

IMPACT OF FLOWER CULTIVATION ON FARMERS' LIVELIHOOD IN JHENAIDAH DISTRICT

IMRAN BIN ISLAM



**DEPARTMENT OF
AGRICULTURAL EXTENSION AND INFORMATION SYSTEM
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
SHER-E-BANGLA NAGAR, DHAKA-1207**

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**IMPACT OF FLOWER CULTIVATION ON FARMERS'
LIVELIHOOD IN JHENAIDAH DISTRICT**

BY

IMRAN BIN ISLAM

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SEMESTER: JANUARY - JUNE, 2016

Approved by

.....
(Md. Wali Ahad Setu)

Supervisor

Assistant Professor

Dept. of Agril. Ext. and Info. System
Sher-e-Bangla Agricultural University

.....
(Dr. Md. Sekender Ali)

Co-Supervisor

Professor

Dept. of Agril. Ext. and Info. System
Sher-e-Bangla Agricultural University

.....
(Md. Mahbubul Alam, Ph.D)

Associate Professor and Chairman

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



Department of Agricultural Extension and Information System

Sher-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh.

Memo No.: SAU/AEIS

Date: 30/06/2016

CERTIFICATE

This is to certify that the thesis entitled, **“IMPACT OF FLOWER CULTIVATION ON FARMERS’ LIVELIHOOD IN JHENAIDAH 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 (MS) in Agricultural Extension**, embodies the result of a piece of bona fide research work carried out by **Imran Bin Islam**, Registration No. 10-03865, under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or sources of information, as has been availed of during the course of investigation have been duly acknowledged.

Dated: June, 2016
Dhaka, Bangladesh

.....
(Md. Wali Ahad Setu)
Supervisor
Assistant Professor

Dept. of Agricultural Extension and Info. System
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka-1207.

DEDICATION

**DEDICATED TO MY BELOVED PARENTS AND
RESPECTED TEACHERS OF SHER-E-BANGLA
AGRICULTURAL UNIVERSITY**

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The Researcher

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ABBREVIATION AND GLOSSARY

Abbreviation	Full word
Ag. Ext. Ed.	Agricultural Extension Education
Ag. Ext. and Info. Sys.	Agricultural Extension and Information System
AIS	Agriculture Information Service
ANOVA	Analysis of Variance
B	Multiple regression
BBS	Bangladesh Bureau of Statistics
BEC	Bangladesh Economic Census
CARE	Cooperative for Assistance and Relief Everywhere
CEGIS	Center for Environmental and Geographic Information Services
DAE	Department of Agricultural Extension
DFID	Department for International Development
<i>et al.</i>	All Others
FAO	Food and Agriculture Organization
HH	Household
HIES	Household Income and Expenditure Surveys
HKI	Helen Keller International
MoYS	Ministry of Youth and Sports
OLS	Ordinary Least Squares
SAAO	Sub Assistant Agriculture Officer
SPSS	Statistical Package for Social Science
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund

IMPACT OF FLOWER CULTIVATION ON FARMERS' LIVELIHOOD IN JHENAIDAH DISTRICT

IMRAN BIN ISLAM

ABSTRACT

The study designs to investigate the impact of flower cultivation on farmers' livelihood. The methodology of this study is an integration of quantitative and qualitative methods based on data collection in Kalukhali and Baliadanga Block of Trilochanpur union under Kaliganj upazila of Jhenaidah district. Data were collected from 115 flower cultivators and 45 controls from February 11 to March 10, 2017. Descriptive statistics, step wise regression, Constraints Facing Index (CFI) were used for analysis data. Most of the farmers (76.5 percent) gained medium livelihood improvement through flower cultivation, while 13.9 percent had high impact of flower cultivation on farmers' livelihood category. Among the variables- attitude towards flower cultivation alone contribute 39.5 percent of the variation where annual income from flower cultivation (2.3 percent), level of education (2.8 percent), annual family income (2.8 percent) and knowledge on flower cultivation (2.3 percent) variation contribute to the impact of flower cultivation on farmers' livelihood. The Majority (73.9 percent) of the flower farmers had medium constraints in flower cultivation whereas the lowest 11.3 percent had high constraints in flower cultivation category. As per Constraint Faced Index (CFI) high labor wages positioned the 1st and insufficient credit support at the last position regarding constraints in respect of flower cultivation. It is concluded that the composite impact of flower cultivation on farmers' livelihood is moderate and needs further advancement. Based on the findings, it is recommended that respective authorities should implement and popularize farmers based projects on a massive scale for flower cultivation with a view to improving farmers' livelihood.

Key words: Impact, Flower cultivation, Livelihood;

CHAPTER I

INTRODUCTION

1.1 General Background

Bangladesh is a densely populated and agro-based developing country. About 76% of the people live in rural areas, and 47.5% of the total manpower is involved in agriculture. In Bangladesh, agriculture contributes 18.82% of the gross domestic product (GDP) of the country in the year of 2014-2015 (BEC, 2016). Around 152.51 million people lives in its 1,47,570 square kilometer of land (BBS, 2014). Most of the rural people are dependent for their livelihood mainly on agricultural activities. Agriculture sector can be divided into many subsectors like livestock, poultry farming, forestry and horticulture etc. Floriculture, viticulture, arboriculture and floriculture are sub-sectors of horticulture. Floriculture is a branch of horticulture dealing with the cultivation of flowers etc. It has been defined by Uffelen *et. al.*(2005) as Floriculture is cultivation/production and marketing of a wide variety of plants and planting material: starting from parental products like plant parts and cuttings to the end product for the market like cut flowers, foliage, potted plants, garden plants, nursery stock, trees, flowering leafy, annuals, perennials, flower bulbs and tubers. Wikipedia (2013) defines it as Floriculture is a discipline of horticulture concerned with the cultivation of flowering and ornamental plants for gardens and for floristry, comprising the floral industry. The development, via plant breeding, of new varieties is a major occupation of floriculturists.

Flower is there in all our occasions- be it a happy one or otherwise. It makes us feel better and soothes us in distress. Its demand in Bangladesh grew as more and more people have been elevated to urban middle class. Within decades, flower cultivation has grown into an industry. The increase in demand is the sign of a change in people's attitude. Commercial farming of flowers began in the country in 1983 on 30-decimal of land in Jessore. Now, flowers are grown

on nearly 1,000 acres of land in 22 districts, mostly in Khulna and Dhaka divisions. At least 1.5 lakh people are involved in the production, distribution and sales. The sales price of flowers was 31 million dollar in 2009-10, which rose to around 100 million dollar in 2014-15 fiscal year. The most sought-after flowers being produced in the country are tuberose, various types of roses, gladiolus, marigold, gerbera and daisy. Though the flower market is expanding, the industry faces a number of setbacks. Farmers are producing various kinds of quality flowers, but often traders introduce them to customers as foreign ones and demand higher prices.

The history of floriculture in Bangladesh may be old but flower business is not older than a decade. Flower cultivation was started commercially from the 80's in Jhikargachha upazilla of Jessore district. Afterward, it was extended to Jessore Sadar, Sharsha and Chowgachha upazilla as well as Kushtia, Chuadanga and Satkhira districts. The increase in area under floriculture and enthusiasm of the growers revealed the potentiality of the industry. The employment generation for both men and women are increasing with the increase in area at about 15.79% per year under floriculture industry. Considering the higher capital mobilization and profit margin from floriculture compared to other field crops, the high lands of Dhaka, Chittgong, Jessore, Cox's Bazar, Chuadanga, Jhenidah, Kushtia, Bogra, Rangpur, Mymensingh has the potentiality to expand the industry. The market growth and market size of floriculture over all Bangladesh revealed the potentiality of its further extension. With this background floriculture in Bangladesh is rising which have a great impact on farmers' livelihood. Impact can be characterized as positive and negative, essential and optional long haul effects produced by a developmental intervention, directly or indirectly, planned or unintended (Garbarino and Holland, 2009). According to CGIAR, impact assessment is a sort of assessment that is expected to decide the results of an intervention, in terms of outcomes of interest (FAO, 2011).

With increasing use of flowers among all classes in society and in various social and state events commercial cultivation of flowers and associated businesses have flourished in the last couple of decades. Because of favorable weather and fertile soil flowers, including rose, tuberose, marigold, gladiolus, calendula, gerbera, and chrysanthemum grow here abundantly. Flower farmers get three to four times' higher return than that from any other crop and thus, flower has become a cash crop. However, though Bangladeshi flowers have a huge export potential, the country managed to occupy negligible 0.3 per cent share of the global flower market. However, it is encouraging to note that some 20,000 people from more than 23 districts are now involved in flower cultivation. And this has provided more than 2.2 million people, including those who are engaged in the flower supply chain, with new livelihoods. Bearing an immense potential to grow very big, this has opened up a new economic frontier. Flower cultivation has the potential to play very important role in farmers' livelihood development programs. Although flower cultivation has an enormous effect and potential on the farmers' livelihood improvement, little research has been conducted regarding the impact of flower cultivation on farmers' livelihood particularly in Bangladesh. Hence, on the basis of the above considerations, research has taken regarding this topic which is entitled 'Impact of Flower Cultivation on Farmers' Livelihood in Jhenaidah District'.

1.2 Statement of the problem

The number of plant farms supplying both horticultural and floricultural plants was minimal in the 1990s, which has increased to 10,200 today, while annual sales jumped from Tk 250 million to Tk 20 billion (US 3.23 to 258.7 million dollar) today.. Flower is a widely-used product around the world. Global export of Cut flowers and flower buds for bouquets, fresh or dried (H.S. 0603) was USD 7375, 7680, 8387, 8480 and 8442 million dollar in 2009, 2010, 2011, 2012 and 2013 respectively (BBS, 2015). Top 10 Cut flowers-exporting countries are the Netherlands, Colombia, Ecuador, Kenya, Belgium, Ethiopia, Malaysia, Italy, Germany and Israel. Top 10 Cut flowers-importing countries

are the United States of America, Germany, United Kingdom, Netherlands, Russian Federation, France, Japan, Belgium, Italy and Switzerland.

In Bangladesh, growth of commercial flower production can be traced back to early 70s to mid-80s when large-scale commercial production started in Jikargacha upazila of Jessore district (Sultana, 2003). Later it speeded largely in Jessore, Savar, Chuandanga, Mymensingh and Gazipur, Narayngonj which turned to be major flower production belt in Bangladesh. Cultivation of flower is reported to give 3-5 times and 1.5-2 times more returns than obtained from rice and vegetable cultivation, respectively. Now- a-days, 10,000 hectares of land covers flower cultivation taking the lead by Jessore district. More than 5,000 resilient farmers are growing flower and foliage in the country and about 1, 50,000 people are directly or indirectly involved in floriculture business as their sole livelihood. In order to formulate suitable strategic measures for the livelihood improvement of the flower cultivators, this research focuses on socio-economic characteristics of flower cultivators and their existing situation and examines the impact of flower cultivation on farmers' livelihood. This was finished by looking for answers to the accompanying queries:

- What was the extent of impact of flower cultivation on farmers' livelihood?
- What were the characteristics of the flower farmers?
- What was the contribution of the selected characteristics of the flower farmers to the impact of flower cultivation on their livelihood?

In order to get a clear view of the above questions the investigator undertook a study entitled 'Impact of Flower Cultivation on Farmers' Livelihood in Jhenaidah District'.

1.3 Objectives of the study

The focal point of the research work was to explore the impact of flower cultivation on farmers' livelihood. This is why, the following objectives were structured out in order to provide an appropriate track to the research work:

- i. To assess the extent of impact of flower cultivation on farmers' livelihood
- ii. To describe the following selected characteristics of the flower farmers:
 - Age
 - Level of education
 - Family size
 - Farm size
 - Annual family income
 - Annual income from flower cultivation
 - Duration of flower cultivation
 - Extension media contact
 - Training exposure
 - Availability of marketing information
 - Attitude towards flower cultivation
 - Knowledge on flower cultivation
- iii. To explore the contribution of the flower farmers' selected characteristics to the impact of flower cultivation on their livelihood
- iv. To assess the extent of constraints faced by the farmers during flower cultivation

1.4 Scope or rationale of the study

The present study was designed to have an understanding the impact of flower cultivation on farmers' livelihood and to explore its contribution with their selected characteristics.

- i. The findings of the study will, in particular, be applicable to the study area at Kaliganj upazila of Jhenaidah district. The findings may also be applicable to other locale of Bangladesh where socio-cultural, psychological and economic circumstance do not differ much than those of the study areas.

- ii. The findings of the study may also be subsidiary to the field worker of extension service to enhance their action strategies on impact of flower cultivation on farmers' livelihood.
- iii. The findings of the study will be conducive to accelerate the improvement in agriculture, farmers' logistic supports, information needs and the way of dissemination especially tuned to key role players in the society as well as impact of flower cultivation on farmers' livelihood. The outcomes might also be helpful to the planners and policy makers, extension workers and beneficiaries of the agriculture.
- iv. To the academicians, it may help in the further conceptualization of the systems model for analyzing the impact of flower cultivation on farmers' livelihood. In addition, the findings of this study may have other empirical evidence to all aspects of impact of flower cultivation on farmers' livelihood which may be used to build a theory of floriculture aspects.

1.5 Justification of the study

Globally, horticulture (including floriculture) has turned into a leading sector for poverty reduction in developing countries. If, there should be an occurrence of low obtaining power and restricted access to nourishment, especially for the rural poor, food security remains a basic concern. Besides this, price hike of recent days recommends us to expand income to overcome this circumstance. Commercial floriculture may be a critical income generating area for many developing countries like Bangladesh is to ensure food security.

Bangladesh has a colossal potential for flower both for export and local market. Different agro climatic conditions are able of producing variety of blossoms all the year round. There is an awesome opportunity for Bangladesh to earn a lot of foreign currency from the foreign market if the generation and marketing of flowers are well developed. Commercial production of flower in Bangladesh started since 1983 as some of the innovative farmers in the country adopted flower cultivation as feasible alternatives to cash crops and field crops.

At present, approximately 12000 farmers are engaged in floriculture and 4000 to 5000 farmers produces ornamental plants on commercial basis. The area coverage under commercial cultivation is approximately 5000 to 6000 hectares of land while commercial nurseries have covered approximately 2000 to 2500 hectares of land. Bangladesh has to spend roughly TK 2-3 million in importing flower and ornamental plants to meet the market demand in every year (Sayla, 2010). But, we have 4,66,607.57 hectares of fallow land in Bangladesh and this fallow land may be used to meet up the domestic demand and also for exporting (BBS, 2011). It is a matter of hope that if floriculture could have been developed with necessary scope then the efficiency in marketing might be achieved within a short span of time: Beside this, floriculture can make a potential contribution to our Gross Domestic Product (GDP) and can create employment opportunity and can also increase participation of rural women in income generating activities and subsequently have the great impact to promote the livelihood.

The study might provide idea about the impact of flower cultivation on farmers' livelihood. The government and some of the NGO in Bangladesh has initiated program on flower cultivation, livestock, fisheries, housing, credit, saving etc. to improve the socio-economic status of the farmers. The success of this program depends on the attitude, knowledge of the floriculture. Therefore, the researcher needs to enquire about the impact of flower cultivation on farmers' livelihood. So, it is logical to investigate about the impact of flower cultivation on farmers' livelihood. The findings of the study are therefore, expected to be conducive to the researchers, academicians and policy makers who are concerned with of floriculture. Keeping the above facts in view, a study has undertaken which is entitled 'Impact of Flower Cultivation on Farmers' Livelihood in Jhenaidah District'.

1.6 Assumptions of the study

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

- i. The respondents were capable of furnishing proper answers to the questions contained in the interview schedule.
- ii. The data collected were free from any bias and normally distributed.
- iii. The responses answered were valid, acceptable and reliable.
- iv. Information sought by the researcher elicited the real situation was the representative of the whole population of the study area to gratify the objectives of the study.
- v. The researcher was well adjusted to himself with the social contiguous of the study area. Hence, the collected data were free from favoritism.
- vi. The selected characteristics and impact of flower cultivation on farmers' livelihood of the study were normally and independently allotted with respective means and standard deviation.

1.7 Limitations of the study

Considering the time, respondents, communication facilities and other necessary resources available to the researcher and to make the study meaningful, it became necessary to impose certain limitations as mentioned bellow-

- i. The study was confined to only one upazila namely Kaliganj upazila of Jhenaidah district which may fail to represent the actual scenario of the whole situation as people develop their strategies according to the concrete situation they face.
- ii. It is difficult to get exact information on impact of flower cultivation on farmers' livelihood indicator from the women as many of them are illiterate.

- iii. Characteristics of the flower farmers were many and varied, but only twelve characteristics were selected for the research study.
- iv. There were embarrassment situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum proper information.
- v. Several methods, scales and statistical tests have been utilized in this study over a relatively short period of time.

1.8 Definition of important terms

Variable: The variable is a characteristic, which can assume varying, or different values in successive individual cases.

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

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

Age: Age refers to the terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the farmers.

Education: Education was measured by assigning score against successful years of schooling by a mango grower.

Family size: Family size refers to the total number of members in the family including him/her, children and other dependents.

Effective farm size: Effective farm size of a farmer refers to the total area of land on which carried out the farming operation, the area being in terms of full benefit to the family.

Annual family income: Annual income refers to the annual gross income from different sources.

Annual family income from flower cultivation: Annual family income from flower cultivation refers to the total financial return from flower production in one year.

Duration of flower cultivation: Duration of flower cultivation of flower cultivators refers to the total number of year involved in flower cultivation.

Extension media contact: Extension media contact defines as one's extent of exposure to different communication media related to farming activities.

Training exposure: Training exposure refers the total number of day attended in different training programs.

Availability of marketing information: Availability of marketing information defines as one's extent of exposure to available marketing information.

Attitude towards flower cultivation: It implies to the beliefs, outlook, perception, action tendencies towards flower cultivation.

Knowledge on flower cultivation: Flower cultivation knowledge refers to the knowledge on different components of flower production.

Impact: Impact referred to a term which refers to sustained changes as a result of any intervention which have lasting effect.

Change: It referred to any improvement or deterioration of the respondents in different aspects of their livelihood.

Impact evaluation: Impact evaluation referred to an outcome based evaluation structured or designed to answer the question of whether the outcomes observed were the result of the intervention or the observed outcomes would have happened anyway.

Treatment group or study group: Organizations (or individuals) who receive the treatment or intervention.

Control group: The Organizations (or individuals) who do not receive the treatment or intervention.

Livelihood: livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term while not undermining the natural resource base

Hypothesis: A supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

Population: Population is the entire pool from which a statistical sample is drawn. The information obtained from the sample allows statisticians to develop hypotheses about the larger population. Researchers gather information from a sample because of the difficulty of studying the entire population.

Sampling: Sampling is a statistical procedure that is concerned with the selection of the individual observation; it helps us to make statistical inferences about the population.

Data: Facts and statistics collected together for reference or analysis.

Variance: In probability theory and statistics, variance is the expectation of the squared deviation of a random variable from its mean, and it informally measures how far a set of (random) numbers are spread out from their mean.

Analysis: Detailed examination of the elements or structure of something, typically as a basis for discussion or interpretation.

Regression analysis: In statistical modeling, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or ‘predictors’).

Findings: The principal outcomes of a research project; what the project suggested, revealed or indicated. This usually refers to the totality of outcomes, rather than the conclusions or recommendations drawn from them.

Discussion: The purpose of the discussion is to interpret and describe the significance of your findings in light of what was already known about the research problem being investigated, and to explain any new understanding or insights about the problem after you’ve taken the findings into consideration.

Research methods: Research methods are a structured set of guidelines or activities to generate valid and reliable research results.

Value of R^2 : The value of R^2 is a measure of how of the variability in the dependent variable is accounted for by the independent variables.

Adjusted R^2 : The adjusted R^2 indicates the loss of predictive power or shrinkage. Therefore, the adjusted value tells us how much variance in Y (dependent variable) would be accounted if the model has been deprived from the populations from which the sample was taken.

Conclusion: Conclusion is the final decision or judgment, which is placed through contention at the end or termination of a research work. It contains inferences and logical interpretation of the findings of the research work.

Recommendation: A suggestion or proposal as to the best course of action, especially one put forward by an authoritative body.

Reference: Use of a source of information in order to ascertain something.

CHAPTER II

REVIEW OF LITERATURE

Review of literature gives the clear and concise direction of the researcher for conducting the experiment. In this chapter, review of literatures relevant to the objectives of this study was presented. This was mainly concerned with ‘impact of flower cultivation on farmers’ livelihood’. There was serious dearth of literature with respect to research studies on this aspect. So, the directly related literatures were not readily available for this study. Some researchers addressed various aspects of the impact of flower cultivation on farmers’ livelihood and its effect on client group and suggesting strategies for their emancipation from socio-economic deprivations. A few of these studies relevant to this research are briefly discussed in this chapter under the following four sections:

Section 1: General review on floriculture in Bangladesh and world perspective

Section 2: Review on livelihood and its related issues

Section 3: Literature concerning the contribution of the farmers’ characteristics to the impact of flower cultivation on their livelihood

Section 4: Research gap of the study

Section 5: Conceptual framework of the study

2.1 General review on floriculture in Bangladesh and world perspective

2.1.1 Floriculture in Bangladesh perspective

A feature of Protom Alo (2016) revealed that flower traders have said that flowers demand have been increased with increasing income of citizen in Bangladesh. Now various festivals have been observed enthusiastically with colorful flowers, ceremony of family, business and state’s festival have not been observed without flowers. Even fresh flower is essential in daily life for decoration. Floriculture has been expanding in various districts in Bangladesh, mostly in Jessore, Jhinaidah, Chuadanga, Mymensingh, Gazipur, Manikgonj,

Tangail, Narayngonj, Rangamati. Almost 16 thousand farmers are engaged in floriculture, they are cultivating flower in 12 thousand acres in Bangladesh; Rose, Rojonidondha, Ganda, Jervera, Gladioli have been cultivated for commercial purpose, flowers of 800 core taka supplied from Bangladeshi farmers in various festivals, national days and daily's demand, according to flower businessman- 20 lac people are engaged in flower business that not only in floriculture also in transports and sales.

BBS (2014) revealed that the Rose has been cultivated at 189 acres in the 2012-13 FY, but that has been increased at 281 acres and The Ganda's cultivation has been increased from 926 acres to 1467 acres, The Rojonigondha's cultivation has been increased from 666 acres to 2339 acres in 2013-14 FY. According to the report'2015 prepared by Bangladesh Tarrif Commission- A farmer earns 25 lac takas by the cultivation of the Jervera, 2 lac takas from the Rose, 1 lac taka from the Ganda and also 1 lac taka from the Gladioli per acre. Whereas, a farmer loses 3 to 4 thousand taka by paddy cultivation per bigha in Jessore district that's why the farmers of Jessore and also farmers of other districts involved in floriculture. According to the daily Prothom Alo's report (30th April,2016) - Rojonigondha, Rose, Ganda, Chandramollika have been cultivated by the farmers of Bangladeshi efficiently and effectively, but now they are cultivating import-alternative flower like Jerbera, Gladulas even Orchid. So, those flowers have been not imported from Malayasia and Thiland. An Orchid firm has been established at Valuka in Mymensingh which area is 22 acres named Dipta Orchid, this flower has been supplying in Dhaka and Cox-bazar based five star hotels and other's hotel.

Haque *et al.* (2012) stated that an attempt was made in this paper to identify agronomic practices, analyze relative profitability and input-output relationships during February 2011. Marigold cultivation is now a profitable enterprise to the farmers, but the socioeconomic data and information of this flower are very scarce in Bangladesh. In this study, primary data were collected from 100 randomly selected farmers from Jessore and Jhenaidah districts. The

results indicated that 95% farmers cultivated T-004 Sline and only 5% farmer's cultivated T-s003 line of marigold. The per hectare costs of marigold cultivation were Tk. 1,47,234 and Tk. 1,02,858 on full cost and variable cost, respectively. The major share of full cost was for human labor (34%), land use (18%), fertilizer (15%), and irrigation (10%). The yield of marigold was 2,650,447 flowers per hectare. The gross margin and net return were Tk.1, 62,186 and Tk.1, 17,812 per hectare, respectively. The net return was 81% higher than lentil, 85% higher than mustard, and 6% lower than potato cultivation. The benefit cost ratios were 2.57 and 1.80 on variable cost and full cost basis, respectively. Cobb-Douglas production function revealed that human labour, land preparation, seedling, urea, TSP, MOP, and irrigation had positive effect on marigold cultivation. The lack of technical knowledge, non-availability of high yielding variety, and infestation of insects and diseases were major problems for marigold cultivation. Therefore, necessary steps from concerned authority are needed to overcome these problems.

Hassan (2012) studied that profitability of using a stratified random sampling of 32 farmers of flower growers for three districts in Bangladesh. There was a gross margin of Taka (currency of Bangladesh) Tk.1,359,824.20. Besides this, the average marketing margin for three intermediaries remained as Tk. 638.39 for Wholesale-cum-retailer, Tk. 187.56 for BRAC and Tk. 689.72 for retailer in Dhaka City. The problems faced by the farmers: were price of fertilizer, insecticides, lack of training and scientific knowledge, pest's attack, plant diseases, poor transportation and communication system, unstructured market, lack of market information and problems of marketing. The lack of adequate market information, unsold flowers, demand fluctuation and lack of storage facilities were also the problems faced by the flower growers.

Mou (2012) examined a study on the production and profitability of some selected flowers in comparison with their competing crops. The study also attempts to identify the value chains and channels of flower marketing in Bangladesh. Stratified random sampling method was used to collect Primary

data collected from the 32 farmers of Guptergaon under Phulpur Upazila in Mymensingh district and from the 21 flower traders, retailers and wholesalers of different flower trading zones in Dhaka city. The study reveals that gross margins of flower and vegetables per hectare were Tk.1, 359,824.20 and Tk.46, 362.14, respectively. The average marketing margin of three intermediaries i.e., BRAC, wholesaler-cum-retailer and retailer in Dhaka city, were Tk. 187.56, Tk. 638.39 and Tk.689.72 per 100 flowers, respectively. Lack of mother stock and their high price, price of fertilizer and insecticides, lack of scientific knowledge & training, attack by pest & disease, lack of extension work came out as major financial and technical problems of the flower farmers while inadequate & underdeveloped transportation & communication system, low market price, lack of market information, unstructured market were observed major market related problems.

Shykh Seraj (2007) stated that there is a huge potentiality of flower business in Bangladesh. It is potential market to export for China. Bangladesh exported Cut flowers, worth \$16.58m, during July-November 2013 into a few destinations like India, Pakistan, Italy, Portugal, Saudi Arabia, the United States, South Korea, the Philippines, Singapore, Japan, Germany, Britain, Denmark and France. Our stake in the global trade of Cut flowers is negligible i.e. 0.3 per cent. We have good potential in the production of Cut flowers due to favorable environment and fertile land; it's a cash cow crop for the farmers.

2.1.2 Floriculture in world perspective

Ghule and Menon (2013) studied that around 120 countries are engaged in of floriculture. Almost 90% demand comes from America, Asia and Europe.

Adenuga *et al.* (2012) observed that the low level of awareness impedes the potential of horticulture's sub-sector. Floriculture resulted in low level of employment and enhanced poverty. On the average, there was an economic return to farmer's labor and management of Nigerian Nira (currency of Nigeria) 174, 974.7/ha. The major constraint was inadequate capital that hindered the

production of floriculture while the use of farm size, labor, manure, educational level, experience and age of the farmers were having significant influence on the revenues of the farmers.

Gudeta (2012) conducted his research on the floriculture from pre-harvest and post-harvest dimension in order to analyze the production level, in his study he found that lack of human resource development, poor technology, poor infrastructure, and poor cool chain preserving system were the major problems faced by the flower growers. During study, it was found that due to lack of facilities, the flower growers had to waste half of their produce due to lack of storage facilities leading to economic loss of the society as a whole.

Ocheing (2010) analyzed the floriculture industry of Kenya in terms of the contribution of small farmers' production and large farmers' production of flowers and their exports. It was found that the contribution of small farmers' production of flowers was decreasing remained minimal relatively to large farmers. It was suggested to establish the exporters-farmers' partnership to improve the exports of this industry. James K. (1999) analyzed the floriculture sector of Canada where production remained of 2.54 bn US dollar. The import of different flowers into Canada remained \$ 70.3 million. This sector employs 0.76% of the total labor force.

Baris and Uslu (2009) examined a study on current status, marketing structure and policies pursued in the Turkish cut flower industry; which can be classified according to the technology used, as well as the structure and the ecological characteristics of production areas. Turkey is among the popular cut flower producing countries because of its suitable ecological advantages. Cut flower production in Turkey started during 1940's in Istanbul and its surroundings and then spread to other provinces. In the study enterprises in this sector are classified into two groups as enterprises with export oriented production (modern enterprises) and with domestic market oriented production (small-family enterprises). Turkish cut flower industry is heavily focused on the

production of carnation. Almost 80% of the total cut flower production is meant for export and consists of spray carnations. Collectively spray and standard carnations constitute 88% of the total production. The cut flower segment has shown great improvements in Turkey during recent years despite the existence of some problems in the stages of production, marketing and transportation.

Ingle *et al.* (2009) conducted a study for estimation of marketing cost, marketing margin and price spread through different channels at kagda (Jasmine) flower in Nanded district of Maharashtra. Five wholesaler and ten retailers were selected for the present study. The data pertained for the year 2005-06. The results revealed that price paid by consumer was Rs.100.00 per quintal in channel-I (P-R-C) in which producers share in consumer rupee was 64.51 per cent. Price spread was found to be Rs.35.50. In channel-II (P-W-R-C) price paid by consumer was Rs. 150 per quintal. In which producer share in consumer rupee was 42.45 per cent. Price spread found to be Rs.86.32/quintal.

Jahan (2009) attempted to examine the production and marketing cost structure and profitability of some selected flowers such as tuberose, rose, gladiolus and marigold. Primary data were collected through stratified random sampling technique. The study covered primary market (Jessore), wholesale market (Dhaka city) and retail market (Dhaka city) for flower business. On an average, the net marketing margin was highest for retailers (Tk. 28.10) and lowest for wholesaler (Tk.9.03). The flower-farmers and intermediaries faced various production and marketing problems in the study areas. Based on the findings, some recommendations were made to overcome the problems that include development of storage facility, provision for scientific knowledge, training facility, establishment of permanent flower wholesale markets etc.

Jagtap *et al.* (2009) made an attempt to study the economic efficiency of marigold marketing in Pune (Maharashtra). In all thirty sample cultivators were selected from the villages of Khed Tahasil of Pune district and data were

collected for the year 2006-07. The collected data were analyzed by a simple tabular method and statistical tools such as arithmetical averages and percentages were worked out for the interpretations of results. It was observed that on an average, marigold flower production was 2850 kg on 0.40 ha. of a farm. The marketed surplus of marigold was disposed through three different channels. The highest net margin of retailer was Rs.4.54 in channel-I followed by that of Rs.3.05 and Rs.3.00 in channel-III and channel-II, respectively. Channels-I was found to be the most efficient in regard to producer, intermediaries and consumer's point of view. Similarly, producer's share in consumer's rupee was also high in channel-I.

Buvaneshwaran and Banumathy (2008) stated that the economics of liliu production under contract farming has been studied by randomly selecting 15 contract growers registered with Kotagiri Floritech Company (KFC) in the Nilgiris district. The bulb, the most important seeding material for cultivation of liliu, is imported from Holland and supplied to growers who normally grow two crops in a year. Among variable cost components, planting material (bulb) accounted for the highest (71%) share, followed by interest on working capital and labour charges. This indicates that liliu is a capital-intensive as well as labour-intensive crop, generating round-the-year employment for labourers. The rate of return on investment has been found as 2.99, i.e. a liliu grower gets Rs 2.99 as return by investing one rupee in the production process. Poor availability of institutional credit and difficulties in securing high quality planting and seeding materials are the major constraints at cut flower production in the states.

Bagade *et al.* (2008) examined cut flower production, disposal and marketing in Ratnagiri district, Maharashtra, India. The volumes of production and disposal of gerbera were 134763 and 132904 flowers for a cooperative unit and 128557 and 126069 flowers for a private unit, respectively. As regards the production and disposal for both co-operative and private units, the month of May had the highest quantity. The total marketed surplus of gerbera was

132904 and 126070 flowers, giving a value of Rs. 388993 for a cooperative unit and Rs. 366936 for a private unit. The maximum share of quantity disposed was through commission agents (97.14% for a cooperative unit and 96.76% for a private unit). The total cost of marketing of gerbera for cooperative and private units was Rs. 84666 and Rs. 77529, respectively, and 44.37% and 45.47% of those amounts were commissions paid to commission agents. Input- output ratios indicated that the profitability of gerbera production was 1:1.0 and 1:1.06 for co-operative and private units, indicating that production is profitable. The main factors influencing the prices of gerbera include seasonality of supply, place and distance of market, high cost of transportation, and availability of technical advice. Major marketing constraints include the high cost of packing material and problems with storage, market functionaries, and market infrastructure.

Belwal and Chala (2008) studied that some of the countries of Africa, South and Central America and Israel itself are the consumers of its own produce of flowers, while in the beginning, in Asia, flowers were produced with a purpose of exports, later on, the domestic consumption also rose mainly increased population, change in the perception of consumers for their life style. While, in case of Ethiopia, the gift of flowers has just emerged and the market is yet not totally matured and attracted an increasing investment in flowers production.

Kinderli and Belgin (2007) analyzed the problems and potential of floriculture in Turkey. Classifying the floriculturists into two groups' big-modern enterprises and small-family enterprises. Four different green houses were selected to analyze the production of roses and camation (a type of flower). The result showed that the plastic greenhouse used for flowers production by big-modern enterprises resulted in more profit as compared to geo-thermal heating.

Ali and Banerjee (2000) conducted a study to examine the economics of marketing of tagar (*Valeriana officinalis*) flower in Bagnan, West Bengal, India. Results showed that packing, loading, and hiring of assistants

contributed to the major costs incurred in marketing tagar flowers. All costs at maximum and minimum prices were higher in marketing channel I than in marketing channel II. The traders' profit in both channels was higher at maximum prices than at minimum prices. At maximum price level, traders had a marketing margin of 84-86%, while producer-sellers' share was 64%. The traders' share was reduced to less than 40% at minimum price level. It is concluded that the marketing system for this flower is imperfect and inefficient. This highlights the need for establishing agro-processing industries in the surrounding area.

Ashok Dhillon *et al.* (2005) conducted a study to estimate the marketing cost and price spread for marigold (*Tagetes sp.*) in three major growing regions of marigold in Haryana, viz., Gurgaon, Sonapat and Faridabad. The primary data for the year 2001-02 were collected from 35 marigold flower growers out of total 120 farmers in these districts. The study revealed that production of marigold was higher (14.55 q) on medium farms followed by large farms (13.85 q). The average area and production of marigold were 1.00 hectare and 12.95 q per hectare on the sample farmers. The study revealed that the marigold was considerably more profitable than rose, chrysanthemum, gladiolus and tube rose. However, to popularize marigold flower, liberal credit facilities, new production technology, storage facilities, efficient marketing system, etc. need to be developed in the study areas.

Hemert (2005) studied that the floriculture industry of Netherlands is operating on world level. Its total exports increased from Euro 5.7 billion in 2002 to Euro 5.9 billion in 2004.

Martsynovska (2005) observes the share of flower production by EU is 44% (i.e. \$ 10.8 billion out of \$ 24.4 billion of the world production) EU remained the major producer of flower production, followed by China and USA each producing 12%, Japan 11%, Canada 4%, Colombia 3%, Korea 2% and other 10% of the world production

Gajanana *et al.* (2005) said that Carnation (*Dianthus caryophyllus*) is a cut flower, which has been the choice for diversification under playhouse cultivation in Pune (Maharashtra) and Bangalore (Karnataka) in India. Economic feasibility of production indicated it to be highly profitable and economically viable in both regions. However, the use of cost effective methods appears to cut down the establishment costs by 50% in Bangalore in comparison to that in Pune. Similar reduction in costs was seen in other items such as the inner net, drip irrigation system and bed preparation in Bangalore, thereby reducing the overall cost of establishment by 27% at Rs. 308 155/500 m² polyhouse as against Rs. 422 585/500 m² in Pune. The annual maintenance costs worked out to Rs. 181 822 in Bangalore while it was Rs. 156 012 in Pune indicating a better maintenance strategy. The productivity was higher in Bangalore at 14 cut flowers/plant/annum as compared to 10 cut flowers/plant/annum in Pune. Overall, the gross returns and benefit cost ratio were higher in Bangalore at Rs. 488 668.9 and 2.69, respectively. The economic viability and feasibility analysis indicated that the production of carnation is highly profitable and economically viable in both the places, with a net present value of Rs.356 302 in Bangalore and Rs. 121 839 in Pune. Results also indicated that growers could expand the area devoted for this cut flower, but it should practice self-marketing in distant markets to achieve higher profits.

Globtdinfo (2004) showed that it was Columbia which first introduced flowers as a business item to the international market. The huge success of Columbia in selling flowers to the international market inspired others countries namely Netherlands, Columbia, Israel, Holland, Mexico, Peru, Kenya etc. involved in exporting flowers. The total world export of flowers during 2002-2003 exceeded to 1.37 billion dollars (www.globtdinfo.au2004).

Hamrick (2004) studied that Netherlands is the main center for the distribution of world flowers with its computerized system. The production in Netherlands worth US \$ 3.6 billion. Besides this, Israel, Ecuador, Colombia and South American countries remained the major producers of flowers while Africa and

especially witnessed an increasing investment for the production of flowers. Developing countries contributes almost 20% to the total trade, while there is an increasing competition of the developing countries including Namibia, Zambia, Malawi, Ethiopia, Tanzania and Uganda.

Khade (2004) selected the area as per higher proportion of marigold production in Pune district. Cultivators were classified on the basis of holding size. For each class, equal numbers of marigold growers were selected from six selected villages. Thus, 48 number of Marigold grower was comprised of 90 sample cultivators. Each class having thirty samples in this study the marketing intermediaries also selected and collect the information regarding marketing activities. Standard cost concept was used for analyzing the data and Cobb-Douglas function for functional analysis. Cost of cultivation in different size group of holding of marigold were observed, at the overall level the per hectare cost of cultivation of cost "C" worked out to Rs. 15,960.78. The cost "A" contributed above 50 per cent of the total. It observed that share of rental value of land in the total cost was found about 20 per cent at overall. It concluded that marigold was highly labor intensive crop. The packing of flowers need to be carried out early in the morning and evening hours. Therefore, it needed practice of using possible family members for operations.

Banerjee and Ali (2004) studied analyses the behavior of the wholesale price of Rangan flower in West Bengal, India, as well as the marketing channels and margins. Primary data were obtained from 75 farmers, 20 producer sellers, 10 wholesalers, and 20 retailers. It is revealed that Rangan flower is available from April to September, and that the price in the early months remains low but increases in the latter months. Producer-sellers account for more than 60% of the consumer's rupee. Higher profit margins are related to higher prices at all levels of trade. Traders' profit comprises 58-83% of the marketing margin.

Shinde (2004) studied the economics of tuberose and for that purpose he chooses one Tahsil of Pune district. According to stratified random sampling,

he classified villages and cultivators. Data shows that the average size of holding was 10.47 hectare. He found average per farm value of investment in various farm assets owned by the tuberose cultivators was Rs. 1.47,633, Rs. 3,98,208 and Rs. 500,055 in small, medium and large size holding, respectively. He found per hectare use of human labour was 141.99 days. It was observed per hectare overall cost and cost C worked out to Rs. 12,334.27 and Rs. 27,958.23 respectively. He found the major item of cost was the planting material (13.92%). According to his study, the total cost of cultivation in different size group of holdings was Rs. 26,890 Rs. 20,046. Rs. 28,760 in small, medium and large size groups of holding, respectively. It concluded, the overall level the cost of production was Rs. 27,958.23 cost A was 35.80 per cent and cost B was about 82.85 per cent. He remarked that cost of production was highest in large sized farms followed by medium and small size group of holding. He suggested for improvement of tube rose cultivation that is government should fix the support prices as well as ceiling prices and second one, government take steps to regularize the transport charges.

Donohou (2003) stated that the floriculture industry is increasing every year. It is now-a-days an industry of billions of dollars and employs millions of people throughout the world. For a farm of 50 acres an amount of Rs. 3.39 million of capital investment is needed for purchasing of machinery, construction and equipment. Besides this, an amount of Rs. 5.3 million is further needed for the purchase of seeds, pesticides, fertilizers etc. known as working capital. Combining both together, a sum of Rs.8.7 million is needed for the above-mentioned farm. While return from this ranges from Rs. 8.8 million to Rs. 16 million from first to tenth year of such a project. Presently, floriculture industry's exports are Euro 5.1 billion and are likely to reach Euro 9.0 billion by the end of 2025. The floriculture exports stood around Rs.63 crore in India in 1996-97 and tripled into Rs. 211 crore in the year 2004-05. The industry is directly contributing to the economic development of the country through creating of employment opportunities and earning of foreign exchange.

Purushottam and Sharma (2002) analyzed the costs and returns of chrysanthemum production as well as the marketing costs and margins in Jaipur district, Rajasthan, India. Data were collected from a sample of 60 farmers and 14 florists/retailers. The findings of the study shows that average cost of production was Rs. 580 per quintal while net return was Rs. 60 806 per hectare. Major cost items in chrysanthemum marketing were damage to the flowers, labour and transportation charges. The loss in the quantity of flowers was high (28.12% of total marketing cost). Producers received only 24.93% from the price paid by consumers while florists earned a margin of 58.42.

Manzoor *et al.* (2001) stated that there was a return of 1.47 per rupee to Rs. 2.36 to producers from the production of different types of flowers. While on the other hand there was a return of 1.18 rupees against per rupee spent by the retailer. The floral business was on limited scale and motivation is needed to expand this business by farmers through some incentives.

Ali and Banerjee (2000) studied to assess the economic aspects (fluctuations in monthly prices, marketing margins and cost) of marketing of Bela flower in West Bengal, India. Primary data were collected from 20 producer sellers 10 wholesalers, and 20 retailers from Howrah district and Midnapur (East). The analysis shows that lower prices of Bela flower prevail in April-May while higher prices prevail in June-August. Producers reap about 60% and 30% of the sale price at maximum and minimum price levels, respectively. Primary wholesalers maintain a higher profit than secondary wholesalers and retailers. Packing, transport, loading and unloading were the major cost items.

Tilekar and Salunkhe (2001) estimated the cost of marketing and cost of cultivation of roses, gladioli, aster, daisy, and tuberose in three districts i.e; Pune, Sangli and Nasik of Maharashtra states. Result shows that the average cost of marketing of rose as cut flowers produced in open cultivation was Rs. 1.41 lakh per hectare. Among the several items of costs, commission of the traders got the maximum share of 48 per cent. The cost of transport formed 39

per cent, which was around Rs. 55,000 per hectare. Cost of packaging and other expenses were comparatively very low. The cost of marketing of tuberose cut flowers produced in open cultivation was very high Rs. 1.01 lakh per hectare, while in case of gladiolus, aster and daisy comparatively very low costs. In all the flowers, the cost on account of commission of traders was more than 60 per cent of the total marketing cost, except for rose. The cost of marketing of gerbera cut flowers produced under green house of 0.05 hectare, 0.10 hectare and 0.40 hectare was Rs. 0.50 lakh, Rs. 0.93 lakh and Rs. 37.2 lakhs respectively. The various items of cost of marketing, commission of agents share nearly 50 per cent while grading, packaging, and transportation formed equally. The cost of marketing of carnation as cut flowers produced under green house of 0.05 hectare, 0.10 hectare, and 0.40 hectare was Rs. 0.56 lakhs, Rs. 1.17 lakh and Rs. 4.87 lakh respectively. Due to high risk, the share of commission agents is comparatively very high that is 66 per cent of total marketing in comparison of gerbera, the average cost of marketing was higher for carnation.

2.2 Review on livelihood and its related issues

2.2.1 Concept of livelihood

Livelihoods can be defined as “a means of gaining living”, which refers to the way of living rather than income and consumption alone (Stroud, 1996; Avnimelech, 1998; Chambers and Conway, 1991). A livelihood comprises people, their capabilities and activities for means of living, including assets (tangible and intangible). Tangible assets are resources and stores, and intangible assets are claim and access (Avnimelech, 1998). Afterwards, several researchers used this definition with minor modification (Carswell, 1997; Scoones, 1998). The theory of livelihood encompasses not only the income generating activities pursued by a household and its individuals, but also entails the social institutions, intra-household relations, and mechanisms of access to resources through the life cycle (Ellis, 2000; Arce, 2003).

The two main concepts of livelihoods i.e., environmental sustainability and social sustainability are basis for sustainability of livelihoods. A livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depends, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations (Chambers and Conway, 1991).

According to Chambers and Conway (1991), sustainable livelihoods concept is based normatively on the ideas of capabilities, equity, and sustainability, each of which is both end and means. A livelihood provides the support for the enhancement and exercise of capabilities (an end); and capabilities (a means) enable a livelihood to be gained. Equity must include adequate and decent livelihoods for all (an end); and equity in assets and access are preconditions (means) for gaining adequate and decent livelihoods. Sustainable stewardship of resources is a value (or end) in itself; and it provides conditions (a means) for livelihoods to be sustained for future generations.

The standard definition of sustainable livelihoods has been provided by Chambers and Conway (1991), and the present research work follows their concept: A “livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term while not undermining the natural resource base”. On this definition, various international agencies like DFID, CARE, IDS team and the United Nations Development Program base their livelihood approaches (Carney *et al.*, 1999).

2.2.2 Livelihood model

The framework shows a way of thinking on livelihoods through the differing contexts such as constraints and opportunities, and ensuring that important factors are not ignored (Ashley and Carney, 1999). There are several livelihood models developed by researches but in most models the main elements are similar and addresses of these are as follows:

Context: The external environment in which households exist and which is responsible for many of their hardships (social, economic, political and environmental dimensions, conditions and trends).

Assets and capabilities (financial, natural, physical, human, political and social capital): The resources poor people possess or have access to and use to gain a livelihood.

Policies, institutions and processes (sometimes called transforming structures and processes): The institutions, organizations, policies and legislation that determine access to assets and choice of livelihood strategies.

Livelihood strategies: The ways which lead to the building up of assets and capabilities to improve their livelihoods (i.e., consumption, production, processing, exchange and income generating activities).

Outcomes: Successful livelihood strategies should lead to more secure income and more economically sustainable livelihoods of people. These include better health, nutrition, water, shelter, education, etc. increased well-being, reduced vulnerability and more sustainable use of the natural resource base. The framework of livelihood presents the main factors, which constrain or enhance livelihood opportunities of people as well as the typical relationships between these. The widely used sustainable livelihoods framework that contains these elements has been presented below (Figure 2.1).

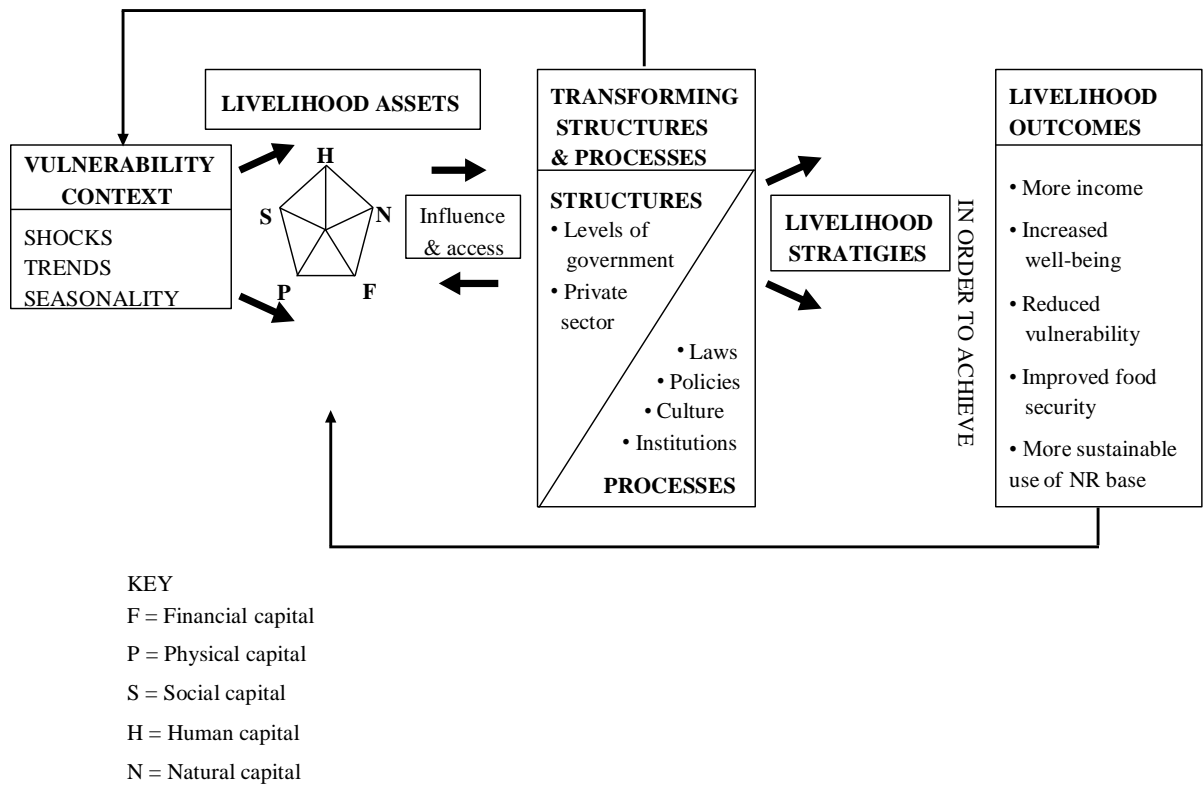


Figure 2.1 DFID sustainable livelihoods framework (Carney *et al.*, 1999)

2.2.3 Frameworks for the analysis of livelihood

There are several frameworks developed by different agencies to help understand the complexity of livelihoods, illustrate the linkages between different factors that influence livelihoods, and identify where interventions can be made. The framework of DFID, UNDP and CARE - Bangladesh, which are relevant to this study, are summarized in Table 2.1.

Table 2.1: Key aspects of the livelihoods approaches used by different development agencies

Agency	Asset categories	Sectors in applied	Core ideas and principles	Levels
DFID	Human, social, natural, physical and financial (consideration of political as a further asset).	Rural, urban, conflict and situations of chronic instability, transport and infrastructure, enterprise, literacy and livelihoods, health and HIV/AIDS.	Six Guiding Principles: People-centered, Responsive and Participatory, Multi-level, Partnership that promote SL in the context of poverty elimination. Various types of Sustainability, Dynamic.	Policy level, project programming framework, external partnerships with NGOs, governments and multilaterals.
CARE	Social, physical, human, political, financial and natural	Rural, urban, conflict and situations of chronic political instability, disaster.	Four principles of HLS: people, holistic, disasters and development, micro and macro. Integration of RBA to livelihood programming.	Household level, urban management, country-specific.
UNDP	Human, social, natural, physical and economic (sometimes adds political).	Uses at the field and country level (with the exception of the PEI).	People-centered, participatory approaches, holistic vision of development agenda. Established SL unit in its Social Development but disbanded in 2001.	Country level, field level, local institutions and organizations.

(Hussein, 2002)

2.2.4 Indicators of livelihood

There are many indicators used to monitor complex changes in livelihoods and to understand the processes that have produced such change. CARE (2004) identified 26 livelihood indicators usually used to measure around 9 livelihood outcomes “themes”, and these have been presented in Table 2.2.

Table 2.2: Some important indicators used by different organizations in Bangladesh at household level

Livelihood outcome	Indicators used by different organization
Nutritional security	% children with low birth rate (UNICEF) Per capita food intake (Kcal) (PROSHIKA) % women have BMI of at least 18.5 (CARE) •Appropriate breast feeding and weaning practices for new-born (CARE)
Food security	HHs with homestead gardens (HKI) Cropping intensity (FAO) Gross crop and livestock income (HKI) % income used to procure food decreases (CARE)
Health security	%HHs with less than \$1/day income (UNICEF) % decrease in general diseases(CARE) % decrease in neonatal mortality, morbidity rates (CARE) % decrease in maternal mortality, morbidity rates (CARE) children with access to immunization (CARE)
Economic security	% HHs with manual labor as principal occupation (HKI) Amount cultivated land/land ownership (HKI) Income from agricultural sales HHs dependent on manual labor (HKI) % HHs using loans for business enterprise activities (CARE) % HHs with increasing assets (CARE) % women with adequate income equal to wage or agriculture labor index (CARE) % women with accumulated savings/investment above mandatory savings (CARE) HHs identified several alternative livelihood options (income diversity) (CARE)
Health security	%HHs with less than \$1/day income (UNICEF) % decrease in general diseases(CARE) % decrease in neonatal mortality, morbidity rates (CARE) % decrease in maternal mortality, morbidity rates (CARE) children with access to immunization (CARE)
WATSAN security	•% HHs using functional latrines (CARE) % HHs with access to safe water (drinking, cooking, bathing, washing) (CARE) % HHs affected by salinity and arsenic (CEGIS)

Livelihood outcome	Indicators used by different organization
Education security	Adult literacy rates (CEGIS) % women with basic numeracy skill (CARE) Increased access to improved learning environment for students (CARE)
Shelter	Housing: roof materials, wall materials, floor materials, number of living rooms (CARE) Access to electricity (CARE)
Community participation	Membership in local groups (savings, gardening, etc.) (HKI) % women engaged in community organizations (CARE) % women invited to more social (community) events and gatherings (CARE) NGO membership (CARE)
Access to institution or service	Access to and use of government and other services (CARE) Extreme poor with increased access to savings services (CARE)
Gender	Women's access to institutions and services Increased (CARE) Mobility of women expanded (CARE) Women involved in decision making regarding marriage, education, mobility, and control related to their children and assets at HH level (CARE)

(CARE, 2004)

2.2.5 Livelihood strategy of rural household

In rural society, the household is the base upon which the role of farmers is negotiated and enforced. Farmers usually play diversified roles in the household by performing different kinds of activities including household activities, on-farm activities like vegetable cultivation, livestock and poultry rearing and non-farm activities such as small business, handicraft, etc. Flower cultivation will change three important dimensions of farmers at household level. These dimensions are building social capital, raising awareness and building capability, presented in Figure 2.2.

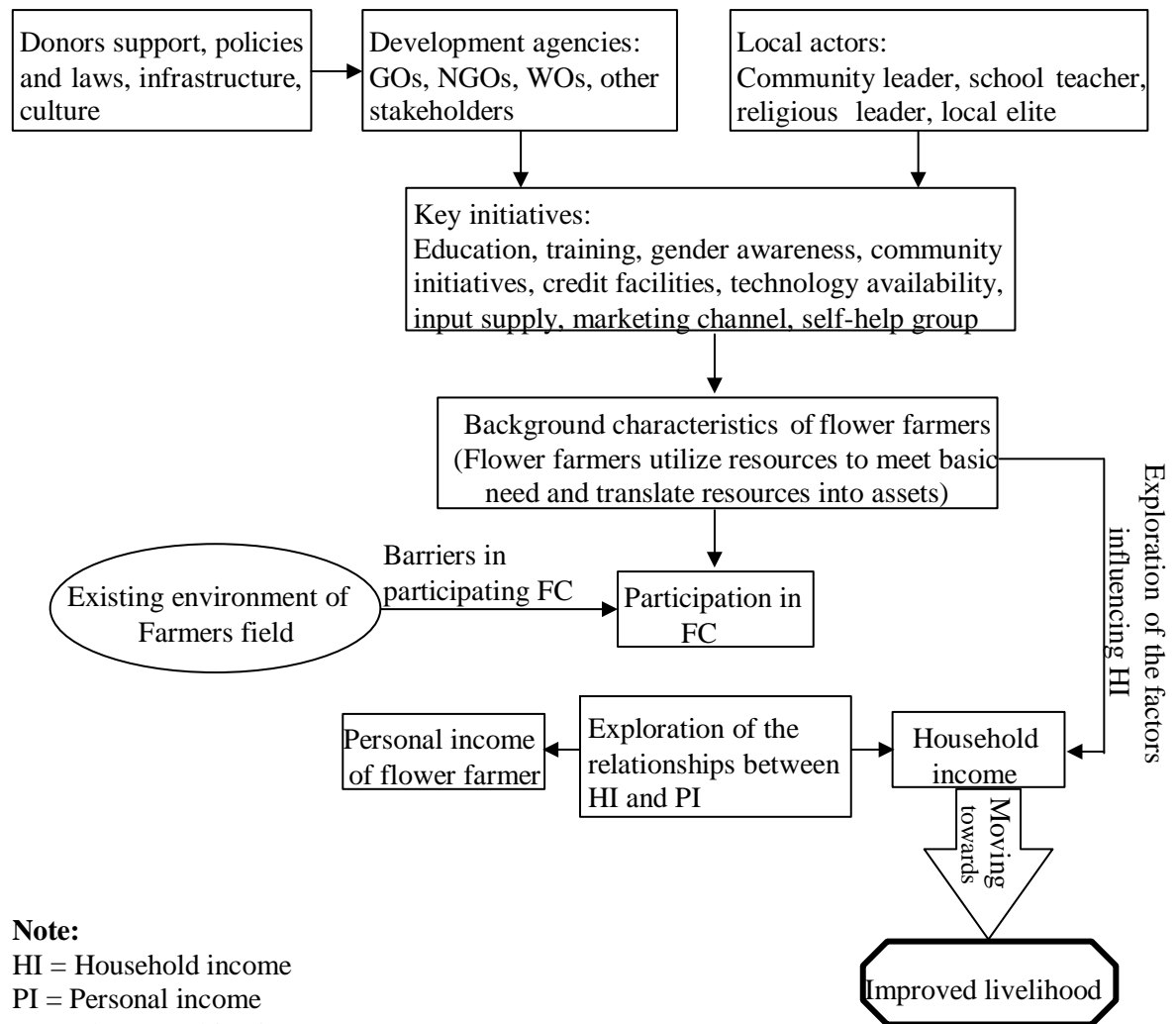


Figure 2.2 Framework of flower farmer’s improved livelihood process adopted in the study (Sheheli, 2011)

2.3 Literature concerning the contribution of the farmers’ characteristics to the impact of flower cultivation on their livelihood

There was found a very little or no review about the contribution or relationship of the flower farmers selected characteristics (age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of floral cultivation, extension media contact, training exposure, training exposure, availability of marketing information, attitude towards flower cultivation, knowledge on flower cultivation) to the impact of flower cultivation on their livelihood.

2.4 Research gap of the study

Very few researches had been done to solely assess the impact of flower cultivation on farmers' livelihood. Moreover, among the limited studies on livelihood status of farmers but only a few researchers followed systematic method of livelihood to assess the impact of flower cultivation on farmers' livelihood. This was one of the research gaps of the study. Hence, the researcher carried out the present study to assess the impact of flower cultivation on farmers' livelihood in Jhenaidah district following the method which is important to be able to identify and understand the research approach suitable for any given study because the selection of a research approach influences the methods chosen, the statistical analyses used, the inferences made and the ultimate goal of the research (Creswell, 1994).

No research was undertaken previously following the methodology which was followed by the present researcher. This was also a significant research gap of the study. The methodology of the present work was very unique in this regard. So, the researcher implemented the research program following the methodology as mentioned.

Again, no research was found which carried out taking the indicators of impact of flower cultivation on farmers' livelihood this was carried out by the researcher in the present study. This is another research gap of the present work. Hence, the researcher followed the current research program using those indicators to assess the impact of flower cultivation on farmers' livelihood. Lastly, very few researches were conducted to assess the impact of flower cultivation on farmers' livelihood taking the variables which were used in the present study. This is also a research gap of the present research.

2.5 Conceptual framework of the study

In scientific research, selection and measurement of variables constitute an important task. Studies on individual, group and society revealed that acceptance of modern technologies is conditional upon many factors. Some of

these are social, personal, economical and situational factors and the behavior of flower cultivators are influenced by these characteristics. The hypothesis of a research while constructed properly consist at least two important elements i.e.: a dependent variable and an independent variable. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. Variables together are the causes and the phenomenon is effect and thus, there is cause effect relationship everywhere in the universe for a specific events or issues.

This study is concerned with the ‘Impact of Flower Cultivation on Farmers’ Livelihood in Jhenaidah District’. Thus, impact of flower cultivation on farmers’ livelihood was the dependent variable and 12 selected characteristics of the flower cultivators were considered as the independent variables under the study. Impact of flower cultivation on farmers’ livelihood may be affected through interacting forces of many independent variables. It is not possible to deal with all of the independent variables in a single study. It was therefore, necessary to limit the independent variables, which age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of flower cultivation, extension media contact, training exposure, training exposure, availability of marketing information, attitude towards flower cultivation and knowledge on flower cultivation for this study.

Considering the above-mentioned situation and discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.3.

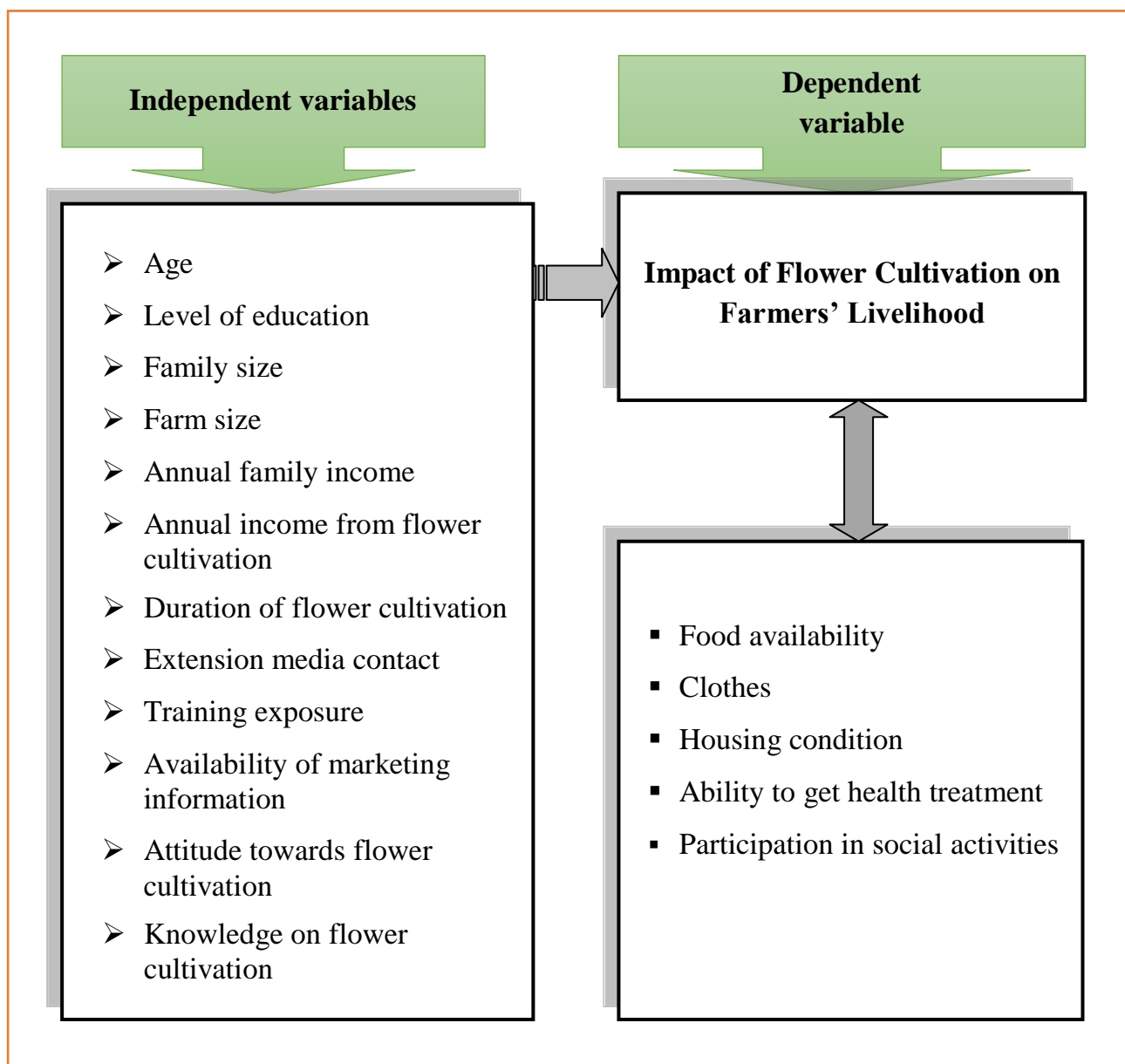


Figure 2.3 The conceptual framework of the study

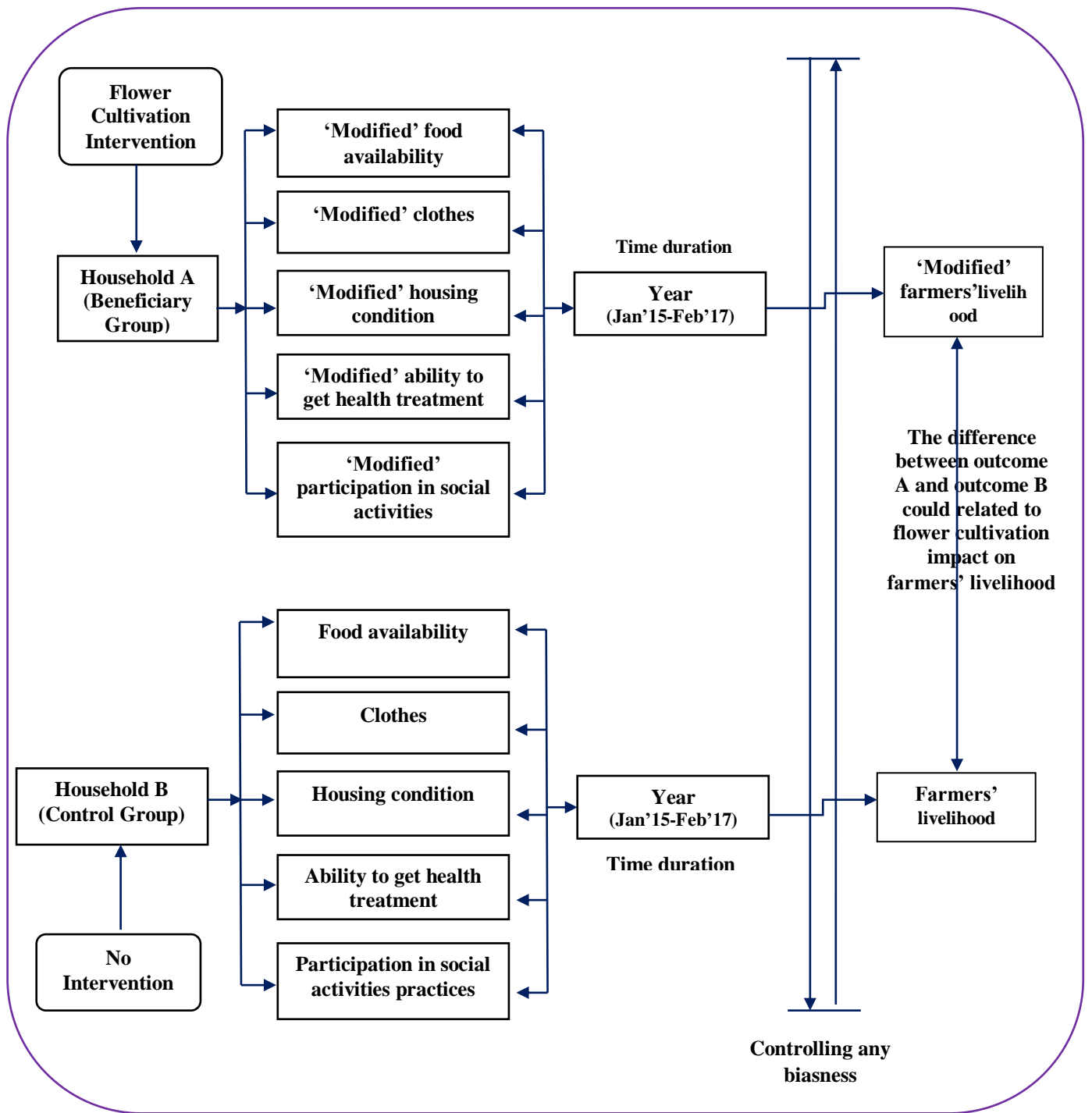


Figure 2.4 What is the impact of flower cultivation on farmers' livelihood?

CHAPTER III

MATERIALS AND METHODS

Methods play an important role in a scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 Research Design

Research design is the blueprint of the detailed procedure of testing the hypothesis and analysis of the obtained data. The research design followed in this study was *ex-post facto*, because of uncontrollable and non-manipulating variables. This is absolute descriptive and diagnostic research design. A descriptive research design is used for fact findings with adequate interpretation. Diagnostic research design, on the other hand, is concerned with testing the hypothesis for specifying and interpreting the relationship of variables.

3.2 Locale of the study area

The study was conducted in the Kaliganj upazila under Jhenaidah district. The area of Kaliganj upazila (Jhenaidah district) is 310.16 sq km, located in between 23'16' and 23'28' north latitudes and in between 89'02' and 89'16' east longitudes. It is bounded by Jhenaidah upazila on the north, Jessor Sadar and Chaugachha upazilas on the south, Salikha and Bagherpara upazilas on the east, Kotchandpur and Chaugachha upazilas on the west. The features of the farmers and agriculture at Kaliganj upazila are:

- i. Main sources of income: agriculture 64.40%
- ii. Non-agricultural laborer: 2.35%
- iii. Industry: 1.10%, commerce 15.07%
- iv. Transport and communication: 5.25%
- v. Service: 5.64%, construction 1.30%, religious service 0.12%, rent and remittance 0.69% and others 4.08%
- vi. Ownership of agricultural land: landowner 63.46%, landless 36.54%
- vii. Agricultural landowner: urban 44.40% and rural 66.58%
- viii. Main crops: paddy, sugarcane, jute, wheat, betel leaf, mustard, sesame, varieties of pulse, vegetables etc.

Kaliganj upazila has 12 unions namely Kashtabhanga, Kola, Jamal, Trilochanpur, Niamatpur, Bara Bazar, Maliat, Rakhalgachhi, Roygram, Simla Rokonpur, Sundarpur Durgapur. Trilochanpur union is one of the union among the unions of Kaliganj upazila which were selected purposively as the study area. The farmers of this union Trilochanpur are mostly engaged in flower cultivation. The number of flower cultivators in the study area was 128 which constituted the population of the study.

The map of Jhenaidah district has been presented in Figure 3.1 and the specific study location namely Kaliganj upazila have also been shown in Figure 3.2.

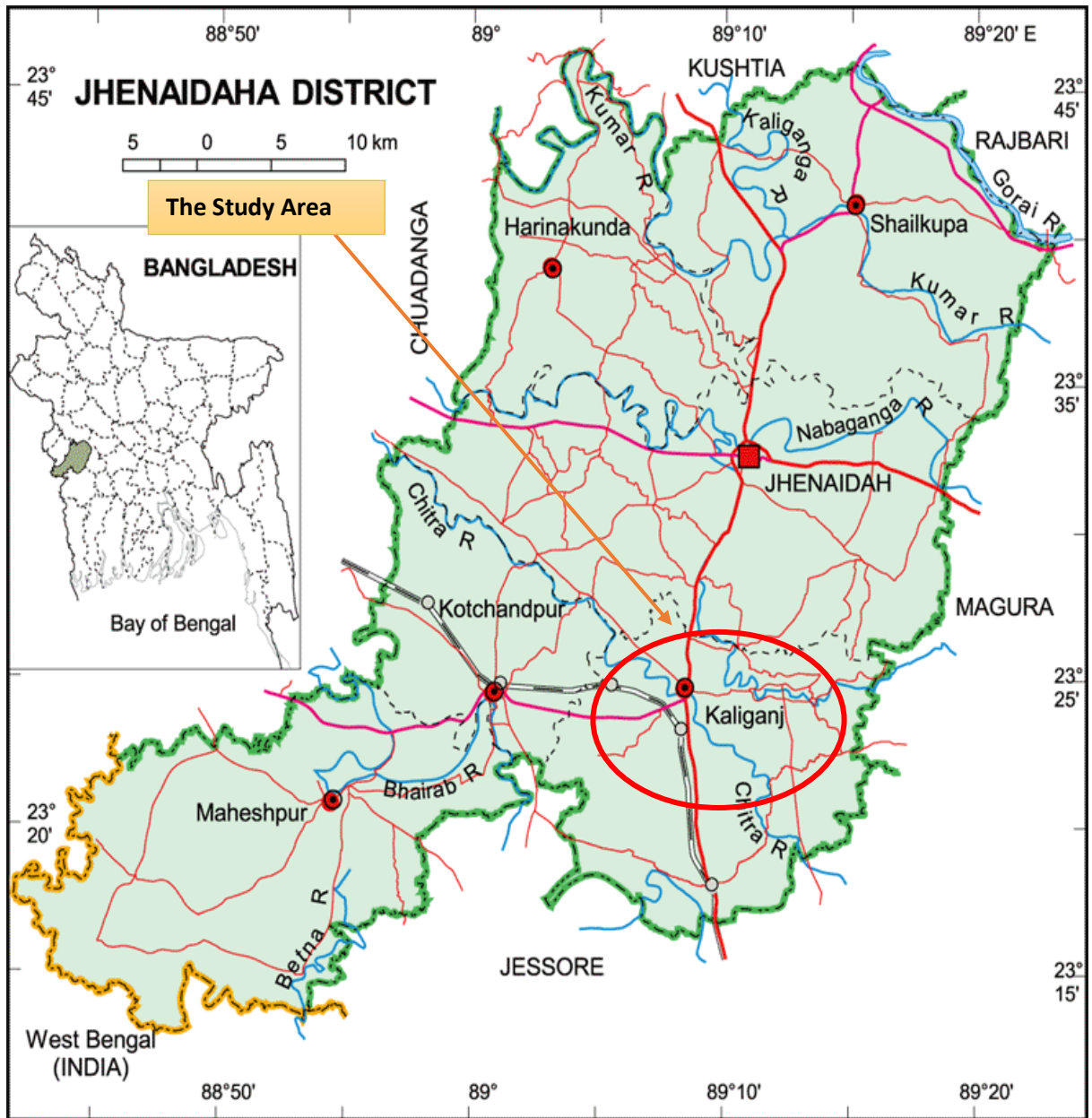


Figure 3.1 Map of Jhenaidah district showing Kaliganj upazila



Figure 3.2 Map of Kaliganj upazila showing the study area (Trilochanpur union)

3.3 Fundamental attributes of the study area

The population of the study areas consists of small, subsistence-based farmers and nearly everyone is directly or indirectly involved in the production or processing of agricultural goods and related activities like livestock rearing, fisheries and forestry. The economy of the study villages primarily depends on agricultural production, principally of flower, rice, potatoes, oilseeds, pulses, wheat, jute and some vegetables. The villages are largely self-sufficient in rice, but other agricultural products are not sufficient to meet their demand. In addition to agricultural products some village households produce handicrafts that are being sold further away, reaching regional and national markets. However, village households in general face a serious economic crisis and they are living below the poverty line. Many village households depend on income from urban areas for their livelihoods.

Generally, rural people build their house in a cluster form called 'Bari' and many generations (2 to 3) live together within a 'Bari'. Houses in villages are situated on high land and linked to walking roads. The shape of the house is commonly rectangular and usually made of dried mud, bamboo, straw, iron sheet or bricks with thatched roofs. The interior decoration is very simple and furniture is minimal, often consisting only of low stools. People sleep on wooden or bamboo platform like as a cot. Houses have verandas usually in the interior front, and many of the activities of daily life take place under the eaves of verandas. Most commonly, a kitchen (ranna ghor) is separated from the living house and during the dry season particularly in winter many women construct hearths in the household courtyard for cooking. Rural houses are simple and functional, but are not generally considered aesthetic showcases. On average, a household consists of 5-6 persons. Most of the village households have a pond used for daily household needs, a nearby river that provides fish, trees that provide fruit and timber (mainly mango and jackfruit), and a piece of garden.

The landowning status mainly reflects socio-economic class position in rural areas, although occupation and education also play a role. Larger farm owners are at the top of the socioeconomic scale, small subsistence farmers are in the middle, and the landless rural households are at the bottom of the socio-economic class position. Another most obvious symbol of class status is dress. The traditional garment for men is lungi and shirt; for women, the sari. The poor people usually wear cheap, rough green or dark colored cotton cloth, while the rich people wear bright colored with elaborate and finely worked cloths. Gold jewelry indicates a high social standing among women as very few households have gold purchasing capacity. Islam is the predominant religion in study area.

Physical infrastructures for public and health services are inadequate. Most of the roads are earthen roads and rickshaw, auto-rickshaw 'tempo' and tractors are the main means of transportation. Only one community clinic has been found among the four villages and pharmacies are the major place where rural people seek treatment. Also, sanitation and water facilities are not adequate. Residents use unsanitary pond water for washing, bathing and cooking. Open defecation beside the pond is a common practice and most of the toilets are also situated within close distance of the ponds. There are very limited electrification facilities in the study area and people are mainly dependent on petroleum oil for lighting during the night and lifting ground water for irrigation. To reduce fuel costs, people go to bed as early as possible after sunset. There are many GOs, NGOs and civil society organizations in the study areas which are working for development and improving the livelihood of the villagers.

3.4 Population and sample of the study (SG - Study Group)

All the farmers who cultivate flower of Trilochanpur union of Kaliganj upazilla of Jhenaidah district constituted the population of the study. For this purpose, an up-to-date list of the flower farmers was prepared with the help of the village elites and Sub-Assistant Agricultural Officers of that union. The total number of the flower farmers in Trilochanpur union was 128. Attempt had been made to collect data from all the 128 flower farmers of the Trilochanpur union. Thus, 128 flower cultivators constituted the population of the study which is shown in the following Table 3.1. But unfortunately, 13 farmers were not available at the time of data collection. Hence, the sample of the study becomes 115.

Table 3.1 Population of the study area

Name of the selected upazila	Name of the selected area	Name of the selected block	Number of the respondents	Sample size
Kaliganj (Jhenaidah District)	Trilochanpur union	Kalukhali	51	45
		Baliadanga	77	70
Total			128	115

3.4.1 Control Group (CG) Selection

Forty (40) farmers from same study area were selected as the control group who did not cultivate flowers. To ensure similar socio-economic conditions for both the control and test groups, a two-way stratified random sampling technique was used (Mazumder and Wencong, 2015), in which education and farm size were considered as two individual strata (Rashid, 2014). Education was categorized into three groups:

Group 1 (denoted E_1): illiterate or can sign only

Group 2 (denoted E_2): having primary education

Group 3 (denoted E_3): having secondary or higher education.

Farm size was also categorized into three groups:

Group 1 (denoted F_1): small farm group (farm size up to 0.5 hectares)

Group 2 (denoted F_2): medium-farm group (farm size 0.51 to 1.0 hectare)

Group 3 (denoted F_3): large farm group (farm size above 1.0 hectare). The two-way stratified random Table is given as Table 3.2.

Table 3.2 Two-way stratified random sampling of respondents based on their level of education and farm size

Category	% of respondents	Study Group	Control Group (one-third of the study group)
$E_1 \times F_1$	7.9	9	3
$E_1 \times F_2$	2.6	3	1
$E_1 \times F_3$	7.9	9	3
$E_2 \times F_1$	6.1	7	3
$E_2 \times F_2$	10.4	12	4
$E_2 \times F_3$	28.6	33	11
$E_3 \times F_1$	7.9	9	3
$E_3 \times F_2$	5.2	6	3
$E_3 \times F_3$	23.4	27	9
Total	100	115	40

With the help of the two-way stratified random sampling procedure, homogeneous/ similar categories of control and testing group respondents were selected, and then the proportionate random sampling technique was used to select either study or control group respondents from each village/group. To ensure the same respondents for the interviews, 5% extra respondents were interviewed to fill in the gaps in case of any interviewed respondent unavailable.

3.4.2 Distribution of Study Group (SG) and Control Group (CG)

The total numbers of sample size under the study area were estimated 155 where the Study Group (SG) and Control Group (CG) covered 115 and 40 respectively. The sample size is showing in the following table 3.3.

Table 3.3 Sample Size of Study Group (SG) and Control Group (CG)

Name of block	Population	Study Group (SG)	Control Group (CG)
Kalukhali	45	45	15
Baliadanga	70	70	25
Total	128	115	40

3.5 Data collection methods and tools

3.5.1 Data collection methods

The survey method was used to collect quantitative data that allow to answer the research questions framed and to gain an understanding of the impact of flower cultivation on farmers' livelihood. Individual interviews were used in the survey and were conducted in a face-to-face (Bryman, 2001) situation by the researcher. This method is useful to get unanticipated answers and to allow respondents to describe the world as they really see it rather than as the researcher does (Bryman, 2001).

3.5.2 Data collection tools

Structured interview schedules were prepared to reach the objectives of the study. A structured interview schedule was prepared containing open and closed formed questions. The open questions allowed for the respondents to give answers using their own language and categories (Casley and Kumar, 1998). The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive. The instruments were first developed in English and then translated into Bengali. The survey tools were initially constructed based on an extensive literature reviews and pre-tested. The schedule was pre-tested with 15 randomly selected flower farmers in the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires

were also checked for validity by supervisor and educational experts at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from field staff of different GOs and NGOs and local leader. The primary data were collected from 02 February, 2017 to 07 February, 2017 and two years back (January, 2015) data were considered through respondents' memory recall for pre-test. Appropriate scales were also developed to operation the reasons to questions. Final part of data collection was started in during 11 February, 2017 to 10 March, 2017. Two years back (January, 2015) data were considered through respondents' memory recall.

3.6 Variables and their measurement techniques

The variable is a characteristic, which can assume varying, or different values in successive individual cases. A research work usually contains at least two important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last 12 independent variables were selected which include age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of floral cultivation, extension media contact, training exposure, availability of marketing information, attitude towards flower cultivation and knowledge on flower cultivation. The dependent variable of this study was the 'impact of flower cultivation on farmers'

livelihood'. The methods and procedures in measuring the variables of this study are presented below:

3.6.1 Measurement of independent variables

The 12 characteristics of the flower farmers mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.6.1.1 Age

Age of the farmers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the farmers. A score of one (1) was assigned for each year of one's age. This variable appears in item number 1 in the interview schedule as presented in Appendix-I.

3.6.1.2 Level of Education

Education was measured by assigning score against successful years of schooling by a farmer. One score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a farmer passed the final examination of class five or equivalent examination, his/her education score has given five (5). Each farmer of can't read & write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5. If a farmer did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number 2 in the interview schedule as presented in Appendix-I.

3.6.1.3 Family size

Family size of a farmer was determined by the total number of members in his/her family including him/her, children and other dependents. The scoring was made by the actual number of family members expressed by the farmers.

For example, if a farmer had five members in his/her family, his/her score was given as 5. This variable appears in item number 3 in the interview schedule as presented in Appendix-I.

3.6.1.4 Effective farm size

Effective farm size of a farmer referred to the total area of land on which his/her family carried out the farming operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the farmer or cultivated on sharecropping, lease or taking from other including homestead area and measured using the following formula (Rashid, 2014):

$$EFS = A + B + \frac{1}{2}(C + D) + E$$

Where, EFS = Effective Farm size

A = Homestead area including garden and pond

B = Own land under own cultivation

C = Land taken from others as borga

D = Land given to other as borga

E = Land taken from others on lease

The data was first recorded in terms of local measurement unit i.e. kani or decimal and then converted into hectare. The total area, thus, obtained is considered as his farm size score (assigning a score of one for each hectare of land). This variable appears in item number four (4) in the interview schedule as presented in Appendix-I.

3.6.1.5 Annual family income

The term annual income refers to the annual gross income of flower cultivators and the members of his family from different sources. It was expressed in taka. In measuring this variable, total earning taka of an individual flower cultivator was converted into score. A score of one was given for every one thousand taka. The method of ascertaining income involved three phases. Firstly, the income from agricultural crops in the preceding year was noted and converted into taka. Secondly, income from animals and fish resources. Thirdly, other source income included earning form small business, service, other family

members' income, day laborer, fishing and others if any. This variable appears in item number five in the interview schedule as presented in Appendix-I.

3.6.1.6 Annual family income from flower cultivation

Annual family income from flower cultivation refers to the total financial return from flower production in one year. It will be expressed in Taka. One score will be given for 1000 taka. A score of 1 was assigned for Tk. 1000. For an amount, less than Tk.1000, a fraction score was computed and added with the main score. This variable appears in item number six in the interview schedule as presented in Appendix-I.

3.6.1.7 Duration of flower cultivation

Duration of flower cultivation of flower cultivators was determined by the total number of year involved in flower cultivation. A score of one (1) was assigned for each year duration of flower cultivation. This variable appears in item number seven in the interview schedule as presented in Appendix-I.

3.6.1.8 Extension media contact

It was defined as one's extent of exposure to different communication media related to farming activities. Extension media contact of a farmer was measured by computing extension media contact score on the basis of their nature of contact with eight extension media. Each farmer was asked to indicate his nature of contact with four alternative responses, like regularly, frequently, sometimes, rarely and not at all basis to each of the seven media and score of four, three, two, one and zero were assigned for those alternative responses, respectively. These five options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Extension media contact of the farmers was measured by adding the scores of eight selected source of information. Thus, extension media contact score of a farmer could range from 0 to 32, where zero indicated no extension media contact and thirty-two indicated highest level of extension media

contact. This variable appears in item number eight in the interview schedule as presented in Appendix-I.

3.6.1.9 Training exposure

Training exposure of a flower cultivator was determined by the total number of day when he attended in different training programs in his life. A score of one (1) was assigned for each day of training attended. This variable appears in item number nine in the interview schedule as presented in Appendix-I.

3.6.1.10 Availability of marketing information

It was defined as one's extent of exposure to available marketing information related to marketing of flowers. Availability of marketing information was measured by computing availability of marketing information score on the basis of their nature of availability of marketing information with six marketing information. Each farmer was asked to indicate his nature of marketing information with five alternative responses, like regularly, frequently, sometimes, rarely and not at all basis to each of the six information and score of four, three, two, one and zero were assigned for those alternative responses, respectively. These five options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Availability of marketing information cited by the farmers was measured adding the scores of six selected source of information. Thus, availability of marketing information score by a farmer could range from 0 to 24, where zero indicated no availability of marketing information and twenty-eight indicated highest level of availability of marketing information. This variable appears in item number 10 in the interview schedule as presented in Appendix-I.

3.6.1.11 Attitude towards flower cultivation

Attitude towards flower cultivation of a respondent implies to his/her beliefs, outlook, perception and action tendencies. To determine this criterion, a

number of 10 statements (5 positive and 5 negative) were randomly presented before the interviewees. A five-point scale was used to measure the attitude of the beneficiaries. This scoring was done in the following manner for the positive statement:

Extent of agreement	Score
Strongly agreed	+2
Agreed	+1
Undecided	0
Disagreed	-1
Strongly disagreed	-2

Reverse scoring system was used for negative statement. All the scores for positive and negative statements were summed up and the final score was determined. This variable appears in item number eleven in the interview schedule as presented in Appendix-I.

3.6.1.12 Knowledge on flower cultivation

Flower cultivation knowledge of a farmer was measured by asking him/her 10 questions related to different components of flower production. It was measured assigning weightage three (3) for each question. So, the total assigned scores for all the questions became thirty. The score was given according to response at the time of interview. Answering a question correctly an individual could obtain full score while for wrong answer or no answer he obtained zero (0) score. Partial score was assigned for partially correct answer. Thus, the agricultural knowledge score of a farmer could range from zero (0) to thirty (30), where zero indicates very poor knowledge and thirty indicates sound knowledge. This variable appears in item number twelve in the interview schedule as presented in Appendix-I.

3.6.2 Measurement of dependent variable

The dependent variable of this study is “Impact of Flower Cultivation on Farmers’ Livelihood in Jhenaidah District”. The dependent variable i.e. impact of flower cultivation on farmers’ livelihood was measured in five dimensions:

a) change in food availability, b) changes in clothes value, c) changes in housing condition, d) changes in ability to get health treatment and e) changes in participation in social activities. All the major components were measured with the help of identified subcomponents. Each subcomponent was measured against the identified items, collected through the process of review of relevant literature, focused discussion with the officials, experts and experienced farmers. Flower Cultivation Impact (FCI) on farmers' livelihood was calculated by using the formula:

$$FCI = CSFA + CSCV + CSHC + CSAGHT + CSPSA$$

Where, FCI = Flower Cultivation Impact

CSFA= Changes Score in Food Availability

CSCV= Changes Score in Clothes Value

CSHC= Changes Score in Housing Condition

CSAGHT= Changes Score in Ability to Get Health Treatment

CSPSA=Changes Score in Participation in Social Activities

In each case, the impact was measured in difference-in-difference method. In this study, the difference between 2015 and 2017 was measured both for study and control group respondents. Finally, the study group was compared with the control group based on difference between 2015 and 2017 data record (Mazumder and Lu, 2015).

3.6.2.1 Change in food availability

Food availability of the respondents was measured in score on the basis of his availability of food during 2015 and 2017. Each farmer was asked to indicate his nature of availability of food with three alternative responses, like adequate, inadequate and shortage basis to each of the five food items and score of three, two and one were assigned for those alternative responses respectively. The changes in food availability score of the study group respondents were classified into three categorized as low, medium and high food availability and then comparing with control group. The change value was computed

considering the changes in availability of food from 2015 to 2017 and then comparing with control group.

3.6.2.2 Changes in clothe value

The clothe value of respondents was measured in taka on the basis of his previous year using clothes during 2015 and 2017. One thousand taka was assigned for score 1. The changes in clothe value of study group was determined on the basis of changed clothe value score during 2015 and 2017. The change value was computed considering the changes in cloth value from 2015 to 2017 and then comparing with control group.

3.6.2.3 Changes in housing condition

This indicator refers to the present situation of the house inhabited by farmers. To determine the housing conditions, three characteristics of houses were considered, namely roof, walls, floor. The overall housing condition of each respondent was calculated by summing the score obtained from these three characteristics of the house. The possible score could vary from 2 to 9, where by 2 indicates a 'very poor' and 9 indicates a 'very good' housing condition. The housing condition of respondents was measured in score. The change value was computed considering the changes in housing condition from 2015 to 2017 and then comparing with control group.

3.6.2.4 Ability to get health treatment

The opportunities of farmers to get treatment from different providers available in the study area were determined. Total number of health treatment providers was five. Scoring for availability of health treatment providers was '2' for frequently, '1' for seldom and '0' for not at all. Health treatment ability was measured by summing scores of five items and the possible score varied from 0 to 10. This variable appears in item number 13 (iv) in the interview schedule as presented in Appendix-I. The change value was computed considering the changes in ability to get health treatment from 2015 to 2017 and then comparing with control group.

3.6.2.5 Participation in social activities

Participation in social activities is defined as the degree to which farmers attend different social events. It was measured by computing a ‘social participation score’ based on the participation in five selected social events. Scoring of participation was ‘2’ for regularly, ‘1’ for occasionally, and ‘0’ for no participation. The scores of five social events were then added to calculate the total score of participation in social activities. Therefore, the participation in social activities score could vary from 0 to 10, whereby a 0 indicates ‘no participation’ and a 10 indicates ‘regular participation’. The change value was computed considering the changes the participation in social activities from 2015 to 2017 and then comparing with control group.

3.7 Constraints faced by farmers during flower cultivation

Constraints in flower cultivation faced by the farmers were measured on the basis of extent of constraints in flower cultivation. The following scores were assigned against each of the problems:

Extent of problems	Score
Very High problem	4
High problem	3
Moderate problem	2
Little problem	1
No problem	0

Flower cultivation constraints of a farmer were measured by asking her 10 questions related to different components of flower cultivation constraints. Thus, constraints in flower cultivation score of a respondent could range from 0 to 40 where 0 indicated no constraints and 40 indicated very high constraints faced in flower cultivation.

3.7.1 Rank order of constraints in flower cultivation

To ascertain the best problem confrontation strategies Constraint Faced Index (CFI) was computed. There were twelve problem confrontation strategies for coping with 10 selected items by the farmers in flower cultivation. The farmer of flower cultivation implements different extent of constraints strategies

against different constraints. They are presented below in rank order. A Constraint Faced Index (CFI) was computed for each constraints strategy by using the formula:

$$CFI = f_{vh} \times 4 + f_h \times 3 + f_m \times 2 + f_l \times 1 + f_n \times 0$$

Where, CFI = Constraint Faced Index

f_{vh} = No. of respondents faced very high constraint

f_h = No. of respondents faced high constraint

f_m = No. of respondents faced medium constraint

f_l = No. of respondents faced low constraint

f_n = No. of respondents faced no constraint

Constraint Faced Index (CFI) for each constraint strategies could range from 0 to 460, where 0 indicating lowest extent of constraint and 460 indicating highest extent of constraint.

3.8 Hypothesis of the study

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis.

3.8.1 Research hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

“Each of the 12 selected characteristics (age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of flower cultivation, extension media contact, training exposure, availability of marketing information, attitude towards flower cultivation, knowledge on flower cultivation) of the farmers has significant contribution on the impact of flower cultivation at their livelihood.”

3.8.2 Null hypothesis

A null hypothesis states that there is no contribution between the concerned variables. The following null hypothesis was formulated to explore the contribution of the selected characteristics on impact of flower cultivation on farmers' livelihood. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows:

“There is no contribution of the selected characteristics (age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of flower cultivation, extension media contact, training exposure, availability of marketing information, attitude towards flower cultivation, knowledge on flower cultivation) of farmers to the impact of flower cultivation at their livelihood.”

3.9 Data processing and analysis

Bogdan and Biklen (2006) insist that data analysis is an on-going part of data collection. Initially, all collected data were carefully entered in Access, exported to Microsoft Excel. Exported data were checked randomly against original completed interview schedule. Errors were detected and necessary corrections were made accordingly after exporting. Further consultation with research assistants and in some cases with the community people were required. Finally, data were exported from the program Microsoft Excel to SPSS/windows version 22.0, which offered statistical tools applied to social sciences. Qualitative data were converted into quantitative numbers, if required, after processing, scaling and indexing of the necessary and relevant variables to perform subsequent statistical analysis for drawing inferences.

As outlined earlier, there are many different forms and methods that can be used to analyze both quantitative and qualitative data in accordance with the objectives of the study. Both descriptive and analytical methods were employed in order to analyze the data. Descriptive techniques have been used to illustrate current situations, describe different variables separately and construct tables presented in results. These included: frequency distribution,

percentage, range, mean and standard deviation. Analytical techniques have been utilized to investigate the contribution of the selected characteristics of the flower farmers to the impact of flower cultivation on their livelihood. Statistical test like regression was used in this study. Each statistical technique is used under specific conditions.

3.10 Statistical analysis

Regression analysis was used to identify the linear combination between independent variables used collectively to predict the dependent variables (Miles and Shevlin, 2001). Regression analysis helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Ordinary Least Squares (OLS) is used most extensively for estimation of regression functions. In short, the method chooses a regression where the sum of residuals, $\sum U_i$ is as small as possible (Gujarati, 1995). The overall quality of fit of the model has been tested by ANOVA specifically F and R^2 test.

The data were analyzed in accordance with the objectives of the proposed research work. The factors that contribute to impact of flower cultivation on farmers' livelihood are analyzed using a regression model, multiple regression analysis (B) was used. Throughout the study, five (0.05) percent and one (0.01) percent level of significance were used as the basis for rejecting any null hypothesis. If the computed value of (B) was equal to or greater than the designated level of significance (p), the null hypothesis was rejected and it was concluded that there was a significant contribution between the concerned variable. Whenever the computed value of (B) was found to be smaller at the designated level of significance (p), the null hypothesis could not be rejected. It was concluded that there was no contribution of the concerned variables.

The model used for this analysis can be explained as follows:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11} + b_{12}x_{12} + e$$

Where, Y= is the impact of flower cultivation on farmers' livelihood;

The value of 'a' represents constant value of the equation. Of the independent variables, x_1 is the flower farmer's age, x_2 is level of education, x_3 is family size, x_4 is farm size, x_5 is annual family income, x_6 is annual income from flower cultivation, x_7 is duration of floral cultivation, x_8 is extension media contact, x_9 is training exposure, x_{10} is availability of marketing information, x_{11} is attitude towards flower cultivation and x_{12} is knowledge on flower cultivation. On the other hand, $b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8, b_9, b_{10}, b_{11}$ and b_{12} are regression coefficients of the corresponding independent variables, and e is random error, which is normally and independently distributed with zero mean and constant variance.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion was made of the findings with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this chapter. These are presented in four sections according to the objective of the study. The first section deals with the selected characteristics of the farmers, while the second section deals with the impact of flower cultivation on farmers' livelihood. The third section deals with contribution of the farmers' selected characteristics to the impact of flower cultivation on farmers' livelihood, while the fourth section deals with the constraints faced by farmers associated in flower cultivation.

4.1 Characteristics of the farmers

Behavior of an individual is determined to a large extent by one's personal characteristics. There were various characteristics of the farmers that might have consequence to livelihood. But in this study, twelve characteristics of them were selected as independent variables, which included their age, level of education, family size, farm size, annual family income, annual income from flower cultivation, duration of flower cultivation, extension media contact, training exposure, availability of marketing information, attitude towards flower cultivation, knowledge on flower cultivation that might be greatly influenced to the impact of flower cultivation on their livelihood are presented-

4.1.1 Age

The age of the farmers has been varied from 25 to 62 years with a mean and standard deviation of 45.41 and 9.10 respectively. Considering the recorded age farmers were classified into three categories namely 'young', 'middle' and 'old' aged following (MoYS, 2012). The distribution of the farmers in accordance of their age is presented in Table 4.1.

Table 4.1 Distribution of the farmers according to their age

Category	Basis of categorization (years)	Observed range (years)	Farmers		Mean	SD
			Number	Percent		
Young aged	≤ 35	25-62	18	15.7	45.41	9.10
Middle aged	36-50		56	48.7		
Old aged	> 50		41	35.7		
Total			117	100.0		

Table 4.1 reveals that the middle-aged farmers comprised the highest proportion (48.7 percent) followed by old aged category (35.7 percent) and the lowest proportion were made by the young aged category (15.7 percent). Data also indicates that the middle and old aged category constitute 84.3 percent of total farmers. The middle and old aged farmers were generally more involved in flower farming activities after the realization of current situation where the flower farming returned more profit.

4.1.2 Level of education

The level of educational scores of the farmers ranged from 0 to 12 with a mean and standard deviation of 4.79 and 3.40 respectively. Based on the educational scores, the farmers were classified into five categories. The distributions of farmers according to their level of education are presented in Table 4.2.

Table 4.2 Distribution of the farmers according to their level of education

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Can't read and sign	0	0-12	5	4.3	4.79	3.40
Can sign only	0.5		16	13.9		
Primary education	1-5		36	31.3		
Secondary education	6-10		54	47.0		
Above secondary	>10		4	3.5		
Total			115	100.0		

Table 4.2 shows that farmers under secondary education category constitute the highest proportion (47.0 percent) followed by primary education (31.3 percent). On the other hand, the lowest 3.5 percent in above secondary education category. Can sign only (13.9 percent) and 4.3 percent respondents were under can't read and sign category. Therefore the data reveals that 81.8% of the betel leaf farmers literate which is better than the average literacy rate of Bangladesh.

4.1.3 Family size

Family size of the farmers ranged from 3 to 7 with the mean and standard deviation of 4.62 and 1.27 respectively. According to family size the farmers were classified into three categories namely 'small', 'medium' and 'large' family. The distribution of the cultivators according to their family size is presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their family size

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Small family	≤ 3 (Mean-1SD)	3-7	26	22.6	4.62	1.27
Medium family	4-6 (Mean ± SD)		77	67.0		
Large family	> 6 (Mean+1SD)		12	10.4		
Total			115	100.0		

Table 4.3 indicates that the medium size family constitute the highest proportion (67.0 percent) followed by the small size family (22.6 percent). Only 10.4 percent farmers had large family size. Such finding is quite normal as per the situation of Bangladesh. The findings indicated that average family size of the study area was smaller than the national average which is 4.85 (BBS, 2014). The trend of nuclear family has been rising in the study area and subsequently the family member becoming smaller than the extended family.

4.1.4 Farm size

The farm size of the farmers ranged from .15 ha to 4.71 ha with a mean and standard deviation of 1.42 and 1.03, respectively. Based on their farm size, the farmers were classified into five categories following the categorization according to DAE (1999). The distribution of the farmers according to their farm size is presented in Table 4.4.

Table 4.4 Distribution of the farmers according to their effective farm size

Category	Basis of categorization (ha)	Observed range (ha)	Farmers		Mean	SD
			Number	Percent		
Landless	≤ 0.02	0.15-4.71 (ha)	0	0	1.42	1.03
Marginal	0.021-0.20		3	2.6		
Small	0.21-1.00		39	33.9		
Medium	1.01-3.0		62	53.9		
Large	>3		11	9.6		
Total			115	100.0		

Table 4.4 indicates that the medium farm holder constituted the highest proportion (53.9 percent) followed by small farm holder (33.9 percent). The findings of the study reveal that majority of the farmers were small to medium sized farm holder. The average farm size of the farmers of the study area (1.42 ha) was higher than that of national average (0.60 ha) of Bangladesh (BBS, 2014). The cultivator with marginal farm size has very little scope to experiment about new technologies as their earnings depend on mainly in agriculture. Due to the enhancing the economic status of the farmers, the farmers are likely to motivate to buy the land.

4.1.5 Annual family income

The score of annual family income of the flower cultivators ranged from 58 to 540 with a mean and standard deviation of 198.44 and 126.33 respectively. On the basis of annual income, the flower cultivators were classified into three categories namely 'low', 'medium' and 'high' annual family income. The distribution of the flower cultivators according to their annual income is presented in Table 4.5.

Table 4.5 Distribution of the farmers according to their annual family income

Category	Basis of categorization ('000' Tk.)	Observed range ('000' Tk.)	Farmers		Mean	SD
			Number	Percent		
Low income	≤ 72 (Mean-1SD)	58-540	14	12.2	198.44	126.33
Medium income	73-325 (Mean ± SD)		82	71.3		
High income	> 325 (Mean+1SD)		19	16.5		
Total			115	100.0		

Data reveals that the flower cultivators having medium annual income constitute the highest proportion (71.3 percent), while the lowest proportion in low income (12.2 percent) followed by high income (16.5 percent). Overwhelming majority (87.80 percent) of flower cultivators have low to medium level annual family income.

4.1.6 Annual income from flower cultivation

The score of annual income of the flower cultivators ranged from 35 to 418 with a mean and standard deviation of 100.07 and 73.73 respectively. On the basis of annual income from flower cultivation, the flower cultivators were classified into three categories namely 'low', 'medium' and 'high' annual income from flower cultivation. The distribution of the flower cultivators according to their income from flower cultivation is presented in Table 4.6.

Table 4.6 Distribution of the farmers according to their annual income from flower cultivation

Category	Basis of categorization ('000' Tk.)	Observed range ('000' Tk.)	Farmers		Mean	SD
			Number	Percent		
Low income	≤ 26 (Mean-1SD)	35-418	0	0	100.07	73.73
Medium income	27-124 (Mean ± SD)		78.3	78.3		
High income	>124 (Mean+1SD)		21.7	21.7		
Total			115	100.0		

Data reveals that the flower cultivators having medium income from flower cultivation constitute the highest proportion (78.3 percent), followed by high income (21.7 percent).

4.1.7 Duration of flower cultivation

Score of duration of flower cultivation of flower cultivators could range from 5 to 15 with mean and standard deviation of 10.0 and 2.57 respectively. On the basis of duration of flower cultivation scores, the flower cultivators were classified into three categories namely ‘low’, ‘medium’ and ‘high’ experience. The distribution of the flower cultivators according to their duration of flower cultivation is given in Table 4.7.

Table 4.7 Distribution of the farmers according to their duration of flower cultivation

Category	Basis of categorization (year)	Observed range (year)	Farmers		Mean	SD
			Number	Percent		
Low duration	≤ 7 (Mean-1SD)	5-15	19	16.5	10.0	2.57
Medium duration	8-12 (Mean \pm SD)		77	67.0		
High duration	> 12 (Mean+1SD)		19	16.5		
Total			115	100.0		

Table 4.7 reveals that the majority (67.0 percent) of the cultivator fell in medium duration of flower cultivation category, whereas only 16.5 percent in low duration of flower cultivation category and 16.5 percent in high duration of flower cultivation category.

4.1.8 Extension media contact

The observed score of agricultural extension contact of the farmers ranged from 20 to 28 against a possible range of 0 to 32. The average score of the farmers was 23.85 with a standard deviation 2.99 (Table 4.10). The farmers were classified into three categories on the basis of their exposure to farming information through communication exposure scores and distribution of the

three categories namely ‘low’, ‘medium’ and ‘high’ extension media contact of the farmers.

Table 4.8 Distribution of the farmers according to their extension media contact

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low contact	≤ 21 (Mean - 1SD)	20-28	18	15.7	23.85	2.03
Medium contact	22-26 (Mean ± SD)		85	73.9		
High contact	> 26 (Mean+1SD)		12	10.4		
Total			115	100.0		

Data shows that the highest proportion (73.9 %) of the farmers had medium extension contact as compared to 15.7 percent of them having low extension contact and 10.4 percent were felt in high extension media contact (Table 4.8). From this table, it might be said that majority (73.9 percent) of the farmers had medium extension media contact. It could be sated that extension agent or media of the study area were available to the farmers. The finding was interesting but logical because in general the farmers in the rural areas of Bangladesh are less cosmopolite in nature and less exposed to different information sources. Finding reveals that 15.7 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 respondent may think that they have enough knowledge about farming activities. They receive information from their neighbors, relatives and workmates etc.

4.1.9 Training exposure

Training exposure score of the flower cultivators ranged from 0 to 15 with a mean and standard deviation of 5.93 and 3.03 respectively. Based on the training exposure score, the flower cultivators were classified into four categories namely ‘no training’, ‘low’, ‘medium’ and ‘high’ training exposure.

The distribution of the flower cultivators according to their training exposure is presented in Table 4.9.

Table 4.9 Distribution of the flower cultivators according to their training exposure

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
No training	0	0-15	6	5.2	5.93	3.03
Low exposure	≤ 2 (Mean -1SD)		1	0.9		
Medium exposure	3-9 (Mean ± SD)		93	80.9		
High exposure	> 9 (Mean+1SD)		15	13.0		
Total			115	100.0		

Table 4.9 indicates that the highest proportion (80.9 percent) of the flower cultivators had medium training exposure compared to 13.0 percent in high training exposure and 0.9 percent in low training exposure category, respectively and the proportion of 5.2 percent had no training. Training makes the flower cultivators skilled and helps them to acquire deep knowledge about the respected aspects. Trained flower cultivators can face any kind of challenges about the adverse situation in their cultivation. So, they show favorable attitude toward adoption of modern flower cultivation technologies.

4.1.10 Availability of marketing information

The score of availability of marketing information on the study area ranged from 13 to 21 with a mean and standard deviation of 18.65 and 1.81 respectively. Based on availability of marketing information score, the flower farmers were classified into three categories namely less, medium and high availability of marketing information. The distribution of the flower farmers as per their availability of marketing information is presented in Table 4.10.

Table 4.10 Distribution of the flower farmers according to availability of marketing information

Category	Basis of categorization (score)	Observed range (score)	Rural women		Mean	SD
			Number	Percent		
Less information	≤ 16 (Mean -1SD)	13-21	15	13.0	18.65	1.81
Medium information	17-20 (Mean ± SD)		74	64.3		
High information	> 20 (Mean+1SD)		26	22.6		
Total			115	100.0		

Data reveals that the highest proportion (64.3 percent) of the flower farmers had medium availability of marketing information, while 22.6 percent had high availability of marketing information and the lowest 13.0 percent had low availability of marketing information category.

4.1.11 Attitude towards flower cultivation

Attitude towards flower cultivation of the farmers ranged from 2 to 12. The average and standard deviation were 6.11 and 2.71 respectively shown in the following Table 4.11. On the basis of attitude towards flower cultivation, the respondents were categorized into three classes namely poorly favorable attitude, moderately favorable attitude and highly favorable attitude.

Table 4.11 Distribution of the farmers according to their attitude towards flower cultivation

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Poorly favorable attitude	≤ 3 (Mean -1SD)	2-12	15	13.0	6.11	2.71
Moderately favorable attitude	4 -9 (Mean ± SD)		71	61.7		
Highly favorable attitude	> 9 (Mean+1SD)		29	25.2		
Total			115	100.0		

Data shows that most of the farmers (61.7 percent) had a moderately favorable attitude towards flower cultivation while 25.2 and 13.0 percent of them had highly and poorly favorable attitude respectively. The attitude of the respondents expressed their perception about flower cultivation. It helped the researcher to judge or measure the acceptance/rejection of flower cultivation in the rural area.

4.1.12 Knowledge on flower production

Flower production knowledge scores of the farmers ranged from 19 to 26 against possible score of 0 to 30. The average score and standard deviation were 22.67 and 1.95 respectively. Based on the flower production knowledge scores, the farmers were classified into three categories namely poor knowledge, moderate knowledge and sound knowledge (Table 4.12).

Table 4.12 Distribution of the farmers according to their knowledge on flower production

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Poor knowledge	≤ 20 (Mean -1SD)	19-26	15	13.0	22.67	1.95
Moderate knowledge	21-24 (Mean ± SD)		71	61.7		
Sound knowledge	> 24 (Mean+1SD)		29	25.3		
Total			115	100.0		

Table 4.12 reveals that 61.7 percent of the farmers had moderate flower production knowledge, 13.0 percent had poor knowledge and 25.3 percent had sound knowledge on flower cultivation. Thus, an overwhelming majority (61.7 %) of the farmers had moderate knowledge.

4.2 Impact of flower cultivation on farmers' livelihood

Impact of flower cultivation on farmers' livelihood was measured in five dimensions: a) change in food availability, b) changes in clothes value, c) changes in housing condition, d) changes in ability to get health treatment and

e) changes in participation in social activities. In this study, the difference between 2015 and 2017 was measured both for study and control group respondents. Finally, the study group was compared with the control group based on difference between 2015 and 2017 data record (Mazumder and Lu, 2015). The changes result for the study are presented in bellow:

4.2.1 A compared livelihood condition index for Study Group (SG) and Control Group (CG)

A comparison between Study Group (SG) and Control Group (CG) was done to find out the flower cultivation impact on farmers. The distributions of changed livelihood with respect to study group and control group respondents are shown in Table 4.13.

Table 4.13 Distribution of study group and control group respondents' level of livelihood based on their changed value

Sl. No.	Livelihood indicators	Study Group (changed mean value differences)	Control Group (changed mean value differences)	t-test
1	Food availability	2.40	1.82	3.43 **
2	clothes value	0.92	0.47	3.09 **
3	Housing condition	0.97	0.72	2.96 **
4	Ability to get health treatment	1.12	0.75	1.71 **
5	Participation in social activities	1.97	1.47	1.89 **
Total		7.37	5.25	2.739 **

** t-value at 1% significant level

Study Group (SG) farmers were considered them who cultivated flowers and Control Group (CG) farmers were considered them who did not cultivate flower. Flower cultivators had mentionable improvement in livelihood. Study group mean score of livelihood was 7.37 while the control group gained only 5.25. The changed score of flower cultivation impact are shown below:

$$\begin{aligned}
 \text{Livelihood Impact} &= \text{Mean score of study group livelihood} - \\
 &\quad \text{Mean score of control group livelihood} \\
 &= 7.37 - 5.25 \\
 &= 2.12
 \end{aligned}$$

The score of livelihood impact was found 2.12. So, there was a positive impact of flower cultivation. Beside the score value, it was also found the significant impact of study group as well as the flower cultivation on farmers' livelihood at 1% significance value from t-test compared with control group who did other farming activities except flower cultivation.

4.2.2 Impact on farmers' livelihood through flower cultivation

Impact of farmers' livelihood through flower cultivation ranged from 3 to 16. The average and standard deviation were 6.86 and 3.20 respectively. On the basis of impact of farmers' livelihood through flower cultivation, the respondents were categorized into three categories namely low, medium and high impact (positive) as shown in Table 4.14.

Table 4.14 Distribution of the respondents according to impact of flower cultivation on farmers' livelihood

Category	Basis of categorization (score)	Observed range (score)	Farmers		Mean	SD
			Number	Percent		
Low impact	≤ 3 (Mean -1SD)	3-16	11	9.6	6.86	3.20
Medium impact	4-10 (Mean \pm SD)		88	76.5		
High impact	> 10 (Mean+1SD)		16	13.9		
Total			115	100.0		

Table 4.12 reveals that 76.5 percent of the farmers had medium impact category, 9.6 percent had low impact category and 13.9 percent had high impact of livelihood through flower cultivation. Thus, an overwhelming majority (90.4 %) of the farmers had medium to high impact of flower cultivation on farmers' livelihood category.

4.3 Contribution of selected characteristics on the respondents' livelihood conditions

For this study twelve characteristics of the respondent were selected and each of the characteristics was treated as independent variable. Of the independent variables, x_1 is the flower farmer's age, x_2 is level of education, x_3 is family

size, x_4 is farm size, x_5 is annual family income, x_6 is annual income from flower cultivation, x_7 is duration of flower cultivation, x_8 is extension media contact, x_9 is training exposure, x_{10} is availability of marketing information, x_{11} is attitude towards flower cultivation and x_{12} is knowledge on flower cultivation. Y is the impact of flower cultivation on farmers' livelihood as dependent variable of this study.

To find out the contribution of selected characteristics of the farmers to their livelihood, the method of stepwise multiple regression was administered and 12 independent variables were fitted together in step-wise multiple regression analysis. Table 4.15 shows the summarized results of step-wise multiple regression analysis with 12 independent variables on farmers livelihood through flower cultivation. It was observed that out of 12 variables only 5 independent variables namely attitude towards flower cultivation (x_{11}), annual income from flower cultivation (x_6), level of education (x_2), annual family income (x_5) and knowledge on flower cultivation (x_{12}) were formed significant into the regression equation. The other seven variables were not entered into regression equation. The regression equation so obtained is presented below:

$$Y = 5.027 + 0.455 X_{11} + 0.021 X_6 + 0.206 X_2 + 0.010 X_5 + 0.440 X_{12} + e$$

Multiple R = 0.721; R-square = 0.519;
 Adjusted R-square = 0.497; F-ratio = 6.060;
 Standard error of estimate = 2.27; Constant = 5.027;

The multiple R and R^2 values were found 0.721 and 0.519 respectively and the corresponding F-ratio was 6.060 which were significant at 1% level of significance. For determining unique contribution of each of the five variables the increase in R^2 value was determined on livelihood. These five variables combinedly explained 49.7 percent of the total variation to the impact of flower cultivation on farmers' livelihood. Attitude towards flower cultivation alone contribute 39.5 percent of the variation where annual income from flower cultivation (2.3 percent), level of education (2.8 percent), annual family income

(2.8 percent) and knowledge on flower cultivation (2.3 percent) variation to the impact of flower cultivation on farmers' livelihood.

Table 4.15 Summary of step wise multiple regression analysis showing the contribution of selected characteristics of the respondents to the impact of their livelihood through flower cultivation

Variables entered	Standardized Partial 'b' Coefficients	Value of 't' (with probability level)	Adjusted R ²	Increase in R ²	Variation explained in percent
Attitude towards flower cultivation (x ₁₁)	0.455	2.843 (0.005)	0.395	0.395	39.5
Annual income from flower cultivation (x ₆)	0.021	3.645 (0.000)	0.418	0.023	2.3
Level of education (x ₂)	0.206	3.177 (0.002)	0.446	0.028	2.8
Annual family income (x ₅)	0.010	3.039 (0.003)	0.474	0.028	2.8
Knowledge on flower cultivation (x ₁₂)	0.440	2.462 (0.015)	0.497	0.023	2.3
Total				0.497	49.7

4.3.1 Contribution of attitude towards flower cultivation to the impact of flower cultivation on farmers' livelihood

The contribution of attitude towards flower cultivation to the impact of flower cultivation on farmers' livelihood was measured by testing the following null hypothesis:

“There is no contribution of attitude towards flower cultivation to the impact of flower cultivation on farmers' livelihood”.

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

- a. The contribution of the attitude towards flower cultivation was 39.5 percent.

- b. It was the highest contribution to the impact of flower cultivation on farmers' livelihood.
- c. The null hypothesis could be rejected.

Based on the above finding, it was concluded that a respondent's attitude towards flower cultivation increased the capabilities of shifting flower cultivation. An attitude towards flower cultivation enhances the abilities of the respondents at a short time than others which transformed to the impact of flower cultivation on farmers' livelihood.

4.3.2 Contribution of annual income from flower cultivation to the impact of flower cultivation on farmers' livelihood

The contribution of annual income from flower cultivation to the impact of flower cultivation on farmers' livelihood was measured by testing the following null hypothesis:

“There is no contribution of annual income from flower cultivation to the impact of flower cultivation on farmers' livelihood”.

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

- a. The contribution of the annual income from flower cultivation was 2.3 percent.
- b. It was an important contributor to the impact of flower cultivation on farmers' livelihood.
- c. The null hypothesis could be rejected.

Based on the above finding, it was concluded that a respondent's annual income from flower cultivation increased the capabilities of shifting flower cultivation. An annual income from flower cultivation enhances the abilities of the respondents at a short time than others which transformed to the impact of flower cultivation on farmers' livelihood.

4.3.3 Contribution of level of education to the impact of flower cultivation on farmers' livelihood

The contribution of level of education to the impact of flower cultivation on farmers' livelihood was measured by testing the following null hypothesis:

“There is no contribution of level of education to the impact of flower cultivation on farmers' livelihood”.

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

- a. The contribution of the level of education was 2.8 percent.
- b. It was an important contributor to the impact of flower cultivation on farmers' livelihood.
- c. The null hypothesis could be rejected.

Based on the above finding, it was concluded that a respondent's level of education increased the capabilities of shifting flower cultivation. A level of education enhances the abilities of the respondents at a short time than others which transformed to the impact of flower cultivation on farmers' livelihood.

4.3.4 Contribution of annual family income to the impact of flower cultivation on farmers' livelihood

The contribution of annual family income to the impact of flower cultivation on farmers' livelihood was measured by testing the following null hypothesis below:

“There is no contribution of annual family income to the impact of flower cultivation on farmers' livelihood”.

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

- a. The contribution of annual family income was 2.8 percent.
- b. It was an important contributor to the impact of flower cultivation on farmers' livelihood.
- c. The null hypothesis could be rejected.

Based on the above finding, it was concluded that a respondent's annual family income increased the capabilities of shifting flower cultivation. An annual family income enhances the abilities of the respondents at a short time which transformed to the impact of flower cultivation on farmers' livelihood.

4.3.5 Contribution of knowledge on flower cultivation to the impact of flower cultivation on farmers' livelihood

The contribution of knowledge on flower cultivation to the impact of flower cultivation on farmers' livelihood was measured by testing the following null hypothesis:

“There is no contribution of knowledge on flower cultivation to the impact of flower cultivation on farmers' livelihood”.

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

- a. The contribution of knowledge on flower cultivation was 2.3 percent.
- b. It was the importation contributor to the impact of flower cultivation on farmers' livelihood.
- c. The null hypothesis could be rejected.

Based on the above finding, it was concluded that a respondent's knowledge on flower cultivation increased the capabilities of shifting flower cultivation. A knowledge on flower cultivation enhances the abilities of the respondents at a short time than others which transformed to the impact of flower cultivation on farmers' livelihood.

4.4 Constraints faced by the farmers in flower cultivation

Constraints faced by the farmers in flower cultivation scores ranged from 22 to 31 against possible score of 0 to 40. The average score and standard deviation were 26.26 and 1.77 respectively. Based on the constraints in flower cultivation scores, the respondents were classified into three categories namely low, medium and high constraints in flower cultivation (Table 4.16).

Table 4.16 Distribution of the respondent according to their constraints in flower cultivation

Category	Basis of categorization (score)	Observed range (score)	Respondents		Mean	SD
			Number	Percent		
Low constraints	≤ 24 (Mean -1SD)	22-31	17	14.8	26.26	1.77
Medium constraints	25-28 (Mean ± SD)		85	73.9		
High constraints	> 28 (Mean+1SD)		13	11.3		
Total			115	100.0		

Table 4.16 reveals that 73.9 percent of the respondents had medium constraints in flower cultivation, 14.8 percent had low constraints in flower cultivation and 11.3 percent had high constraints in flower cultivation. Thus, an overwhelming majority (73.9 percent) of the respondents had medium category constraints in flower cultivation at the study area.

4.4.1 Rank order of constraints in flower cultivation

Rank order of the ten strategies of flower cultivation constraints faced by the farmers in flower cultivation is presented in the following Table 4.17. As per Constraints Faced Index (CFI), high labor wages ranked the 1st and insufficient credit support in last position.

The constraints faced by the farmers in flower cultivation according to descending order through CFI from respondents are high labor wages, lack of knowledge about flower preservation, lack of knowledge about modern technologies of flower cultivation, unavailability of labor, flower processing problem, poor marketing facilities, lack of improved propagating materials, lack of suitable selling center, lack of transportation and insufficient credit support respectively.

The results show that the highest constraint faced by the farmers in flower cultivation is high labor wages. This might be caused because the people more or less invest their labor at their own business as well as own farming activities

found in the study area. The lowest constraint in flower cultivation at the study area was insufficient credit support. This might be happened because of many NGOs were work to provide credit found at the study area.

Table 4.17 Rank order of constraints faced by respondents in flower cultivation

Sl. No.	Nature of problems	CFI score	Rank
1.	High labor wages	352	1 st
2.	Lack of knowledge about flower preservation	343	2 nd
3.	Lack of knowledge about modem technologies of flower cultivation	323	3 rd
4.	Unavailability of labor	316	4 th
5.	Flower processing problem	304	5 th
6.	Poor marketing facilities	293	6 th
7.	Lack of improved propagating materials	285	7 th
8.	Lack of suitable selling center	273	8 th
9.	Lack of transportation	270	9 th
10.	Insufficient credit support	261	10 th

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Major Findings

5.1.1 Selected characteristics of the flower cultivators

Age: The middle-aged flower cultivators comprised the highest proportion (48.7 percent) and the lowest proportion by old aged category (15.7 percent).

Level of education: Secondary education constituted the highest proportion (47.0 percent) and the lowest 3.5 percent in above secondary category.

Family size: The medium size family constituted the highest proportion (67.0 percent) and the lowest 10.4 percent farmers had large family size.

Farm size: The medium farm holder constituted the highest proportion (53.9 percent), whereas the landless farm holder was not found.

Annual family income: Medium annual income constituted the highest proportion (71.3 %), while the lowest proportion in low income (12.2 percent) category among the flower cultivator of the study area.

Annual family income from flower cultivation: The flower cultivators having medium income from flower cultivation constituted the highest proportion (78.3 percent), followed by high income (21.7 percent).

Duration of flower cultivation: The majority (67.0 percent) of the cultivator fell in medium duration of flower cultivation category, whereas only 16.5 percent in low duration of flower cultivation category and 16.5 percent in high duration of flower cultivation category.

Extension media contact: The highest proportion (73.9 %) of the farmers had medium extension contact as compared to 15.7 percent of them having low extension contact and 10.4 percent fell in high extension media contact.

Training exposure: The highest proportion (80.9 percent) of the flower cultivators had medium training exposure and the lowest 0.9 percent in low training exposure category.

Availability of marketing information: The highest proportion (64.3 percent) of the flower farmers had medium availability of marketing information and the lowest 13.0 percent had low availability of marketing information category.

Attitude towards flower cultivation: The most of the farmers (61.7 percent) had a moderately favorable attitude towards flower cultivation while 25.2 and 13.0 percent of them had highly and poorly favorable attitude respectively.

Knowledge on flower production: The 61.7 percent of the farmers had medium flower production knowledge, 13.0 percent had low knowledge and 25.3 percent had high knowledge on flower cultivation.

5.1.2 Impact of flower cultivation on farmers' livelihood

Flower cultivators had mentionable improvement in livelihood. Study group mean score of livelihood was 7.37 while the control group gained only 5.25. The score of livelihood impact found 2.12. So, there was a positive impact of flower cultivation.

From the study group, the 76.5 percent of the farmers had medium impact of flower cultivation on farmers' livelihood category, 9.6 percent had low impact category and 13.9 percent had high impact of flower cultivation on farmers' livelihood category.

5.1.3 Contribution of selected characteristics of the respondents' livelihood conditions

The multiple R and R^2 values were found 0.721 and 0.519 respectively and the corresponding F-ratio was 6.060 which were significant at 1% level of significance. For determining unique contribution of each of the five variables the increase in R^2 value was determined on livelihood. These five variables combinedly explained 49.7 percent of the total variation to the impact of flower cultivation on farmers' livelihood. Attitude towards flower cultivation alone

contribute 39.5 percent of the variation where level of education (2.8 percent), annual family income (2.8 percent), annual income from flower cultivation (2.3 percent) and knowledge on flower cultivation (2.3 percent) variation to the impact of flower cultivation on farmers' livelihood.

5.1.4 Constraints faced by farmers in flower cultivation

The Majority (73.9 percent) of the flower farmers had medium constraints in flower cultivation whereas the lowest 11.3 percent had high constraints in flower cultivation category.

5.1.5 Rank order of constraint faced by farmers in flower cultivation

Rank order of the ten strategies of constraint confrontation was measured. As per Constraint Faced Index (CFI) high labor wages positioned the 1st, and insufficient credit support at the last position regarding constraints in respect of flower cultivation.

5.2 Conclusions

The findings and relevant facts of research work prompted the researcher to draw following conclusions.

- i. The findings revealed that an overwhelming majority (90.4 %) of the farmers had medium to high impact of flower cultivation on farmers' livelihood category. However, to meet the ever-growing demand of economic status, there is a need to sustain the flower cultivation. It may be concluded that the composite impact of flower cultivation on farmers' livelihood needs to maintain and enhance.
- ii. The findings revealed that attitude towards flower cultivation had a significant contribution to the impact of farmers' livelihood. Attitude towards flower cultivation increases the outlook of the farmers which lead them to practice flower cultivation with a view to enhancing the impact on farmers' livelihood.
- iii. Maximum (78.3 %) flower cultivators had medium annual income from flower cultivation category and regression analysis revealed that annual

income from flower cultivation of the flower cultivators was a contributing factor to the impact of farmers' livelihood. Therefore, it may be concluded that high family income from flower cultivation encourages the farmers to practice flower cultivation.

- iv. Level of education of the farmers showed the important contributing factor to the impact of flower cultivation on farmers' livelihood. This means that high literacy and educational level among the farmers might have influenced high practice in flower cultivation. Conclusion could be drawn that these farmers could be more ameliorated in all aspects of socio-economic of life if government takes more educational project to make it more educated.
- v. Maximum (71.3 %) flower cultivators had medium annual family income and regression analysis revealed that annual family income of the flower cultivators was a contributing factor to the impact of farmers' livelihood. Therefore, it may be concluded that high annual family income encourages the farmers to practice flower cultivation.
- vi. Flower cultivation knowledge had a significant contribution to the impact of farmers' livelihood. Through flower cultivation knowledge an individual farmer became aware of the information on the various aspect of selected flower production practices. Consequently, they became motivated to practice flower cultivation. The above facts lead to the conclusion that necessary arrangements should be made to increase the knowledge of farmers which would ultimately increase the flower cultivation with a view to enhancing the impact on farmers' livelihood.

5.3 Recommendations

5.3.1 Recommendations for policy implications

On the basis of observation and conclusions drawn from the findings of the study following recommendations are made:

- i. An increased rate and extent of flower cultivation are vitally important for increasing the farmers' livelihood. It is revealed from the impact of the flower cultivation on farmers' livelihood that a considerable proportion ((90.4 %) of the farmers had medium to high impact of flower cultivation on their livelihood. It is, therefore, recommended that an effective step should be taken by the Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for strengthening the farmers' qualities in favor of flower cultivation to a higher degree for their livelihood improvement.
- ii. The concerned authorities like Department of Agricultural Extension (DAE), Non-Government Organizations (NGOs) should take necessary steps to increase the attitude towards flower cultivation of the farmers with a view to improving their livelihood. Therefore, it is recommended that the extension worker should provide supports to increase the attitude towards flower cultivation so that farmers themselves could come in contact with flower cultivation.
- iii. Annual income from flower cultivation of the flower cultivators was important contributing factors to the impact of flower cultivation on farmers' livelihood. Therefore, it is recommended that the extension workers should work with the farmers and motivate them to enhance the annual income from flower cultivation which would help to improve their livelihood.
- iv. Level of education of the farmers had a significant contribution to the impact of flower cultivation on farmers' livelihood. It indicates the importance of education for the flower cultivators. It may be recommended that arrangements should be made for enhancing the education level of the flower cultivators by the concerned authorities through the establishment of night school, adult education and other extension methods as possible.
- v. Annual family income was important contributing factors to the impact of flower cultivation on farmers' livelihood. Therefore, it is recommended that

the extension workers should work with the farmers and motivate them to enhance annual family income which would help to improve their livelihood.

- vi. Farmers having moderate to sound knowledge about flower cultivation. It should be selected on priority basis for any motivational training by Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for gaining sustainable flower production.

5.3.2 Recommendations for further study

On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for future study.

- i. The present study was conducted in Kalukhali and Baliadanga block of Jhenaidah district. It is recommended that similar studies should be conducted in other areas of Bangladesh.
- ii. This study investigated the contribution of twelve characteristics of the farmers to the impact of flower cultivation on farmers' livelihood as independent variables. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers to the impact of flower cultivation on farmers' livelihood.
- iii. Studies need to be undertaken to ascertain the principles and procedures for installation and patronization of nursing organization in the rural areas of Bangladesh.
- iv. The study was based on the impact of flower cultivation on farmers' livelihood. Further studies may be conducted in respect of other crops impact on farmers' livelihood.

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APPENDIX-I

ENGLISH VERSION OF THE INTERVIEW SCHEDULE (STUDY GROUP)
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University
Dhaka-1207

An Interview Schedule for the Study Entitled

**IMPACT OF FLOWER CULTIVATION ON FARMERS' LIVELIHOOD
IN JHENAIDAH DISTRICT**

Name of the respondent: Serial No:

Union:

Village:

(Please provide the following information. Your information will be kept confidential and will be used for research purpose only)

1. Age

How old are you? _____ years.

2. Level of education

Please mention your level of education.

- a) I can't read and write
- b) I can sign only
- c) I have passed.....class.

3. Family size

How many members do you have in your family?.....

4. Farm size

(Please mention the area of your land according to use)

Sl. No.	Types of land use	Area of land	
		Local unit	Hectare
F1	Homestead land (including pond and orchard)		
F2	Land under own cultivation		
F3	Land given to others on barga		
F4	Land taken from others on barga		
F5	Land taken from others on lease		
F6	Others		
Total farm size = $F1+F2+1/2(F3+F4) + F5+ F6$			

5. Annual family income

Please mention the amount of annual family income from the following sources during last year:

a) Income from agricultural crops

SL. No.	Crop Name	Production (Kg or Maund)	Cost/Kg or Maund	Total Cost
1.	Rice			
2.	Wheat			
3.	Maize			
4.	Jute			
5.	Potato			
6.	Pulse crop			
7.	Oil crop			
8.	Spice crop			
9.	Vegetables			
10.	Fruits			
Total				

b) Income from animals and fish resources

Sl. No.	Income resources	Production (Kg or Maund/Number)	Cost/Unit (Tk)	Total Cost (Tk)
1.	Livestock			
2.	Poultry			
3.	Fish resources			
Total				

c) Income from other resources

Sl. No.	Income resources	Total Income (Tk.)
1.	Service	
2.	Business	
3.	Day labor	
4.	Other family members	
5.	Other income sources	
Total		

6. Duration of flower cultivation

How many years do you involve with flower cultivation? years

7. Annual income from flower cultivation

Please mention your annual income from flower cultivation:

Sl. No.	Name of the flower	Source of income			Amount of income (BDT)
		From flower	From bulb	Others	
1.	Rose				
2.	Tuberose				
3.	Gladiolus				
4.	Others				
Total					

8. Extension media contact

Please state the extent of your contact with the following ones:

Sl. No.	Name of information sources	Extent of contact				
		Regularly (4)	Frequently (3)	Sometimes (2)	Rarely (1)	Not at all (0)
1.	Seed, Insecticide, Fertilizer dealer	> 9 times/year	7-9 times/year	4-6 times/year	1-3 times/year	0 time/year
2.	Ideal vegetable cultivators	> 9 times/year	7-9 times/year	4-6 times/year	1-3 times/year	0 time/year
3.	Agricultural Extension Officer (AEO)	> 6 times/year	5-6 times/year	3-4 times/year	1-2 times/year	0 time/year
4.	Sub Assistant Agriculture Officer (SAAO)	> 6 times/year	5-6 times/year	3-4 times/year	1-2 times/year	0 time/year
5.	Group discussion	Once in a month	Once/ 2 months	Once/ 3 months	Once/ 4 months	0 time/ 6 months
6.	Watching agril. related programs on TV	Daily	Weekly	Fortnightly	Once/month	0 time/6 months
7.	Listening agril. related programs on radio	Daily	Weekly	Fortnightly	Once/month	0 time/6 months
8.	Reading agril. related leaflets	Daily	Weekly	Fortnightly	Once/month	0 time/6 months
Total						

9. Training exposure

Please mention about your training exposure on flower cultivation:

Sl. No.	Name of the training courses	Organization	Days
01.			
02.			
03.			

10. Availability of marketing information

Please mention about availability of marketing information on flower business:

Sl. No	Item	Extent of marketing information				
		Regularly (4)	Frequently (3)	Sometimes (2)	Rarely (1)	Not at all (0)
1.	Information about market price					
2.	Information about ware house					
3.	Information about quality product					
4.	Information related to production					
5.	Information about product demand					
6.	Information about marketing facilities					

11. Attitude towards flower cultivation

Please indicate your agreement with the following statement:

SL. No.	Statement	Extent of agreement/disagreement				
		SA	A	UD	DA	SDA
1 (+)	Commercial flower gives higher profit compared to other crops.					
2 (-)	Laborious to cultivate because it requires less labor and capital.					
3 (+)	Flower market demand is increasing					
4 (-)	Flower quality can be retained for a short period.					
5 (+)	Difficult to follow proper techniques of flower cultivation.					
6 (-)	Flower requires more fertilizers.					
7 (+)	Flower cultivation training is effective.					
8 (-)	Marketing procedure is very difficult.					
9 (+)	Flower cultivation is suitable for land.					
10(-)	Flower cultivation creates environmental hazards.					

Note: SA= Strongly Agreed; A=Agreed; UD=Undecided; DA=Disagreed; SDA= Strongly Disagreed;

12. Knowledge on flower cultivation

Please answer the following questions about flower cultivation:

Sl. No.	Questions	Full marks	Marks obtain
1.	What is meant by top dressing of fertilizer?	3	
2.	What kind of soil is suitable for flower cultivation?	3	
3.	Mention two popular varieties of flower like rose, tuberose, gladiolus, and marigold.	3	
4.	Do you practice pruning in rose, why?	3	
5.	What is the time of pruning in rose?	3	
6.	How many sticks do you allow in tuberose cultivation,	3	
7.	How do you store corm/cornel of gladiolus?	3	
8.	What is the spacing of marigold?	3	
9.	Mention 3 insects/pests that cause damage to flower cultivation.	3	
10.	What is meant by breaking of colds?	3	

13. Impact of flower cultivation

i. Food availability

Please mention your opinion of the following ones:

Sl. No.	Type of food	Score					
		(January, 2015)			(February, 2017)		
		ADQ (3)	IADQ (2)	SRT (1)	ADQ (3)	IADQ (2)	SRT (1)
1.	Cereal						
2.	Vegetables						
3.	Meat						
4.	Fish						
5.	Fruits						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: ADQ= Adequate; IADQ=Inadequate; SRT= Shortage;							

ii. Clothes value

Please state your used number of clothes and its value:

Year	Number of clothes			
	2 clothes x value	3 clothes x value	4 clothes x value	> 4 clothes and value
January, 2015				
February, 2017				

Score 1 assign for BDT1000 value change

iii. Housing condition

Please state your housing condition

Sl. No.	Sites of house	Score					
		(January, 2015)			(February, 2017)		
		Brick (3)	Tin (2)	Straw (1)	Brick (3)	Tin (2)	Straw (1)
1.	Roof						
2.	Walls						
3.	Floor			-			-
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							

iv. Ability to get health treatment

Please mention your opinion of the following ones:

Sl. No.	Health treatment providers	Score					
		(January, 2015)			(February, 2017)		
		FRQ (2)	SLD (1)	Not at all (0)	FRQ (2)	SLD (1)	Not at all (0)
1.	Homeopath						
2.	Trained village doctor						
3.	Kabiraz (herbal medicines & sacred text)						
4.	MBBS doctor						
5.	Specialist doctor						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: FRQ= Frequently; SLD= Seldom;							

v. Participation in social activities

Please mention your opinion of the following ones:

Sl. No.	Sites of house	Score					
		(January, 2015)			(February, 2017)		
		RG (2)	OCN (1)	Not at all (0)	RG (2)	OCN (1)	Not at all (0)
1.	Family program (marriage, chehlum, etc.)						
2.	Voluntary work						
3.	Negotiation (mediating quarrels among neighbors, relatives)			-			-
4.	Cultural program						
5.	Attending meetings						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: RG= Regularly; OCN= Occasionally;							

14. Constraints faced by the farmers in flower cultivation

Please mention the extent of constraints you facing in achieving food security.

Sl. No.	Constraints	Extent of constraints				
		Severe (4)	Medium (3)	Low (2)	Very Low (1)	Not at all (0)
1.	Flower processing problem					
2.	Poor marketing facilities					
3.	Lack of transportation					
4.	Lack of knowledge about modern technologies of flower cultivation					
5.	Lack of knowledge about flower preservation					
6.	Insufficient credit support					
7.	Lack of improved propagating materials					
8.	Lack of suitable selling center					
9.	Unavailability of labor					
10.	High labor wages					

Thanks for your participation.

Dated:

(Signature of interviewer)

APPENDIX-II

English Version of the Interview Schedule (Control Group)

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

Dhaka-1207

An Interview Schedule for the Study Entitled

IMPACT OF FLOWER CULTIVATION ON FARMERS' LIVELIHOOD IN JHENAIDAH DISTRICT

Name of the respondent: Serial No:

Union:

Village:

(Please provide the following information. Your information will be kept confidential and will be used for research purpose only)

1. Age

How old are you? _____ years.

2. Level of education

Please mention your level of education.

- a) I can't read and write
- b) I can sign only
- c) I have passed.....class.

3. Farm size

(Please mention the area of your land according to use)

Sl. No.	Types of land use	Area of land	
		Local unit	Hectare
F1	Homestead land (including pond and orchard)		
F2	Land under own cultivation		
F3	Land given to others on barga		
F4	Land taken from others on barga		
F5	Land taken from others on lease		
F6	Others		
Total farm size = $F1+F2+1/2(F3+F4) + F5+ F6$			

4. Impact of flower cultivation

i. Food availability

Please mention your opinion of the following ones:

Sl. No.	Type of food	Score					
		(January, 2015)			(February, 2017)		
		ADQ (3)	IADQ (2)	SRT (1)	ADQ (3)	IADQ (2)	SRT (1)
1.	Cereal						
2.	Vegetables						
3.	Meat						
4.	Fish						
5.	Fruits						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: ADQ= Adequate; IADQ=Inadequate; SRT= Shortage;							

ii. Clothes value

Please state your used number of clothes and its value:

Year	Number of clothes			
	2 clothes x value	3 clothes x value	4 clothes x value	> 4 clothes and value
January, 2015				
February, 2017				

Score 1 assign for BDT1000 value change

iii. Housing condition

Please state your housing condition

Sl. No.	Sites of house	Score					
		(January, 2015)			(February, 2017)		
		Brick (3)	Tin (2)	Straw (1)	Brick (3)	Tin (2)	Straw (1)
1.	Roof						
2.	Walls						
3.	Floor			-			-
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							

iv. Ability to get health treatment

Please mention your opinion of the following ones:

Sl. No.	Health treatment providers	Score					
		(January, 2015)			(February, 2017)		
		FRQ (2)	SLD (1)	Not at all (0)	FRQ (2)	SLD (1)	Not at all (0)
1.	Homeopath						
2.	Trained village doctor						
3.	Kabiraz (herbal medicines & sacred text)						
4.	MBBS doctor						
5.	Specialist doctor						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: FRQ= Frequently; SLD= Seldom;							

v. Participation in social activities

Please mention your opinion of the following ones:

Sl. No.	Sites of house	Score					
		(January, 2015)			(February, 2017)		
		RG (2)	OCN (1)	Not at all (0)	RG (2)	OCN (1)	Not at all (0)
1.	Family program (marriage, chehlum, etc.)						
2.	Voluntary work						
3.	Negotiation (mediating quarrels among neighbors, relatives)			-			-
4.	Cultural program						
5.	Attending meetings						
Total							
Change score = Score of February, 2017 - Score of January, 2015 =							
Note: RG= Regularly; OCN= Occasionally;							

Thanks for your participation.

Dated:

(Signature of interviewer)