an estimate of the situation and make a decision on the course of action. (Dictionary of Military and Associated Terms US Department of Defense 2005).

Hypothesis

"A hypothesis is a proposition which can be put to a test to determine its validity." (Goode and Hatt, 1952) A research hypothesis is a predictive statement capable of being tested by scientific methods that related independent variables and dependent variables.

Null Hypothesis

A null hypothesis states that there is no relationship between the concerned variables. If a null hypothesis is rejected on the basis of a statistical test, it is assumed that there is a relationship between the concerned variables.

Variable

A general indication in statistical research characteristics that occur in a number of individuals, objects, groups etc. and that can take on various values for example the age of an individual.

Statistical test

A body of rules which help to take decision regarding acceptation or rejection of the hypothesis is defined as test. However, different descriptive and inferential statistics were included in this study.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this chapter is to review the past studies and opinions of experts and social scientists having relevance to this investigation based on the major objectives of the study. Attempts have been made in this chapter to review the findings of past researchers having relevance to the present study. But unfortunately, very few studies have been obtained which were directly related with causes of food insecurity in general or which explain the factors that influence the causes of food insecurity faced by the rural people in particular. The researcher made exhaustive effort to review the previous research works directly or indirectly related to the present study by different researchers in home and abroad. However, many studies could be found on agricultural problem confrontation and food security research, the result of which were indirectly related to the present study and also which focuses general behavior pattern of the farmers and their overall survive strategies.

2.1 Studies on Relationships of the Selected Characteristics of the Respondents with Reduction of Food Insecurity through Homestead Vegetable Production

2.1.1 Age and Reduction of Food insecurity

Alam et al. (2008) in their study entitled 'Involvement of farmers in BAUEC adult education activities in the Sadar upazilla of Mymensingh district" showed that the age has significant relationship with their adult education.

Basak (1997) in his study entitled "Impact of BRAC Rural Development Activities as Perceived by the Participating Woman" showed that the age of the rural woman under BRAC has no significant relationship with their impact of involvement in BRAC rural development activities.

Bhuiyan (2002) in his study found positive and significant relationship between age of the farmers and their constraint in Banana cultivation. Similar findings were obtained by Haque (1995) and Rahman (1996) in their respective study.

Hossain (1985) in a study on landless labors in Bhabakhali union of Mymensingh district found that there was no relationship between age of landless labors and their problem

confrontation. Similar findings were obtained by Rahman (1995), Ali (1999), Pramanik (2001), Salam (2003) and Halim (2003) in their respective studies.

Hossain (1990) found that age did not show and significant relationship with production of crop.

Islam (1996) conducted a study on farmers' use of indigenous technical knowledge (ITK) in the context of sustainable agricultural development. He found that age of the farmers has significant negative relationship with their extent or use of ITK.

Mansur (1989) found that age of the farmers had no significant relationship with the feeds and feeding problem confrontation.

Rashid (2003) found that age of the rural youth had significant negative relationship with problem confrontation in selected agricultural production activities.

Roy (1997) studied on factors associated with the extent of adaptation of integrated pest management practices by the Boro rice growers in Sadar thana of Magura district and found that age and farm size could not keep significant impact on the adaptation of IPM practices.

Sarkar (1996) observed that there was no significant relationship between age and adoption of an improved potato cultivation practices. Karim and Mahbub (1986), Singh (1990) and many others observed similar findings.

2.1.2 Education and Reduction of Food insecurity

Alam (1997) observed that the level of education of the farmer had a positive and significant relationship with the use of improved farm practices.

Alam *et al*. (2008) in their study entitled "Involvement of farmers in BAUEC adult education activities in the Sadar upazilla of Mymensingh district" showed that the age has negative significant relationship with their adult education.

ESCAP (1997) stated that small farmers deal with agricultural production and natural resources management with poor or no education, within a global context that is marked by changing techniques and technologies including those relevant to sustainable agriculture and information.

Haque (1995) in his study on problem confrontation by farmers of Mohila Bittaheen Samabayan Samittee working under the Bangladesh Rural Development Board found a negative significant relationship between education of members and their problem confrontation. Similar finding were obtained by Mansur (1989), Rahman (1995), Rahman (1996), Faroque (1997), Ahmed (2002), Hossain (2002), Bhuiyan (2002) and Salam (2003) in their respective studies.

Hasan (2005) in his study found that there was no relationship between education of the farmers and their problem confrontation in crop production activities.

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the literacy has significant negative relationship with their problem confrontation in practicing IPM.

Rahman (1986) in his study found that education had significant and positive relationship with the adoption of improved farm practices.

Sarkar (1997) found that the level of education of the farmers had a positive and significant relationship with the adoption of improved potato cultivation.

Ullah (1995) found a positive and significant relationship between family education and group members' effectiveness in respect of livestock and green revolution technology.

2.1.3 Farm size and Reduction of Food insecurity

Aktar (2000) found that there was a positive and significant relationship between the farm size of the rural poor and their decision making role in the family with regard to development activities.

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that the farm size had a significant relationship with their use of improved farm practices.

David *et al.* (2000) concluded that work with smallholders, but accept that most innovation, investment and commercialization will come from only that portion with more and capital than the average. Some claim that these farmers will then create enough jobs locally,

through hiring labor and spending on local goods and services, to boost the welfare of other farm households.

Hasan (2005) in his study found that there was no relationship between farm size of the farmers and their problem confrontation in crop production activities.

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that farm size has significant relationship with their problem confrontation in practicing IPM.

Karmakar (2004) observed statistically insignificant relationship between farm size and their constraints in adopting aquaculture technologies.

Mannan and Miah (2007) in their study "Present status of fruit cultivation and problems confronted by the farmers at Dighullia upazilla of Khulna district" showed that the land size has negative trend of relationship with their problem confrontation.

Muttalab (1995) in his study observed that farm size of the farmers had a positive relationship with the adoption of improved potato farmers and showed positive and significant effect.

Rahman (1995) found that the farm size of the farmers had a significant negative relationship with their problem confrontation in cotton cultivation. Similar finding were obtained by Islam (1987), Mansur (1989), Rahman (1996), Faroque (1997) and Halim (2003) in their respective study.

Rahman (1995) found that farm size of the farmers was negatively related with their constraints.

Sarkar (2002) found that there was a positive and significant relationship between the farm size and their knowledge on BRRI dhan-29.

2.1.4 Family income and Reduction of Food insecurity

Braun (1995) highlighted the fact that cash crop contribute only a portion of household food security and household income. He also stated that diversification of farming enterprises reduces risk and maximize food security and household income.

FAO (1995) reported that the lack of adequate incomes and purchasing power of large parts of the population is expected to slow down world agricultural growth.

Hirschman (1958) found that changes in a small holder output mixes typically affect the overall level of rural employment and which ultimately affects the household food security.

Hossain (1999) found a positive significant relationship between family income and effectiveness of agricultural activities.

Hussen (2001) found that the annual income had positive significant relationship with their adoption of modern sugarcane cultivation practices.

Karim (1996) found in his study that annual family income of the farmers had a negative significant relationship on their problem confrontation in Kakrol cultivation.

Kobir (2007) in his study entitled "Contribution of farming enterprises of the small farmers towards household food security" showed that the family annual income of the small farmers had negatively significant relationship with their farming enterprises towards the household food security.

Mansur (1989) in his study found that the relationship between income of the farmers and their problem confrontation in feeds and feeding cattle was significant but show a negative trend.

Quisumbing *et al.*(1995) cited that household food security depends on both the level of household income and who earns it.

Rahman (1995) found in his study that annual family income of the farmers had a significant negative effect on their problem confrontation in pineapple cultivation.

Rahman (2007) in his study entitled "Food Security through Homestead Vegetable Production in the Smallholder Agricultural Improvement Project Area" showed that the family annual income of the rural farmers had strongly significant relationship with their average per day per family vegetable consumption.

Saad (2000) stated that ability to emphasis on income from farm production and nonfarm enterprises as an indispensable factor in determining economic access to food.

2.1.5 Cosmopoliteness and Reduction of Food insecurity

Akanda (1994) found that non- localite behaviour or cosmopoliteness of rural woman was negatively correlated with their participation in homestead vegetable cultivation, cultivation of fruit trees and nonfarm household activities.

Ahmed (1977) found no relationship between cosmopoliteness of the farmer and each of the adoption of recommended varieties of jute, recommended dose of fertilizers and plant protection measure in jute cultivation.

Latif (1974) in his study found that there was a positive relationship between cosmopoliteness of the farmers and their communication exposure.

Karim (1973) found a significant positive relationship between cosmopoliteness of the transplanteated Aman rice growers and their adoption of fertilizers.

2.1.6 Extension contact and Reduction of Food insecurity

Alam (2007) in his study entitled "Impact of Food Insecurity Project on Crop Production" showed the extension contact of the rural farmers had strongly positive significant relationship with their crop production after involvement with food security project.

Ali (1978) found that contact and non contact farmers differed significantly in respect of their extension contact.

Anon (1994) presented an evaluation study of invested in pond development for pisciculture under two island fisheries scheme supported by the Indian's National Bank for rural development.

Aurangozeb (2002) observed that there was significant relationship between contact with extension media and adoption of integrated homestead farming technologies.

Biswas (2003) reported that extension contact of the rural women had positive and significant relationship with their accessibility of family decision making.

Hasan (2005) in his study found that there was no relationship between extension contact of the farmers and their problem confrontation in crop production activities.

2.1.7 Agricultural training and Reduction of Food insecurity

Hossain (1981) showed that proper training could raise the knowledge and skill level of participants significantly.

Haque (2003) found that training received of the respondent had positive significant relationship with their adoption of modern maize cultivation technologies.

Islam (2002) conducted a study on farmers' knowledge and adoption of ecological agricultural practices under the supervision of PROSHIKA. He found that agricultural training exposure of the farmers had no significant relationship with their adoption of ecological agricultural practices.

Mannan (2001) in his study observed that the training received by the respondents had positive and significant relationship with their knowledge on food and nutrition.

Nuruzaman *et al*. (2001) conducted a study to determine the knowledge, attitude and practices (KAP) of IPM male and female FFS farmers. In the study KAP was found significantly related with their extent of training exposure.

2.1.8 Knowledge on homestead agricultural activities and Reduction of Food insecurity

Alam *et al*. (2008) in their study entitled "Involvement of farmers in BAUEC adult education activities in the Sadar upazila of Mymensingh district" showed that the knowledge on agriculture has negative significant relationship with their adult education.

Ali (1999) revealed that knowledge of the rural youth had significant positive relationship with their anticipated problem confrontation in self employment by taking selected income generating activities.

Eicher and John (1990) stated that increasing attention has been paid to household food security because of the growing knowledge about food production will not ensure that all families will be able to secure their food needs.

Hoque (2001) in his study entitled "Environmental awareness and problem confrontation of the FFS farmers in practicing IPM" showed that the knowledge on agriculture has significant negative relationship with their problem confrontation in practicing IPM.

Mansur (1989) found in his study that there was a substantial significant negative relationship between knowledge in feeds and feeding cattle of the farmer and their problem confrontation in feeds and feeding.

Raha (1989) in a study on poultry problem confrontation reported that the relationship between poultry knowledge and poultry problem confrontation was negative. He reported from his study that farmers' knowledge in irrigation of modern Boro rice had no significant relationship with their irrigation problem confrontation. Anwar (1994), Karim (1996), Ali (1999), Rashid (1975), Ismail (2001), Salam (2003) and Rashid (2003) found similar finding in their respective studies.

Rahman (2008) in his study entitled "Agricultural problem confrontation by charland farmers of Jamuna River" showed that the knowledge on agriculture of the farmers had negative significant relationship with their problem confrontation.

2.2 Literatures on Reduction of Food Insecurity through Homestead Vegetable Production

Ahsan (1995) in his study on gender dimension in agricultural extension program observed that gender affects involvement in different type of works by men and women in farming depending on social system, local customs and religious influence. Homestead based agricultural system was basically the domain of female members of the households. The important components of the homestead agricultural system include backyard gardening for cultivation of vegetables and fruits, homestead forestry, livestock farming, poultry raising and fish culture in the pond.

Aireen (1992) conducted a study on women's work in homestead farming in soe selected areas of Gazipur district. The study revealed that women generally carried out homestead farming. On an average, women spent 30 percent of day time in household activities and another 30 percent on homestead agricultural operations such as land preparation, planting, seeding, weeding and irrigation and post harvest activities.

Andrews et al. (2000) stated that, at some time during the previous year they were uncertain of having, or unable to acquire food sufficient to meet basic needs at all time due to inadequate household resources for food.

Anonymous (2002) study carried out at Atkapalia FSRD site, Noakhali to assess the profitability of homestead vegetable production and utilization system. The study revealed that farmers produce homestead vegetables like tomato, brinjal, radish, chili, bottle gourd, sweet gourd, okra and red amaranth etc. Among the vegetables higher gross margin (TK.4025/ha) found from radish followed by tomato (Tk 47992/ha) and bottle gourd(Tk.4025/ha).The findings showed that production of homestead vegetables is highly profitable.

Badiane (1988) stated that food insecurity, aside from an inability to consume the desired amount of food at the individual level, can also exist in the form of excessive costs incurred by the economy to ensure food availability.

Begum *et. al*., (1989) studies on two models of vegetables production for homestead under different levels of fertility. Two models (mono crop and inter crop) of vegetables production were tested under three fertility (cowdung, fertilizer and cowdung + fertilizer) levels. The results revealed that the yield of all vegetables was maximum grown by applying both cowdung and fertilizer compared to cowdung and fertilizer alone. Intercropping was better than mono crop in terms of yield, nutrient availability and income. A family could get 18.96mg iron, 552.17mg calcium, 22453.9 microgram vitamin A and 438.63 mg calcium, 27172.80microgram vitamin B and 285.15mg vitamin C per day from mono crop under higher fertility level.

Bhuian and Amin (1988) studied about inter linkages among homestead farm size and family size and livestock ownership in a area of Chittagong district of Bangladesh. They suggested that the homestead area more closely inter linked with size of farm than with size of family. Significant inter dependence association of winter vegetable area of homestead was observed with the ownership of livestock.

Bryceson (1990) found that food insecurity, “the inadequacy of quantity and quality of food consumption, as well as the irregularity over time, “ can lead to the contraction and ineffectiveness of the institutions that might serve as positive spurs to the enhancement of food production and distribution.

Cathie and Dick (1987) in their study found that food insecurity can be defined to consider both its long time and short term aspects. Long term food insecurity or chronic is defined in terms of persistent existence of malnutrition and the associated lack of development and

growth in low income developing economies and regions of those economies. The inability to attain food security in the short term, or transitory food insecurity, is defined as a temporary decline in a household's or region's or nation's access to food.

Chisholm and Tyers (1982) stated that the food insecurity in this sense is ultimately a problem that stems from real income fluctuations that affect the ability of people to command adequate food trough legal means.

Choudhury (1986) have been shown the inverse relationship with household size, in terms of adult equivalent, with energy intake.

Corbett (1988) found that food insecurity of many families in Africa is seen as problems in obtaining stable and adequate access to food. Such food insecurity varies from the recurrent and predictable food deficits to more severe entitlement failures, which arise from a mix of socio-economic, environmental and political factors and which at their worst may lead to famine.

Economic Commission for Africa (1991) found the essential elements of food insecurity include adequate levels of food production, stabilization of food supplies and guarantee of food availability for all. For the ECA, food insecurity in Africa is mainly due to low levels of production.

FAD (1991) stated that food insecurity is a situation in which the individual of a society have neither the physical nor the economy assess to nourishment they need. In some cases, there is not enough food at the time and location required to fulfill the needs all the members of the community, whether it be a nation, a region, a village or a household. These dimension constitutes the problem of the physical ability of food supplies. On the other hand, in order to provide physical assess to food, it is necessary to have an efficient distribution system, including processing, storage, transportation and marketing to assure the dispatch of food products within a specific country in the desired time.

Fokhrul *et al*., (1994) studied about gender issues in homestead farming. It was studied that Bangladeshi rural women play a significant role in homestead farming particularly at the production phase and decision making. Their specific role vary widely depending upon the ecological, socio-economic, and religious factors. Women who possess different physiques and energy capabilities in comparison to men have also wide range of daily activities than

men do in homestead agricultural production systems. Women are more involved in poultry raising and pre and post harvest activities of homestead vegetable production.

Gershon. J. (1995) wrote that gardening in rural areas of Less Developed countries is characteristically women's activity. The men generally work in the field and women do the gardening. He suggested if better gardening technologies can be introduced among the functionally landless in Bangladesh it could go along away towards not only feeding families better, but it could also contribute towards getting women into the economic activities in their society.

Green and Krikpatrick (1981) stated that food security problem has two principal dimensions: long term and short term. Problems of long term food insecurity are reflected in the increasing gap between the conception needs and production capacities of the developing countries. Irrespective of the long-run trend in per capita food conception, however, variability in per capita conception has significant cause of food security. Short-run insecurity in food supplies has to main sources: domestic food production and foreign exchange availability.

Green and Krikpatrick (1982) found that aim to expand current concept of food insecurity be one the long term trained of increasing food imports by developing countries, and short term insecurity caused by fluctuations in annual supply. Conventional estimates tend to suppose that insecurity can be identified with actual short-term variation in food conception. In general, it is also believed that the principle source of food insecurity arises from variations in domesticate food production. Their argument places greater weight on the manner in which a country response to periodic shortfalls in food supplies. Food insecurity may be concealed by a country's willingness to sacrifice other imports to maintain conception levels. In short, the relations between food production and conception cannot be analyzed in isolation from the balance of payments position; it may be a misleading assumption to identify food in security with food conception variability.

Halim, *et al*., (1995) an investigation was made with 60 household s at Kazirshimla Farming System Research and Development Program (FSRDP) site Bangladesh to find out the gender differences in contribution of agricultural, domestic and non farm activities in the homesteads. It was found that the household covered, large, medium and small farm

categories with homestead sizes of 0.41, 0.12 and 0.06ha respectively. Nine different agricultural and six different domestic and non farm activities were recorded in homestead.

Hopkins (1986) found that food insecurity arises at various systems levels; household, national and international and does so because of a unit's insufficient adaptive capacity. Households, the state, or the international system are unable to adjust patterns of food related activities with a minimum of financial cost or dietary loss. Ultimately, food insecurity is a national level problem. It occurs in countries that experience variations in production or inadequate production to meet consumption needs. In such situations, household level actions, at least in the short run, put pressures on national governments which in turn frequently turn to international markets, either for commercial or concessional food imports.

Hossain *et al*.,(1989) studied on utilization of homestead production of seasonal vegetable in Bangladesh showed that with the increase in land holding size, proportion of homestead decreases. In the area under study, three types of vegetables such as leafy, fruit and root vegetables were grown in the homesteads. In case of production of leafy vegetables 36.61, 19.69 , 38.75 and 2.28 percent positive answers were obtained in favor of Puishak (Indian spinach), Lalshak (Amaranthus), Kangkong and others respectively. In case of root vegetables, 13.03, 5.67, 29.75, 43.34 and 8.21 percent positive answers were obtained in favor of production of potato, carrot, radish, arum and others respectively.

Islam, *et al*,. (1989) conducted a survey with sample of 100 cooperator and 100 non cooperator farms were surveyed during December 1986 to May 1987.In their study, productivity and income per unit area from homestead production were found higher for the small farm group. Cooperator farmers earned higher returns than non cooperators, indicating the technological gap between the two groups. Homesteads were utilized and there was scope for both qualitative and quantitative improvements.

Islam, *et al*,. (2003) studied at Farming System Research site, Kalikapur Pabna, Multiplication Testing site, Kurigram. The major objective of the study was to develop a package for year round production of vegetables in homesteads and increase household food nutrition security of the poor farm family of flood plain and char land areas. Vegetable produced in the floodplain module fulfilled the requirement of vitamin A, vitamin C, calcium, iron and 57% of protein of family of five members.

Islam and Ahmed (1987) found that landless, marginal and small farm households concentrate primarily on vegetable and spices cultivation, large and medium farm households cultivated more often fruit and timber trees.

Jonsson and Toole (1991) identified adequate household food security as one of three conditions necessary for good nutrition. They argue that any assessment of the three conditions must include an investigation into the resources used to ensure their fulfillment. This permits food secure households to be differentiated by the share of total resources used to achieve food access. The higher the share the more vulnerable the household each to becoming the food secure.

Karim, et al. (1994) studied about homestead vegetable garden. Results indicated that total edible production, nutrient yield, nutritional contribution to RDA, distribution, gross and net returns from vegetable gardens were higher in the small group of farmers compared to their larger counterparts. The health and life style of the landless, marginal and small group of farmers has improved. Female participation of same group was more than large and medium group of farmers. It provides nutrition, extra incomes as well as employment opportunity.

Kennes (1990) stated that food security can more simply be defined as the absence of hunger and malnutrition. For this to be possible, household, villages or countries must have enough resources to produce or otherwise obtain food. This condition is necessary, but not sufficient because the resources must also be used way. It is useful to subdivide food insecurity problems into transitory and chronic. Transitory food insecurity refers to a temporary decline in household food intake resulting from instability in food production, food prices or income. In its extreme form it can mean famine, a situation where a sizeable population group lacks the resources for even a minimum subsistence diet. Chronic food insecurity occurs when household on a more permanent basis lack the resources to acquire enough food for a healthy and active life, while they are not directly threatened by starvation. It is worthwhile to further subdivide chronic food insecurity into a lack of overall food quantity, normally measured in energy, i.e. calorie intake and insufficiencies at the level of particular nutrients. In most cases, the satisfaction of overall calorie needs implies that the needs for specific nutrient are covered as well. However, if the diet lacks variety, the intake of specific nutrients, such as iron, iodine and vitamins is often not

guaranteed. This type of food insecurity does not necessarily result from lack of resources or income; it can be the consequence of a lack of information or nutritional knowledge.

Khadka (1991) found that food insecurity is defined as lack of excess members of society and nations to enough food throughout the year to live healthily. This is a situation caused either by inadequate food availability i.e. lack of adequate supply or by inadequate entitlements i.e. lack of effective demand, or both.

Life sciences research organization, Federation of American Societies for Experimental Biology (1990) stated that, exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable food in socially acceptable ways is limited or uncertain.

Maxwell and Simon (1989) stated that the three dimensions of food security (poverty, vulnerability and malnutrition) can be depicted as overlapping circles. Transitory food security will be concentrated in the overlap between poverty and vulnerability whereas chronic food insecurity will be concentrated in the area of overlap between the three.

Maxwell *et.al*. (1990) suggested that they lay insufficient emphasis on subjective perceptions of food insecurity. In addition, they find a unidimensional distinction between chronic and transitory food insecurity inadequate, since it deals only with the periodicity or incidence of food insecurity. Another dimension as to be introduced to describe the intensity or severity of episodes of food insecurity. A simple classification of none mild and severe is used to illustrate the point.

Mellor (1987) found that identifies chronic long term food insecurity as a problem of aggregate food supply, and short term transitory food insecurity as the result of fluctuations in annual food supply.

Mellor (1988) stated that food insecurity is the inability of poor countries, poor families and poor individuals to purchase sufficient quantities of food from existing supplies. Improving food security requires both increasing the purchasing power of the poor and boosting overall food production. Developing countries can develop a two-pronged strategy to promote food security. In the long run, efforts must be made to increase the purchasing power of the poor by raising the overall level of food production in the Third World. Increased food supplies and purchasing power must be inextricably linked to elements of

any long term food security efforts. In the short run, redistributing food supplies from the developed to the developing world is likely to be the best way to meet the more immediate food security needs of the poor.

Mellor (1990) stated that in the late 1980s, food insecurity was defined as "the inability of poor countries, poor families and poor individuals to purchase sufficient quantities of food from existing supplies." The present food security situation is recognized as being much more complex and linked to acute structural imbalances. The promotion of food security requires: a) increasing the purchasing power of the poor, and b) raising the overall level of food production in third World. In the developing world, agricultural production must be stimulated through cost decreasing technologies change. Food transfers from the structurally food deficient nations must be achieved through mechanisms which boost the purchasing power of the poor, while also increasing the incentives to raise agricultural and food production over the long run.

Mia and Parveen (1992) found that average homestead farm income was Tk. 18,160 out of which products valued Tk. 11,050 (60.85%) were consumed by the household members and the rest (39.15%) were sold which valued TK. 7,110. Among the different sectors, vegetables, fruits, and poultry and goat contributed 13.93%, 35.19% and 50.88% respectively of the total homestead farm income.

Mlambo (1988) found that food security has a chronic as well as transitory dimension. Chronic food insecurity is a problem which affects households that chronically lack sufficient purchasing power. Transitory food insecurity on the other hand, is a problem that concerns fluctuations in household income food consumption and the unavailability of food at national as well as village level.

Murshidul, et al., (1994) studied about the implementation of homestead vegetable production through farming system perspective at the grass root levels. Extension agents at the village level play an important role for the development and implementation of homestead vegetable production (HVP). The HHVP is a vital sector that would satisfy our nutritional requirement.

Phillips (1991) stated that there are a number of commonly recognized features of food security. One, food insecurity is a problem ultimately faced by individuals, although food security is commonly defined in terms of household or nation. Two, household and national

level food insecurity is generally seen as result of lack of actual food supplies or lack of access to acquire food supplies. Three, it is commonly agreed that incidence of food insecurity differ in both frequency and intensity. The frequency of food insecurity is often defined as transitory, chronic or seasonal in nature. The intensity of food insecurity is often defined as a lack of overall food quantity or insufficiencies of particular nutrients. Food insecurity is recognized as a result of manmade and natural phenomenon and is increasingly being recognized as a dynamic concept that affects all segments of the population equally.

Phillips and Taylor (1990) stated that a state of food insecurity exists when members of a household have an inadequate diet, during part or all of the year, or face the possibility of having an inadequate diet in future. States of food insecurity maybe defined in terms of types of food insecurity (e.g. temporary, cyclical, chronic), levels of food insecurity (e.g. dietary intake as a percentage of an acceptable standard), or a combination of both. Food insecurity results from an unfavorable balance between risk and insurance.

Reardon and Malton (1989) found that food insecurity in a farm household as the consumption of less than 80 percent of what the World Health Organization (WHO) considers to be an average required daily caloric intake of 2,850 kilocalories (Kcals) for a moderately active adult equivalent. This includes households that consume less than 2,280 Kcals per adult equivalent (AE) per day. We define a household to have chronic food insecurity when consumption during two or more seasons is inadequate, particularly if consumption is deficient during the cropping season. Households that are chronically food insecure constitute the highest risk group and for policy purposes might be considered a primary target group for aid.

Rebeka (1994) studied about economic aspects of homestead enterprises in some selected areas of Jessore district. The study estimated total cost of production of vegetables produced in homestead area was Tk. 1226.44 while gross and net return per household was Tk. 1753.83 and 52639 respectively.

Reutlinger (1977) stated that the probability of food grain consumption in developing countries falling below a desired level due to a fixed upper limit on the food import bill they can afford and an unfavorable combination f poor harvests and world food grain prices.

Reutlinger (1987) stated that food insecurity is the lack of access to sufficient food and can be either chronic or transitory. Chronic food insecurity is a continuously inadequate diet resulting from the lack of resources to produce or acquire food. Transitory food insecurity, however, is a temporary decline in a household's access to enough food. It results from instability in food production and prices or in household incomes. The worst form of transitory food insecurity is famine.

Rukuni and Bernsten (1988) stated that food insecurity has both short run and long run dimensions. Short run food insecurity results from intra and inter-seasonal shortfalls in food supplies and effective demand for food. Long run food insecurity arises from a persistent failure of the economy to assure stable, long run growth in food supplies especially for nutritionally at risk groups as population increases and consumer demands change as a consequence of income growth and urbanization.

Safilios, et al., (1989) reported that household production was in the hands of women. The major tasks and decisions regarding homestead crops and spices were the responsibility of the women in all except the large farm households.

Shalaby 1991) revealed that women engaged in gardening to supplement incomes and to provide food for the family. Almost 30% of the farmers did not buy vegetables from the market and claimed to be totally sufficient in these products.

Solari, *et al*., (1991) gardening provides a diversity of fresh foods that improve the quantity and quality of nutrients available to the family. Households with gardens typically obtain from them more than 50 percent of their supply of vegetables and fruits, medicinal plants and herbs; those households having garden systems that include animal raising also obtain their primary and often only source of animal protein.

Swift and Gray (1989) found that an analysis is made of food insecurity according to three interrelating components: production, exchange and assets, emphasizing the recent recognition of the role of assets in determining food security. A distinction is drawn between "chronic" and "acute" food insecurity.

Tylor (1991) stated that food insecurity is a state that exists when members of a household have an inadequate diet, during part or all of the year, or face the possibility of having an inadequate diet in the future.

Tullis and Hollist (1989) stated that food insecurity is domestic and international vulnerability to shifts in food and agricultural production and exchange practices; the insecurity that could result from international food shortfall or boycott. Some governments found that “cheap food” seemed less desirable than secure food and the political tranquility that such security implied.

United Nations (1990) stated that the distinction between chronic and transitory states of food insecurity is necessary to keep in mind. The latter may be triggered by seasonal fluctuations in food availability, food prices or incomes, which themselves may result in seasonal fluctuations in individual nutritional status. While not serious as chronic food insecurity, it is nevertheless important, particularly as it may precipitate the chronic condition.

Valdes and Konandreas (1981) found that food insecurity in developing countries is the uncertain ability to finance needed imports to meet immediate targets for consumption levels. There are to main causes of food insecurity: shortfalls in domestic production and sudden fluctuations in the prices of food imports and national food or non food exports.

2.3 The Conceptual Framework of the Study

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while framing the structural arrangement for the dependent and independent variables. This study expected that reduction of food insecurity through homestead vegetable production might be influenced by selected characteristics of the farmers. In view about discussion and prime findings of review of literature, the researcher constructed a conceptual framework of the study which is self explanatory and is presented in figure 2.1.

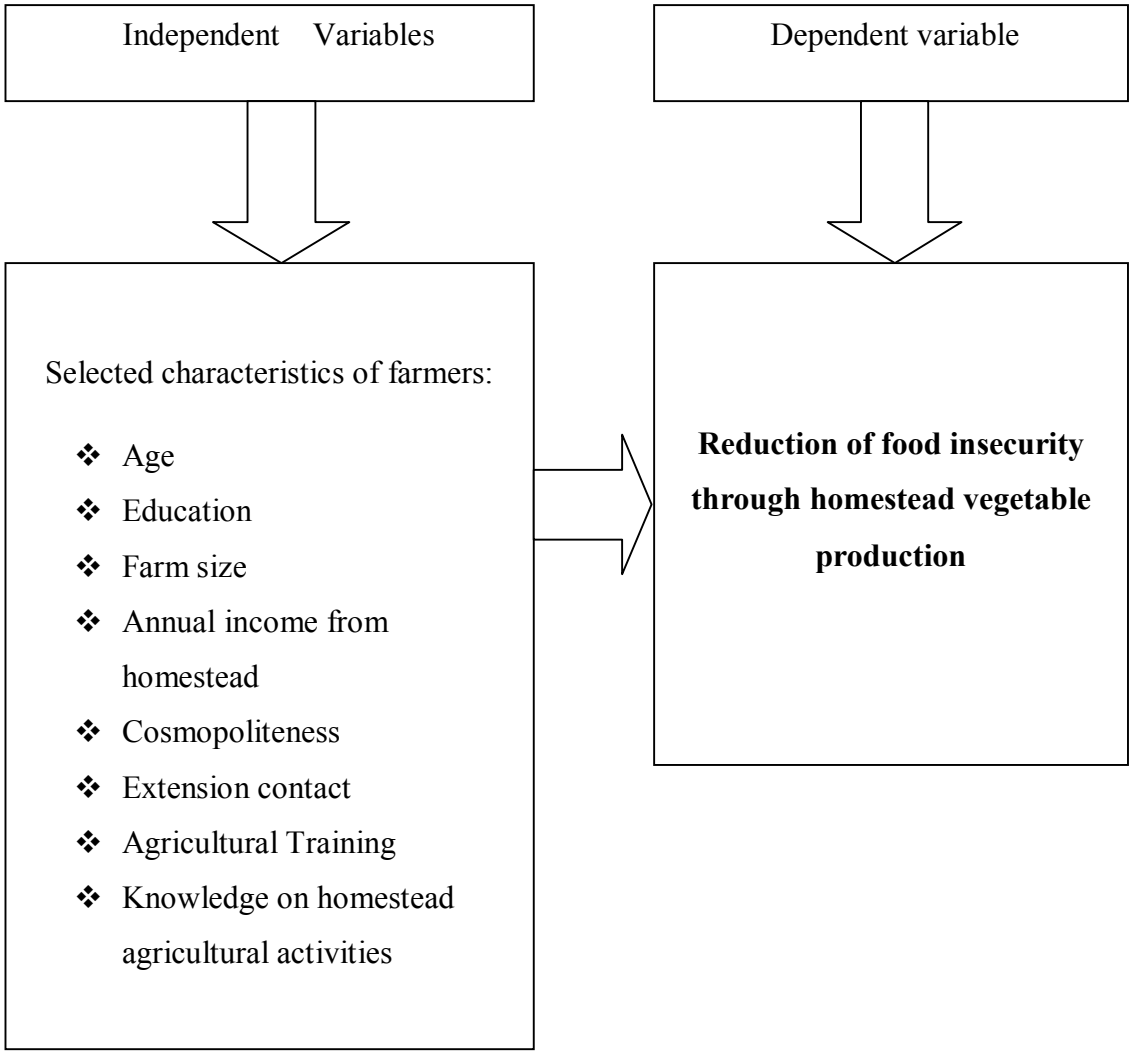

Figure 2.1: Conceptual framework of the study

CHAPTER 3

METHODOLOGY

A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 Research Design

A research design is a detailed plan of investigation. It is the blue print of the detailed procedure of testing the hypothesis and analysis of the obtained data. The research design followed in this study was ex-post factor, because of uncontrollable and non-manipulating variables. This study is descriptive and diagnostic research design.

3.2 Locale of the Study

The supported area Bhaluka, Gaforgaon and Trishal upazilla of Mymensingh district were selected as locale of the study. A map of Mymensingh district showing the study area has been presented in Figure 3.1

3.3 Population and Sampling

A list of the home gardening demonstration farmers of the study area was prepared with the help of Upazila Agricultural Officers (UAO) of the area. All the listed demonstration farmers constituted the population of the study. Three upazillas were selected randomly from the study area. There were 2099 farm families who practiced homestead agricultural activities in these three upazillas. These families constituted the population of the study. Among them one hundred farmers were selected randomly as sample of the study by using random selection method taking 5% of the population.

Table 3.1: Distribution of population and sample of the selected upazillas with Reserve List

Upazillas	Population (Farm Families)	Sample size	Reserved list
Bhaluka	787	38	4
Gaforgaon	678	32	3
Trishal	634	30	3
Total	2099	100	10

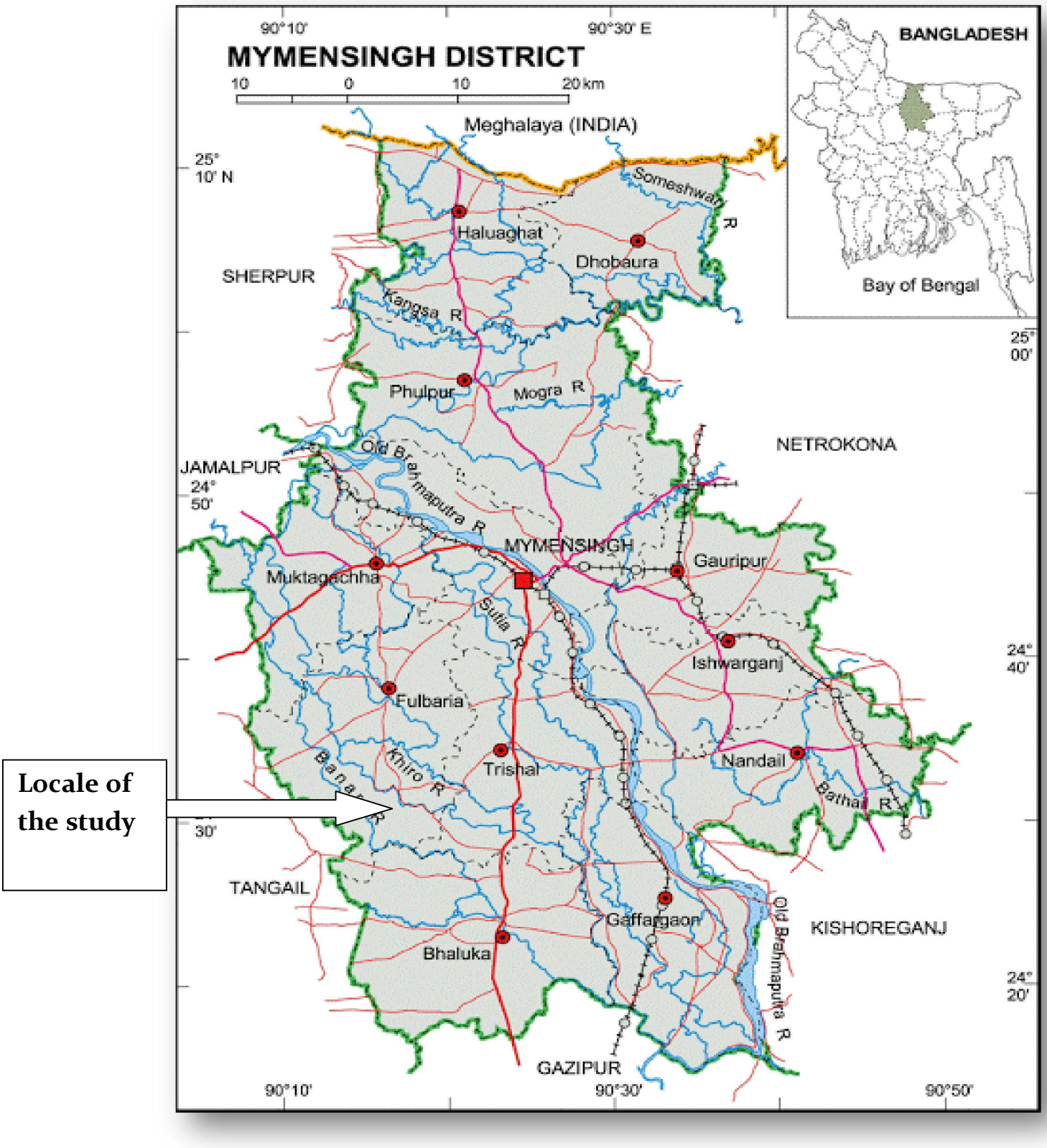

Figure 3.1: Location of the study showing Bhaluka, Gaffargaon and Trishal upazilla of Mymensingh district

3.4 Instrument of Data Collection

In order to collect reliable and valid information from the home gardening demonstration farmers an interview schedule was prepared carefully keeping the objective of the study in mind. The interview schedule contained both open and closed form questions. Appropriate scales were also developed to operationalize the selected characteristics of the home gardening demonstration farmers. The draft interview schedule was prepared and pre-tested. On the basis of pretest result and suggestions of advisory committee correction, modification and necessary adjustments were done in the interview schedule. The interview schedule has included in *Appendix-1*.

3.5 Variables and Their Measurement

This section contains procedures of measurement of the dependent and independent variables of the study.

3.5.1 Measurement of independent variables

The independent variables of the study were age, education, farm size, annual income, cosmopoliteness, extension contact, Agricultural training, Knowledge on homestead agricultural activities.

3.5.1.1 Age

Age of a respondent was measured in terms of years from birth to the time of the interview, which was found on the basis of his response. A unit score was assigned for each year of age. This variable appears in item no.1 in the interview schedule as presented in *Appendix-1*.

3.5.1.2 Education

Education was measured in terms of one's year of schooling. Score 1 was given for passing each year in the educational institution. For example, if a respondent passed the SSC examination, his educational score was given as 10. This variable appears in item no.2 in the interview schedule as presented in *Appendix-1*.

3.5.1.3 Farm size

The farm size of a respondent was measured in hectares using the following formula:

$$FS = A_1 + A_2 + {}^1/_2 (A_3 + A_4) + A_5 + A_6$$

Where, FS= Farm Size

A_1= Homestead area including garden and pond

A_2= Own land for own cultivation

A_3= Cropped area taken from others on half shared basis

A_4= Cropped area given to others on half shared basis

A_5= Land taken from others on lease

A_6= Land given to others on lease

The data were first recorded in terms of local unit i.e. "bigha" and then converted to hectare. This variable appears in item no. 3 in the interview schedule as presented in *Appendix-1*

3.5.1.4 Annual income from homestead

Annual income of a respondent was measured in taka on the basis of his total yearly earning from different sources of homestead (e.g. agricultural, nonagricultural, homestead vegetable and others) in last year. This variable appears in item no. 4 in the interview schedule as presented in *Appendix-1*.

3.5.1.5 Cosmopoliteness

Cosmopoliteness of a respondent refers to his frequency of movement to a distant place from his village. This variable appears in item no. 5 in the interview schedule as presented in *Appendix-1*.

3.5.1.6 Extension contact

Communication exposure of a respondent was measured by the frequency of contact made by him to selected media as shown in the question no.6 in the interview schedule as

presented in Appendix-*1*. A four point rating scale was used to measure the frequency of visit made by a respondent. Each respondent was asked to mention the frequency of different media contact such as frequently, occasionally, rarely and not at all. Weights were assigned as 3, 2, 1 and 0 respectively. Communication exposure score of a respondent was computed by summing up all the scores for seventeen different media/sources. Thus the score of each respondent could range from 0 to 51, where 0 indicating no communication exposure and 51 high communication exposure.

3.5.1.7 Agricultural training received

Agricultural training score of a respondent was measured by the number of days that a respondent had received agricultural training in his entire life. It was indicated by the total number of days of receiving agricultural training by a respondent under different training programs. Data obtained in response to item no.7 of the interview schedule were used to obtain agricultural training score of a respondent.

3.5.1.8 Knowledge on homestead agricultural activities

According to Naher (2000), knowledge on homestead agricultural activities of the farmers was measured in score by asking 15 selected questions related to various activities related to homestead agriculture. A full score 1(one) was assigned for each correct answer and 0 (zero) score was assigned for the wrong answer. Therefore, for correct responses to all the questions a respondent could get a total score of '15', while for wrong responses to all the questions. A respondent could get '0'. However, the knowledge scores of the respondents were computed by adding his scores for all the 15 items. Thus, the knowledge score could range from '0' to '15', where '0'(zero) indicates 'no knowledge on homestead agricultural activities' and 'high knowledge on homestead agricultural activities'. This variable appears in item no. 8 in the interview schedule as presented in *Appendix-1*.

3.5.2 Measurement of dependent variable

As stated earlier, the dependent variable of this study was 'reduction of food insecurity through homestead vegetable production'. Household food insecurity expressed the economic, physical and social limited accessibility, unavailability and non sustainability of the dietary needs of the individual of rural families (FAO, 2002).

To measure the reduction of food insecurity in four selected activities.

Four activities are-

1) Vegetables are grown in homestead
2) Vegetables are consumed from homestead
3) Vegetables are sold in market
4) Vegetables are stored for future use.

Five point rating scale was used to determine reduction of food insecurity. It was measured by asking their opinion on 20 selected questions. For each question score of four (4), three (3), two (2), one (1) and zero (0) was assigned to indicate extent of food insecurity as 'Regularly', 'Rarely', 'Occasionally', 'Often' and 'Never', respectively (FANTA, 2005). These five options for each question were defined to each difficulty considering the situation, rationally and result of pre-test. For each of the question associated with household food insecurity was determined by summing up the scores obtained by himself for the twenty (20) concerned questions, while the overall food insecurity of a respondent was computed by adding together the scores. The possible range of reduction of food insecurity score could be zero (0) to eighty (80), a total zero

(0) indicated household food insecurity never reduced while a score of eighty (80) indicated mostly reduced. Weight was assigned for reduction of food insecurity questions in the following manner:

Reduction of food insecurity	**Weighting system**
Mostly	4
Rarely	3
Occasionally	2
Often	1
Never	0

This variable appears in item no. 9 in the interview schedule as presented in Appendix-*1*.

3.6 Measurement of Problem Confrontation Index (PCI) in Reducing Food Insecurity through Homestead Vegetable Production

Reduction of food insecurity through homestead vegetable production was measured by asking farmers' opinion on 10 selected problems. A five point rating scale was used for computing the problem score of the respondent. To reduce food insecurity through homestead vegetable production was measured by asking their opinion on ten selected problems. For each problem score of four (4), three (3), two (2), one (1) and zero (0) was assigned to indicate extent of problem as 'very high problem', 'high problem', 'moderate problem', 'low problem' and 'no problem at all'.

To measure Problem Confrontation Index (PCI), the following 10 (ten) items were selected:

i. Lack of irrigation water
ii. Insufficiency of credit
iii. Lack of capital or fund
iv. Lack of quality seed
v. Poor quality of training system
vi. Lack of storage facility
vii. Risk of natural calamities(e.g. Flood, cyclone)
viii. Pest infestation in agricultural production
ix. Lack of technical knowledge
x. Non Co-operative activities among family member

The Problem Confrontation Index (PCI) for each problem was computed by using the following formula:

$$\mathbf{PCI = (P_{vh}\times 4) + (P_h\times 3) + (P_m\times 2) + (P_l\times 1) + (P_n\times 0)}$$

Where,

P_{vh} = Percentage of farmers who confronted very high problem

P_h = Percentage of farmers who confronted high problem

P_m = Percentage of farmers who confronted moderate problem

P_l = Percentage of farmers who confronted low problem

P_n = Percentage of farmers who confronted no problem at all

To determine comparative importance of those ten problems, PCI was computed for each of the ten problems by summing up the scores of all the respondents. Problem Confrontation Index (PCI) could range from '0' to '400', where '0' indicated 'no problem confrontation' and '400' indicated 'high problem confrontation'. This variable appears in item no. 11 in the interview schedule as presented in *Appendix-1*.

3.7 Collection of Data

The researcher himself collected data from the sample farmers through the personal interview during October 20 to November 20, 2015. Before starting collection of data; the researcher met the respective Upazila Agricultural Extension Officers (UAO), Additional Agricultural Officers (AAO), Agricultural Extension Officers (AEO), Field Monitoring Officers (FMO) and the concerned SAAOs. The researcher also discussed the objectives of the present study with the respondents and DAE personnel and request them to provide actual information. The researcher established desired rapport with the respondents so that they did not feel hesitate at the time of interview. However, if any respondents failed to understand any question, the researcher took necessary care to explain the issue as far as possible.

3.8 Data Processing and Analysis

After completion of the field survey the collected data recorded in the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Qualitative data were converted to quantitative equivalent by means of suitable scoring technique and local units were converted into standard units. The responses of the respondents contained in the interview schedule were transferred to a master sheet in order to facilitate entering data into the computer. Data were analyzed by using software named SPSS.

The statistical measures such as number, percentage, mean, standard deviation use describing the variables. Mean and standard deviation were used in describing the independent and dependent variables of the study. For exploring the relationship between selected characteristics of the respondents and their reduction of food insecurity through homestead vegetable gardening Pearson's Product Moment Correlation Coefficient (r) was computed.

Throughout the study, 5% level of significant was used for rejecting or accepting null hypothesis. If the computed value of (r) was equal to or greater than the table value of (r) at the designated level of significance for the relevant degree of freedom, the null hypothesis was rejected and it was concluded that there was significant relationship between the concerned variable. Whenever the computed value of (r) was found to be smaller than the tabulated value of (r) at the designated level of significance for the relevant degrees of freedom, the null hypothesis could not be rejected. Hence, it was concluded that there was no relationship between the concerned variables.

CHAPTER 4

RESULTS AND DISCUSSION

The findings of the study and discussion of the results are presented in this chapter. These are discussed separately as per the objective of the study in the following manner.

4.1 Socio-demographic Profile of the Respondents

Behavior of an individual is determined to a large extent by his personal characteristics. There were various characteristics of the farmers that might have consequence to reduce food insecurity through homestead vegetable production. But in this study, eight characteristics if they were selected as independent variables, which include their age, education, farm size, area under homestead, extension contact, annual income from homestead, cosmopoliteness, extension contact, agricultural training, knowledge on homestead agricultural activities. The salient features of the different characteristics of the respondents have been presented in table 4.1. These characteristics were discussed under the following sub-headings.

Table 4.1: Salient features of the selected characteristics of the sample farmers

Characteristics (measuring unit)	Range		Mean	Standard Deviation
	Possible	Observed		
Age (years)	Unknown	19-55	37.02	10.45
Education (years of schooling)	Unknown	0-12	4.16	4.26
Farm size (ha)	Unknown	0.02-4.92	0.78	0.911
Annual income (‘000’ Tk.)	Unknown	8.50-342.00	96.15	41.85
Cosmopoliteness (Scores)	0-15	0-9	5.1	2.82
Extension contact (Scores)	0-36	1-21	8.09	5.15
Agricultural training received (scores)	Unknown	0-15	2.51	3.17
Knowledge on homestead agricultural activities (scores)	0-15	5-13	8.58	3.08

4.2 Selected Characteristics of the Farmers

Behavior of an individual is determined to a large extent by his personal characteristics which were identified for investigation in this study. The characteristics were discussed under the following sub-heads.

4.2.1 Age

The farmers' age ranged from 19 to 55 years having an average of 37.02 and a standard deviation of 10.45. For the analysis purpose, age of the respondent was broken into three categories according to Roy (1997): "young" (up to 35 years), "middle aged" (36-50 years) and "old" (above 50 years). The distribution of the farmers according to their age is shown in Table 4.1.

Table 4.2 Distribution of the farmers according to their age

Categories (years)	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
Young (up to 35)	44	44	37.02	10.45
Middle aged (36-50)	46	46		
Old (above 50)	10	10		
Total	100	100		

The finding indicated that a large proportion (46 percent) of the farmers were middle aged compared to 44 and 10 percent being young and old respectively. The age of an individual is an important social factor in many aspects. It is one of the most imperative factors pertaining to one's personality make up. It is a norm in most traditional cultures that people respect the elder people, seek advice from them and obey their decision. The elders are important as they have long experience in many spheres of life.

4.2.2 Education

The observed education scores of the farmers ranged from 0 to 12 having an average of 3.42 and the standard deviation was 3.63. On the basis of their schooling years or education scores, the farmers were classified into five categories, namely "illiterate" (0), "can sign only" (0.5), "primary level" (1-5), "secondary level" (6-10) and "above secondary level" (above 10). The distribution of the respondent according to their level of education is shown in Table 4.3.

Table 4.3 Distribution of the farmers according to education

Categories (Schooling years)	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
Illiterate (0)	45	45	4.16	4.26
Can sign only (0.5)	0	0		
Primary level (1-5 class)	28	28		
Secondary level (6-10 class)	24	24		
Above secondary level (above 10 class)	3	3		
Total	100	100		

The finding showed that the majority (45 percent) of the farmers had no education at all. On the other hand, among the farmers 0 percent had can sign only, 28 percent had primary education, 24 percent had secondary level and 3 percent above secondary level having an average of 4.16 and standard deviation was 4.26. The percent of illiterate farmers is so high because of the farmers are not conscious of their education.

4.2.3 Farm size

The observed farm size scores of farmers varied from .02 hectare to 4.92 hectares. The average farm size was 0.78 hectares and the standard deviation was 0.91. The farmers were classified into the following for categories based on their farm size scores: "marginal farm size (up to 0.5), "small farm size" (0.51-1.00) and "medium farm size" (1.01-2.00) and "large farm size" (above 2.00 ha). The distribution of the farmers according to their farm size is shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their farm size

Categories (Hectare)	Respondent farmers N=100		Mean	Standard Deviation
	Number	Percentage		
Marginal (up to 0.5)	57	57	0.78	0.91
Small (0.51-1.00)	18	18		
Medium (1.01-2.00)	17	17		
Large (above 2.00)	8	8		
Total	100	100		

The finding showed that 57 percent of the farmers possessed marginal farm size compared to 18, 17 and 8 percent of them having small and medium and large farm size respectively. The average farm size of the farmers was 0.78 hectare which is a little bit lower than the national average farm size which is equivalent to 0.80 hectare (BBS, 2010) This indicates that the farm size levels of the farmers in the study area were like a typical agricultural farming community of Bangladesh. Most of the farmers having marginal farm size so their income is comparatively lower.

4.2.4 Annual family income

Annual family income from homestead source of the respondents was measured in 'thousand taka' per year. In the present study it ranged from 8.50 to 342.00 thousand taka with an average of 96.15 thousand taka with a standard deviation of 41.85.The respondents were grouped into three categories depending on the annual income from homestead vegetable: "low income" (up to 100 thousand taka), "medium income" (101-200 thousand taka) and "high income" (above 200 thousand taka). The distribution of the farmers according to their family income is shown in Table 4.5.

Table 4.5 Distribution of the farmers according to annual family income

Categories ('000' taka)	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
Low income (upto100 thousand taka)	85	85	96.15	41.85
Medium income(100-200 thousand taka)	10	10		
High income (above 200 thousand taka)	5	5		
Total	100	100		

Data presented in the Table 4.5 showed that 85 percent of the respondents farmers belonged to low income from homestead, while 10 percent had medium income and 5 percent had high income from homestead vegetable gardening.

4.2.5 Cosmopoliteness

The observed cosmopoliteness scores of the farmers ranged from 0 to 9 with an average of 5.1 and a standard deviation of 2.82 against the possible range of 0 to 15. On the basis of

their cosmopoliteness scores, the farmers were classified into four categories: "no cosmopoliteness" (0), "low cosmopoliteness" (1-3), "medium cosmopoliteness" (4-6) and "high cosmopoliteness" (above 6). The distribution of the farmers according to their cosmopoliteness is shown in Table 4.6.

Table 4.6 Distribution of farmers according to cosmopoliteness

Categories (scores)	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
No cosmopoliteness (0)	2	2	5.1	2.82
Low cosmopoliteness (1-3)	26	26		
Medium cosmopoliteness (4 6)	61	61		
High cosmopoliteness (above 6)	11	11		
Total	100	100		

The finding showed that the majority (61 percent) of the farmers had medium cosmopoliteness compared to 26 ad 11 percent having low and high cosmopoliteness respectively. On the other hand, 2 percent of the farmers had no cosmopoliteness. Rather, only 2% have no cosmopoliteness, on the other hand 98% are cosmopolite with varying degrees. So, it proves the farmers of this are progressive.

4.2.6 Extension contact

The observed overall communication exposure scores of the farmers based on extension contact ranged from 1 to 21 against the possible range of 0 to 36 having an average being 8.09 with a standard deviation of 5.15. Based on the extension contact scores, the farmers were classified into three categories according to Huda (2006): "low extension contact" (up to 7), "medium extension contact" (8-14) and "high extension contact" (above 14). The distribution of the farmers according to their extension contact scores is shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their extension contact

Categories (scores)	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
Low extension contact (up to 7)	60	60	8.09	5.15
Medium extension contact (8-14)	32	32		
High extension contact(above 14)	8	8		
Total	100	100		

As indicated in Table 4.7 most of the farmers had low (60 percent) extension contact followed by medium (32 percent) and high (8 percent) extension contact respectively. Findings revealed that 60 percent of the farmers had low extension contact which demands for strengthening and improving the communication strategy. Low extension contact might be the reason that some farmer may think that they have enough knowledge about production technologies; they need not contact with extension personnel. They need only production input (seed, fertilizer, pesticide etc.) Therefore, the extension service organizations should increase the contact.

4.2.7 Agricultural training received

The observed agricultural training scores of the farmers ranged from 0 to 15 having an average of 2.51 and a standard deviation of 3.17. On the basis of their agricultural training scores, the farmers were classified into four categories: “no training” (0), “low training” (up to 5), “medium training” (6-10) and “high training” (above 10). The distribution of the farmers according to their agricultural training scores is shown in Table 4.8.

Table 4.8 Distribution of farmers according to agricultural training received

Categories (days)	Respondents farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
No training (0)	46	46	2.51	3.17
Low training (up to 5)	38	38		
Medium training (6-10)	12	12		
High training (above 10)	4	4		
Total	100	100		

The finding revealed that 46 percent of farmers had no agricultural training. On the other hand, 38 percent of the farmers had low training compared to 12 and 4 percent having

medium and high training respectively. So, there is a need to train up the farmers for different agricultural activities. Lack of proper training and illiteracy is responsible for extension contact.

4.2.8 Knowledge on homestead agricultural activities

The Knowledge on homestead agricultural activities scores of the farmers ranged from 5 to 13 having an average of 8.58 and a standard deviation of 3.08 against the possible range of 0-15. Based on the knowledge on homestead agricultural activities scores, the farmers were classified into the following three categories: "low knowledge" (up to 7), "medium knowledge" (8 to 10) and "high knowledge" (above 10). The distribution of the farmers according to their knowledge on homestead agricultural activities is shown in Table 4.9.

Table 4.9 Distribution of farmers according to knowledge on homestead agricultural activities

Categories (scores)	Respondent farmers N=100		Mean	Standard Deviation
	Number	Percentage		
Low knowledge (up to 7)	23	23	8.58	3.08
Medium knowledge (8-10)	62	62		
High knowledge (above 10)	15	15		
Total	100	100		

The findings indicated that the highest proportion (62 percent) of the farmers had medium knowledge on homestead agricultural activities compared to 23 and 15 percent having low knowledge and high knowledge on homestead agricultural activities respectively. Therefore, it can be assumed that majority of the farmers of the study area showed interest to participate in homestead agriculture.

4.3 Reduction of Food Insecurity through Homestead Vegetable Production

As stated earlier, the dependent variable of this study was 'reduction of food insecurity through homestead vegetable production'. Direct survey measures level of food insecurity through a series of questions designed to identify whether household members experienced reductions in the quantity or quality of food over a specific period of time as a result of their lack of access to food or resources to obtain food. The observed score of reduction of food insecurity through homestead vegetable production ranged from 10 to 52 having an

average of 30.16 with a standard deviation 7.22 against the possible range of 0 to 80. On the basis of food insecurity condition of farmers, the respondents were categorized into four classes namely "low food insecure" (up to 24), "moderately food insecure" (25-38) and "highly food insecure" (above38). According to the observed value of food insecurity of the respondents in the study area, majority (73 percent) of the respondent positioned in the moderately food insecure condition, 20 percent to be found in the low food insecure condition, only 7 percent were in highly food insecure condition. The distribution of farmers according to food insecurity condition is shown in Table 4.11.

Table 4.11: Reduction of food insecurity through homestead vegetable production

Categories	Respondent farmers (N=100)		Mean	Standard Deviation
	Number	Percentage		
Low food insecure (up to 24)	7	7	34.5	6.97
Moderate food insecure (25-38)	73	73		
High food insecure (above 38)	20	20		
Total	100	100		

4.4 Relationship between the Characteristics of Farmers and Reduction of Food Insecurity through Homestead Vegetable Production

Coefficient of correlation was computed in order to explore the relationship between the selected characteristics of farmers and reduction of food insecurity through homestead vegetable production. The selected characteristics of farmers constituted independent variables and reduction of food insecurity through homestead vegetable production constituted the dependent variables of the study.

In this section relationship between nine selected characteristics (independent variables) of the farmers viz, age, education, farm size, family income, cosmopoliteness, extension contact, agricultural training, knowledge on homestead agricultural activities, awareness on food and nutrition and dependent variable i.e. reduction of food insecurity through homestead vegetable production have been described.

Pearson's Product Moment Co-efficient of Correlation (r) has been used to test the hypothesis concerning the relationship between two variables. Five percent and one percent level of probability were used as the basis for rejection of a hypothesis. The table value of 'r' was calculated at (100-2) = 98 degrees of freedom. The summery of the results of the

co-efficient of correlation indicating the relationships between the selected characteristics of the respondents and reduction of food insecurity through homestead vegetable production is shown in Table 4.12

Table 4.12 Results of Correlation coefficient showing Relationship between each of the selected characteristics of the farmers and reduction of food insecurity through homestead vegetable production

	Selected characteristics of farmers	Observed Correlation coefficient value (r) with 98 d.f	Table Value	
			at 0.05 level	at 0.01 level
Reduction of food insecurity through homestead vegetable production	Age	0.112^{NS}	0.196	0.256
	Education	0.059^{NS}		
	Farm size	0.409**		
	Family income	0.413**		
	Cosmopoliteness	0.317**		
	Extension contact	0.481**		
	Agricultural Training	0.224**		
	Knowledge on homestead agriculture	0.368**		

^{NS} = Not significant

*= Significant at 0.05 level of probability

** = Significant at 0.01 level of probability

4.4.1 Relationship between farm size of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between farm size of the farmers and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between farm size of the farmers and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between farm size of the farmers and reduction of food insecurity through homestead vegetable production was found to be

0.409** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the observed co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.409) was greater than the table value (0. 256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the farm size had significant positive relationship with reduction of food insecurity through homestead vegetable production. Small land for farming create problem for farmers in adopting different farming practices. Greater land areas obviously facilitated to practice more number and quantity of farming practices. Therefore, as the farm size of the respondent increased, the food insecurity decreased.

4.4.2 Relationship between family income of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between family income of the farmers and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between family income of the farmers and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between family income of the respondents and reduction of food insecurity through homestead vegetable production was found to be 0.413** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.413) was greater than the table value (0. 256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.

- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the family income had significant positive relationship with reduction of food insecurity through homestead vegetable production. Higher annual family income of farmers makes them more courageous to adopt diversified farming technology and farming enterprises. Moreover, they can meet up the family needs at the expense of their income.

4.4 3 Relationship between cosmopoliteness of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between cosmopoliteness of the respondents and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between cosmopoliteness of the respondents and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between cosmopoliteness of the farmers and reduction of food insecurity through homestead vegetable production was found to be 0.317** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.317) was greater than the table value (0. 256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the family income had significant positive relationship with reduction of food insecurity through homestead vegetable production. Findings as documented above implied that the farmers who are cosmopolite have more participation in homestead vegetable production. Movement outside one's periphery creates opportunity to meet with others, learn and see new innovations which ultimately change attitudes.

4.4.4 Relationship between extension contact of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between extension contact of the farmers and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between extension contact of the farmers and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between extension contact of the farmers and reduction of food insecurity through homestead vegetable production was found to be 0.481** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.481) was greater than the table value (0. 256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the family income had significant positive relationship with reduction of food insecurity through homestead vegetable production. Due to lack of high extension contact they were unknown to modern varieties of crops, livestock, fisheries and fruits. The people with lower extension contact were likely to have higher level of food insecurity status.

4.4.5 Relationship between agricultural training received of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between agricultural training of the farmers and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between agricultural training of the farmers and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between agricultural training of the farmers and reduction of food insecurity through homestead vegetable production was

found to be 0.224** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.224) was greater than the table value (0. 196) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the family income had significant positive relationship with reduction of food insecurity through homestead vegetable production. Agricultural training as observed from above findings had significant effect on reduction of food insecurity through homestead vegetable production.

4.4.6 Relationship between knowledge on homestead agricultural activities of the farmers and Reduction of food insecurity through homestead vegetable production

The relationship between knowledge on homestead agricultural activities of the farmers and reduction of food insecurity through homestead vegetable production was measured by testing the following null hypothesis;

"There is no relationship between knowledge on homestead agricultural activities of the farmers and reduction of food insecurity through homestead vegetable production".

Computed value of the co-efficient of correlation between knowledge on homestead agricultural activities of the farmers and reduction of food insecurity through homestead vegetable production was found to be 0.368** as shown in Table 4.11. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- The computed value of 'r' (0.368) was greater than the table value (0.256) with 98 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that the knowledge on homestead agricultural activities had significant positive relationship with reduction of food insecurity through homestead vegetable production. Due to lack of high knowledge on agriculture they were unknown to modern varieties of crops, livestock, fisheries and fruits. Lack of high technical knowledge they cannot buy higher quality seed, control insect or pest and preserve food for future. The people with lower knowledge on agriculture were likely to have higher level of food insecurity status.

4.5 Comparative Problem Confrontation of the Farmers in Reducing Food Insecurity through Homestead Vegetable Production

The Problem Confrontation Index (PCI) was calculated to find out major problems confronted by the farmers in reducing food insecurity through homestead vegetable production. The severity of problem confrontation of the respondents is shown in Table 4.13. Data furnished in the table indicate that the problem which ranked first was 'inadequate agricultural land' followed by second ranked 'insufficiency of credit' and third ranked 'Lack of capital or fund'. 'Non Co-operative activities among family members' was the least important problem in reducing food insecurity problem.

Table 4.13: Problem Confrontation Index (PCI) for selected 10 problems with rank order

SL NO.	Problems	Opinion on extent of problem					PCI	Rank order
		Very high	High	Moderate	Little	Not at all		
1.	Lack of irrigation water	56	18	12	7	7	309	1
2.	Insufficiency of credit	48	27	13	7	5	306	2
3.	Lack of capital or fund	24	56	10	7	3	291	3
4.	Lack of quality seed	44	29	7	13	7	290	4
5.	Poor quality of training system	32	26	30	10	2	276	5
6.	Lack of storage facility	34	26	22	13	5	271	6
7.	Risk of natural calamities(e.g. Flood, cyclone)	25	35	22	13	5	262	7
8.	Pest infestation in production	18	24	26	22	10	218	8
9.	Lack of technical knowledge	14	24	21	26	15	196	9
10.	Non Co-operative activities among family members	19	16	27	16	22	194	10

From Table 4.13 it was observed that-

Lack of irrigation water was the most crucial problem faced by the respondents in reducing food insecurity through homestead vegetable production. It is a real condition of the study area. In this study, reduction of food insecurity referred to extent of problem faced by respondents in achieving household food security in fourteen selected aspects. On the other hand, most of the people has not cannot get enough credit from credit providing institution according to their need. However, who take loan they cannot repay loan at proper time. As

a result, they become more poor to repay this loan. People do not have adequate capital or fund to invest in their farming activities for the satisfying their purpose. Respondents cannot collect quality seed for large production. Respondents do not get sufficient training opportunities to know how to operate different farming activities in a rational way. Other problems of the respondents of the study area were lack of shortage of irrigation water in dry season, lack of storage and processing facilities, flood or cyclone, insect and pest attack, lack of technical knowledge and non cooperative activities in conducting farm activities. Thus, the problems were complex and intermingled with one another.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

Homestead vegetable production is related with family vegetable consumption for food and nutrition of a respondent. Home gardening is especially important in overcoming food insecurity and promotes household self-sufficiency. Extent of vegetable cultivation is related with the socio-economic characteristics of the farmers. Farmers faced different problems in homestead vegetable gardening. Hence the major objective of the study was to determine the food security through homestead vegetable production.

5.1.1 Findings of individual characteristics of the farmers

The farmers ranged in age from 19 to 55 years and the average age was 37.02 years. The highest proportion 46 percent of the farmers was in middle-aged groups as compared to 10 percent who were old and 44 percent of the farmers were young. Educational scores ranged from no formal education to Secondary with an average of 4.16 years of them 45 percent had no education compared to 28 percent of the respondent had primary level education, 24 percent of the farmers had secondary level education and 3 percent had above secondary level education. The smallest farm size was 0.51-1.00 ha and the largest farm size was above 2.00 ha. The average size was 0.78. The highest proportion (57 percent) of the farmers was in marginal category group compared to 18 percent was in small group, 17 percent was in medium group and 8 percent of the farmers was in large group. The income from homestead of the respondents ranged from 8.50 to 342.00 thousand taka. Most of the farmers (85 percent) were in low income as compared to 10 percent were in medium income and 5 percent of farmers were in high income respectively. Majority (61 percent) of the farmers had medium cosmopoliteness compared to 26 percent and 11 percent having low and high cosmopoliteness. The computed scores of the farmers based on extension contact score of the respondents ranged from 1 to 21 and the mean score was 5.10. Most of the farmers had low (60 percent) extension contact followed by medium (32 percent) and high (8 percent) extension contact respectively. Majority (46 percent) of the farmers had no agricultural training. On the other hand, 38 percent of the respondents had low training compared to 12 percent and 4 percent having medium and high training respectively. The highest proportion (62 percent) of the farmers had medium knowledge on homestead

agriculture compared to 23 percent and 15 percent having poor and high knowledge agriculture respectively.

5.1.2 Findings related to reduction of food insecurity through homestead vegetable production

The highest proportions (73 percent) of farmers of the study area were moderately food insecured compared to 20 percent and 7 percent having low and high food insecured condition after vegetable cultivation.

5.1.3 Relationship between the selected characteristics of the respondents and reduction of food insecurity through homestead vegetable production

Correlation analysis indicated that seven, out of nine independent variables namely farm size, annual income, cosmopoliteness, extension contact, agricultural training, knowledge on homestead agriculture had significant positive relationship with reduction of food insecurity through homestead vegetable production. Other two variables namely, age and education had no significant relationship with reduction of food insecurity through homestead vegetable production.

5.1.4 Comparative Problem Confrontation of farmers in reducing food insecurity through homestead vegetable production

On the basis of descending order of Problem Confrontation Index (PCI), 'Inadequate agricultural land' ranked first followed by 'Insufficiency of credit', 'Lack of capital or fund', 'Lack of quality seed', 'Poor quality of training system', 'Lack of storage facility', 'Risk of natural calamities(e.g. Flood, cyclone)', 'Pest infestation in agricultural production', 'Lack of technical knowledge'. 'Non Co-operative activities among family members' ranked last.

5.2 Conclusions

A Conclusion may be looked upon as an inference based on the findings of empirical study, pertinent facts and unbiased judgments. Findings of the study and the logical interpretations of their meaning in light of other relevant facts prompted the researcher to draw the following conclusions:

1. The study indicated that most of the respondents of that area faced 73 percent food insecurity problem so respondents were able to reduce 73 percent food insecurity through producing homestead vegetables. To meet the ever growing demand for food and nutrition, there is a need for further enhancements of the rate of production of homestead vegetables.

2. The study indicates that majority of the respondents was middle aged and its relationship with their reduction of food insecurity through homestead production was not significant. It may be concluded that proper emphasis should be given on all age categories of respondents by extension workers in order to encourage vegetable production.

3. Education of the respondents had no significant relationship with their reduction of food insecurity through homestead vegetable production. According to this result we can draw a conclusion that high literacy rate does not have much influence in their reduction of food insecurity through homestead production. But, it was observed that 45 percent of respondents had no education. Though education does not direct effect on their reduction of food insecurity, but it can indirectly help them to become aware of the benefits of homestead agricultural activities. So, necessary steps should be taken to improve the education level of the respondents.

4. Farm size of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. The respondents having large farm are generally economically solvent and they always try to avoid labor intensive technology due to scarcity of labor. Majority of the respondents had marginal farms. So, it may be concluded that their reduction of food insecurity through homestead vegetable production among marginal farm size holder should be encouraged.

5. Finding of the study showed that annual income of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. It may be concluded that the availability of money is more essential to reduce financial hardships to considerable extent and to increase their reduction of food insecurity through homestead vegetable production.

6. Cosmopoliteness of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. Through cosmopoliteness a respondent becomes aware of the recent information on various aspects of vegetable production. Consequently, he becomes motivated to reduce food insecurity problem as though he is influenced by others. For this, field days, tours, fairs etc. should be arranged to increase cosmopoliteness among the respondents.

7. Finding of the study showed that extension contact of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. Extension contacts increase the outlook of the respondents which lead them to adopt new technologies related to homestead agriculture. It is evident that majority (60 percent) of the respondents had low extension contact. It may be concluded that further communication planning and implementation by the extension workers of Government Organizations and Non- Government Organizations with respondents through effective methods would lead to the multiplication of their vegetable production.

8. Agricultural training of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. The respondents having high training gained more knowledge on homestead agriculture and as a result, they adopt new technologies related to homestead agriculture very swiftly. It was observed that majority (46 percent) of the respondents had no agricultural training at all. Considering above facts, it may be concluded that the homestead vegetable production can be increased if more agricultural training is concluded for those respondents.

9. Findings showed that knowledge on homestead agricultural activities of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. Through this kind of knowledge a respondent becomes aware of the recent information on various aspects of modern agricultural activities related to homestead vegetable production. It was found that majority (62 percent) of the respondents had medium knowledge on homestead agricultural activities.

10. Findings showed that attitude towards homestead agriculture of the respondents had positive significant relationship with their reduction of food insecurity through homestead vegetable production. In that area of human behavior, it is important to know that the nature of human behavior is very complex and the personality with its high complex components manifests itself in different kinds of behavior. It is observed that majority (67 percent) of the respondents had moderately favorable attitude towards homestead agriculture. So, it may be concluded that favorable attitude towards homestead agriculture can lead the respondents to adopt more homestead agricultural activities.

5.3 Recommendations

5.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations could be made:

- Findings of the study indicate that inadequate land was the highest problem of the respondents in achieving household food security and maximum of them cultivate in a share basis. As extension agencies will not able to give them land but can easily train them up for modern agriculture by teaching them new agricultural technology and land tenure policy should be reformed by the government act and properly monitored in order to promote the decision making capacity and benefits from the sharecropping and leased farms by the respondents.
- Findings of the study indicate that lack of capital and insufficient credit is an obstacle in achieving food security. Therefore, farmers should be given the opportunity to acquire loans at low interest rates and create off farm activities for themselves to improve on their revenues and purchasing power, thereby reducing food insecurity.
- The unsatisfied dietary needs of the family members should be fulfilled in order to have healthy power. Government should take initiatives to overcome the household food insecurity by providing aid to poor and unemployed people.
- Farmers with good agricultural knowledge want to use improve agricultural practice for agricultural production. For this purpose the concern authority like extension services should facilitate the effective measures and proving improved agricultural technologies.

5.3.2 Recommendations for future study

The researcher conducted a small piece of study which could not make available all information for the proper understanding of the reduction of food insecurity. Therefore, the following recommendations could be made for further research works:

- The study was conducted in some selected areas. The study should be replicated other areas to get more realistic information.
- The study was undertaken to explore the relationships of only nine selected characteristics of respondents and food insecurity. Therefore, it could be recommended that further studies should be conducted with other independent and dependent variables.

- Training program should be strengthed to maximize the utilization of homestead area, upgrade technical knowledge on vegetable production, food processing and consumption more fresh vegetables to enrich their food.
- Aside from the existing vegetables cultivation of them potential vegetables such as green chili, carrot, onion, ginger, turmeric could be incorporated in the existing system.
- Homestead agriculture is an important source of nutrients that make diets for human beings more balanced and also a good earning source for the family. It is recommended that necessary steps should be taken to motivate them in homestead vegetable production.

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APPENDIX-1

AN ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Agricultural Extension & Information System

Sher-e-Bangla Agricultural University

Dhaka-1207

An interview schedule for a research study entitled

"Reduction of food insecurity through homestead vegetable production in Mymensingh district"

ADDRESS OF THE RESPONDENT

Name of the respondent……
Father's or Husband's name…….
Village……..
Union……
Thana/Upazila……
District……..

(Please answer the following questions. Provided information will be strictly kept confident)

1. Age

How old are you? ……Years

2. Education

Please mention your educational status:

a) Can't read and write……..
b) Can sign only ……..
c) Study up to Primary level……..
d) Study up to Secondary level…….
e) Study above Secondary level……

3. Farm size

Please indicate the area of land owned and homestead area by your family:

SL NO.	Types of Land Use	Area of Land	
		Local Unit	Hectare
a)	Homestead area including garden and pond		
b)	Land area under own cultivation		
c)	Land given to others on borga		
d)	Land taken from others on borga		
e)	Land given to others on lease		
f)	Land taken from others on lease		
	Total Farm size		

4. Annual Family Income

Please furnish the annual family income from different sources per year (including you):

SL NO.	Sources of Income	Total Income (Tk/Yr)
1.	From Agricultural Sources	
2.	From Non-Agricultural Sources	
3.	Homestead vegetable sources	
4.	Others	
	Total	

5. Cosmopoliteness

Please mention your extent of visit in the following places outside of your village.

SL no.	Places of visit	Extent of visit			
		Regularly (score-3)	Occasionally (score-2)	Rarely (score-1)	Never (score-0)
1.	Other village	9 or more times/month	5-8 times/month	1-4 times/month	0 (zero) time/month
2.	Upazila town	9 or more times/ 6months	5-8 times/ 6 months	1-4 times/ 6 month	0 (zero) time/6 months
3.	Own district town	9 or more times/year	5-8 times/year	1-4 times/year	0 (zero) time/year
4.	Other district town	6 or more times/year	3-5 times/year	1-2 times/year	0 (zero) time/year
5.	Capital city/divisional town	3 or more times/year	2 times/ year	Once/year	0 (zero) time/year

6. Extension contact

Please indicate your extent of contact with the following media.

a) Personal contact

SL no.	Places of visit	Extent of contact			
		Regularly (score-3)	**Occasionally (score-2)**	**Rarely (score-1)**	**Never (score-0)**
1.	Dealer of agricultural commodities	4 or more times/ month	3 times/ month	1-2 times/ month	0 time/ month
2.	Field worker of NGO	4 or more times/month	3 times/ month	1-2 times/ month	0 time/ month
3.	SAAO	6 or more times/month	4-5 times/ month	1-3 times/ month	0 time/ month
4.	Upazila Agriculture Officers (UAO/AAO/AEO)	3 or more times/ year	2 times/ year	1 time/ year	0 time/ year
5.	Other Extension Officers (Livestock, Fisheries etc.)	3 or more times/ year	2 times/ year	1 time/ year	0 time/ year

b) Group contact

SL no.	Places of visit	Extent of contact			
		Regularly (score-3)	**Occasionally (score-2)**	**Rarely (score-1)**	**Never (score-0)**
1.	Group discussion	10 or more times/ year	5-9 times/ year	1-4 times/ year	0 time/ year
2.	Field day	3 or more times/year	2 times/year	1 time/year	0 time/year
3.	Result discussion	3 or more times/year	2 times/year	1 time/year	0 time/year

c) Mass contact

SL no.	Places of visit	Extent of contact			
		Regularly (score-3)	**Occasionally (score-2)**	**Rarely (score-1)**	**Never (score-0)**
1.	Radio	3 or more times/ week	2 times/ week	1 time/ week	0 time/ week
2.	Television	3 or more times/ week	2 times/ week	1 time/ week	0 time/ week
3.	Newspaper related to agriculture	3 or more times/ week	2 times/ week	1 time/ week	0 time/ week
4.	Agricultural fair	3 or more times/year	2 times/ year	1 time/ year	0 time/ year

7. Agricultural training received

Please state your participation in training programs.

SL no.	Topics of training	Duration (Days)
1.	Irrigation on vegetable cultivation	
2.	Use of IPM on vegetable garden	
3.	Crop diversification program	

8. Knowledge on homestead agricultural activities

Please answer the following questions:

SL no.	Questions	Full marks	Marks obtained
1.	What do you understand by homestead agriculture? (a)Working in homestead area for earning money (score-1),(b)Any kind of work (score-0)	1	
2.	Do you think homestead is ideal for vegetable cultivation?(a)Yes, I do (score-1),(b)No, I don't (score-0)	1	
3.	What is the optimum time for sowing lady's finger? (a)April-May (score-1), (b)January-February (score-0)	1	
4.	What is the optimum time for planting tomato? (a)October-November (score-1), (b)March-April (score-0)	1	
5.	Name two organic fertilizers used in vegetable cultivation. (a) Cowdung & Rotten leaves (score-1), (b) Urea &Phosphate (score-0)	1	
6.	Name two trees which give food, fodder and fuel. (a) Mango tree &Jackfruit tree (score-1), (b) Sugarcane plant &Jute plant (score-0)	1	
7.	Name two vegetables which you cultivated in your homestead. (a)Bean and Amaranth (score-1), (b)Rice and wheat (score-0)	1	
8.	Name two diseases caused by lack of fruits and vegetables	1	
9.	Name two modern varieties of potato	1	
10.	Name two Vit 'A' enriched fruits	1	
11.	Name two Vit 'C' enriched fruits	1	
12.	Name two insecticides.	1	
13.	What kind of insect infest fruits?	1	
14.	Which kind of vegetables are suitable to grow in that area?	1	
15.	What is the optimum time for planting bottle gourd? (a)October-November (score-1), (b)March-April (score-0)	1	
Total =		15	

9. Reduction of food insecurity through homestead vegetable production

(a) Vegetables are grown in homestead

Food insecurity questions	Extent of problem				
	Mostly (Score-4)	**Rarely** (Score-3)	**Occasionally** (Score-2)	**Often** (Score-1)	**Never** (Score-0)
In the last month how often did you have to grow cabbage although you wanted to grow another vegetables?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
Did any pest attack in your vegetable garden in the time of planting?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
Did any harmful diseases attack in vegetables?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
Did you worry that you have no enough land for growing vegetables?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
In the last month how often did you have to use money that you needed to use for another purpose to buy seed?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month

(b)Vegetables are consumed from homestead

Food insecurity questions	Extent of problem				
	Mostly (Score-4)	**Rarely** (Score-3)	**Occasionally** (Score-2)	**Often** (Score-1)	**Never** (Score-0)
In the last month how often did you have to consume cabbage although you wanted to eat another vegetables?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
In the last month how often did you have to use money that you needed to use for another purpose to buy vegetables?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
In the last month how often did worry about where vegetable would come from?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
How often in the last month eat brinjal or red amaranth as part of an ordinary meal?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
Did you rely on only a few kinds of low cost food to feed your children because of a lack of money?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month

(c)Vegetables are sold in market

Food insecurity questions	Extent of problem				
	Mostly (Score-4)	**Rarely** (Score-3)	**Occasionally** (Score-2)	**Often** (Score-1)	**Never** (Score-0)
In the last month how often did you have to sell or mortgage your own things in order to buy vegetables?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
In the last month how often did you have to sell vegetables to your relatives or neighbors to make a meal?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
How much you did earn money last month by selling vegetable?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
How often you did sell vegetables in a month?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
Did you or your household sell vegetables as whole seller?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month

(d)Vegetables are stored for future use

Food insecurity questions	Extent of problem				
	Mostly (Score-4)	**Rarely** (Score-3)	**Occasionally** (Score-2)	**Often** (Score-1)	**Never** (Score-0)
In the last month how often did vegetables stored in your home?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
Were you able to store vegetable seed?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month
Did you worry that you don't have good storage condition?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
In the last month how often did storage pest attack vegetable seed?	15 days/ month	10 days/ month	4-9 days/ month	1-3 days/ month	0 days/ month
Did any vegetable destroy in time of storage?	10 days/ month	6-9 days/ month	3-5 days/ month	1-2 days/ month	0 days/ month

10. Problem Confrontation of the farmers in reducing food insecurity through homestead vegetable production

Please mention problems you usually faced in reducing food insecurity through homestead vegetable production.

SL No.	Problems	Opinion on extent of problem					Total
		Very high (score-4)	**High** (score-3)	**Moderate** (score-2)	**Low** (score-1)	**Not at all** (score-0)	
1	Lack of irrigation water						
2	Insufficiency of credit						
3	Lack of capital or fund						
4	Lack of quality seed						
5	Poor quality of training system						
6	Lack of storage facility						
7	Risk of natural calamities (e.g. Flood, cyclone)						
8	Pest infestation						
9	Lack of technical knowledge						
10	Non Co-operative activities among family members						

Date: Signature of the interviewer

APPENDIX-2: Correlation matrix among the variables of the study (N=100)

VARIABLE	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y
X1	1									
X2	-.103	1								
X3	.356**	.392**	1							
X4	.301**	.504**	.930**	1						
X5	.193NS	.208*	.435**	.410**	1					
X6	.184NS	.411**	.690**	.729**	.538**	1				
X7	.196NS	.320**	.334**	.391**	.246*	.375**	1			
X8	.019NS	.596**	.547**	.602**	.367**	.619**	.374**	1		
X9	.087NS	.610**	.627**	.630**	.496**	.669**	.392**	.750**	1	
Y	.112NS	.059NS	.409**	.413**	.317**	.481**	.224*	.368**	.259**	1

X1= Age

X2= Education

X3= Farm Size

X4= Annual Family Income

X5= Cosmopoliteness

X6= Extension Contact

X7= Training Received

X8= Knowledge On Homestead Agricultural Activities

Y= Reduction Of Food Insecurity Through Homestead Vegetable Production

** Significant at the 1% level of probability

* Significant at the 5% level of probability

NS =Correlation is not significant