FARMERS' PERCEIVED LIVELIHOOD IMPROVEMENT THROUGH PARTICIPATION IN NATP-2 PROJECT

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CERTIFICATE

This is to certify that the thesis entitled, **"FARMERS' PERCEIVED LIVELIHOOD IMPROVEMENT THROUGH PARTICIPATION IN NATP-2 PROJECT"** 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 & INFORMATION SYSTEM,** embodies the result of a piece of bona-fide research work conducted by **ZINAT REHANA SHOMPA, Registration No. 18-09184**, 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: December, 2020

Dhaka, Bangladesh

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DEDICATION

DEDICATED TO

THIS THESIS IS LOVINGLY DEDICATED TO MY PARENTS AND RESPECTED TEACHERS FOR THEIR ENDLESS SUPPORTS, ENCOURAGEMENT THROUGHOUT MY LIFE

A C K N O W L E D G E M E N T S

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The Author

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ABBREVIATION AND ACRONYMS

AEO	Agriculture Extension Officer
CCMC	Commodity Collection and Marketing Centers
CIGs	Common Interest Groups
DAE	Department of Agricultural Extension
DFID	Department for International Development
FIAC	Farmer's Information and Advisory Centre
GoB	Government of Bangladesh
IFAD	International Fund for Agricultural Development
MoA	Ministry of Agriculture
MoFL	Ministry of Fisheries and Livestock
NARS	National Agricultural Research System
NATP	National Agricultural Technology Program
POs	Producers Organizations
PIU-BRAC	Project Implementing Unit of Bangladesh Agricultural Research Council
PIU-DAE	Project Implementing Unit of Department of Agricultural Extension
PIU-DOF	Project Implementing Unit of Department of Fisheries
PIU-DLS	Project Implementing Unit of Department of Livestock Services
PMU	Project Management Unit
SAAO	Sub-Assistant Agriculture Officer
SAU	Sher-e-Bangla Agricultural University
SPSS	Statistical Package for Social Science

FARMERS' PERCEIVED LIVELIHOOD IMPROVEMENT THROUGH PARTICIPATION IN NATP-2 PROJECT

Zinat Rehana Shompa

Abstract

The study aimed at assessing the livelihood improvement of the National Agricultural Technology Program (NATP) phase-2 project as perceived by participant farmers and finding out the contribution of the selected characteristics of the farmers to their perceived livelihood improvement through participation in NATP-2 project. A pre-tested interview schedule was used for collecting data from the farmers of Saidpur and Khongoan union of Pirgonj upazila under Thakurgoan district. Out of 420 farmers, 111 farmers were randomly selected and interviewed from 10 October to 10 November, 2019. Perceived livelihood improvement of the farmers was measured by 5- point rating scale. Among the farmers, half of the respondents (50.4 percent) belonged to high status of livelihood improvement while 31.3 percent of them had medium and 18.3 percent had low status of livelihood improvement respectively. The variation regarding different assets of livelihood was minimum, the highest status of livelihood improvement was observed in case of physical capital and it was the lowest in case of natural capital. Three out of nine selected characteristics of the farmers such as farm size, use of technology and extension media contact had significant positive relationships with their perceived livelihood improvement while the rest of the variables showed no significant contribution. All the factors jointly contribute 37.0% of the variance of perceived livelihood improvement (R^2 = .370). Age, education qualification, family size, annual income, farming experience, training experience had no significant contribution. To summarize, this study offered several practical and theoretical recommendations about farmers' perceived livelihood improvement through NATP-2 project.

CHAPTER I

INTRODUCTION

1.1 General Background

Poverty reduction in rural areas depends crucially on growth in agricultural productivity, which is driven by investment in infrastructure, generation of new or improved technologies adapted to changing climate, and their adoption by farmers and other supply chain actors (e.g. traders, processors). Sustainable intensification and diversification of agriculture through technological change requires an efficient and productive national agricultural technology system, comprising agricultural research (technology development and refinement) and agricultural extension (technology dissemination and adoption). This needs to be supported by appropriate value addition and market linkages through smallholders' participation in emerging/established commodity supply chains for higher value agriculture. To achieve these strategic goals, the GOB sought the support of development partners such as the World Bank to provide technical and financial support to activities aimed at boosting agricultural production through productivity enhancement, and increasing smallholders' income. In order to improve agricultural productivity and farm income, on the request of the Government of Bangladesh, the World Bank agreed to support a long term agricultural development program over a period of 15 years to be implemented in three phases of five years each with the first phase beginning in July 2007. International Fund for Agricultural Development (IFAD) also agreed to co-finance the program with the World Bank. Accordingly, the National Agricultural Technology Project (NATP): Phase-I (NATP-1) was designed with the development objective of improving the effectiveness of national agricultural technology system (including agricultural research, extension and development of supply chains) and increasing agricultural productivity and farm income in Bangladesh. NATP-1 was initiated in July 2007 and completed in December 2014. NATP-1 has significant achievements in 1.generating technologies, 2.increasing the effectiveness of extension and research systems and 3.development of supply chains and broadening linkages between research-extension-farmers across the project areas. Research component generated valuable technologies and information including new varieties/breeds/fingerlings

pertinent to stable and higher production of crops, livestock and fisheries. The technologies gained acceptability among the farmers need scaling-up. Under extension component, an effective farmer platform has been established in 120 upazilas under 25 districts for bottom-up planning, demonstrations, trainings and technology transfer. Approximately 0.4 million farmers have been benefitted through training, demonstration support, setup of Farmer's Information and Advisory Centre (FIAC), federation of Common Interest Groups (CIGs) to Producers Organizations (POs), etc. Supply chain component covered 20 upazilas focusing on farmer-market linkage for supply of quality produces with minimization of postharvest loss of high value agro-commodities through 25 Commodity Collection and Marketing Centers (CCMC) and strengthening capacity of stakeholders in supply chain management and agro-enterprise development.

After successful completion of phase-I, phase-2 has been started in October 2015. NATP-1, had been designed as the first phase of a national program whose medium-term objective was to increase income and reduce extreme poverty and hunger by improving agricultural productivity and performance of the national agricultural technology system. NATP-1 has achieved some such gains by increasing efficiency and effectiveness of the agricultural research and extension systems, but there is yet much to be done to broaden and deepen such needed gains, as well as to add greater value to the output of the agricultural sector by strengthening its commercialization. Also a key lesson learned from the implementation of NATP-1 is the need to look beyond productivity increases and focus as well on facilitating value addition and market linkages to ensure sustainability of farmer groups and in particular of Producer Organizations.

Project Components and Implementers

i. Component-1: Enhancing Agricultural Technology Generation-To be implemented by the Project Implementing Unit of Bangladesh Agricultural Research Council (PIU-BARC), MoA

ii. Component-2: Supporting Crop Development-To be implemented by the Project Implementing Unit of Department of Agricultural Extension (PIU-DAE), MoA

iii. Component-3: Supporting Fisheries Development-To be implemented by the Project Implementing Unit of Department of Fisheries (PIU-DoF), MoFL

iv. Component-4: Supporting Livestock Development-To be implemented by the Project Implementing Unit of Department of Livestock Services (PIU-DLS), MoFL

v. Component-5: Project Management-To be implemented by the Project Management Unit (PMU), MoA

National Agricultural Research System (NARS) institute and public universities participated in research activities under PIU-BARC. Extension activities were implemented by DAE, DOF and DLS. The project was implemented in 270 upazilas of 57 districts in 8 divisions. The Project Management Unit (PMU) manages the activities of all the components and acted under the guidance of the Joint Project Steering Committee.

1.2 Statement of the Problem

National Agricultural Technology program Phase-2 project is undertaken for the generation and sustainability of overall management of different production programs as well as marketing, preservation and storage of produced commodities at field level. Farmers are the main executor and beneficiaries of this project. The Farmers can produce diversified products which will ensure their food security and also economic stability. Integration of products in a balanced way will also ensure resource recycling. For the successful adoption and sustainability of this project it is very important to know the livelihood improvement scenario of the farmers through participation in this project.

In view of the above discussion, facts and the need for having an understanding of the livelihood improvement of the farmers through participation in NATP-2 project for better implementation and adoption of the project. The present study entitled "farmers' Perceived livelihood improvement through participation in NATP-2 project" was undertaken. The study aimed at providing information regarding the following questions:

i) What are the socio-economic characteristics of the farmers participating in NATP -2 project?

ii) What is the present level of livelihood improvement status of the NATP -2 project as perceived by the farmers?

iii) What is the contribution of the selected characteristics of farmers and their livelihood improvement through NATP-2 project?

1.3 Specific Objectives of the Study

In view of the above discussion and in order to give proper direction to the study, the researcher undertook the present research with the following specific objectives:

1. To determine the selected characteristics of the farmers participated in NATP-2 project.
   i. Age
   ii. Educational qualification,
   iii. Family size,
   iv. Farm size,
   v. Annual income,
   vi. Farming experience,
   vii. Training experience,
   viii. Use of agricultural technologies ,
   ix. Extension media contact and
2. To determine and describe the livelihood improvement status of NATP -2 project farmers as perceived by them in terms of the following livelihood capitals:
   i. Human capital,
   ii. Social capital,
   iii. Financial capital,
   iv. Physical capital, and
   v. Natural capital
3. To explain the contribution of the selected socio-economic characteristics of the farmers to their perceived livelihood improvement through NATP-2 project.

1.4 Justification of the Study

NATP is an agricultural multi-agency project of Bangladesh Government. The Project is developed with the support and financial assistance from the Government of

Bangladesh, World Bank, and IFAD. NATP is running under the Department of Agricultural Extension (DAE) of the Ministry of Agriculture (MoA) of Government of Bangladesh.

NATP aroused a new hope and dimension in the field of Bangladesh agriculture which might create a bright future for Bangladesh. The NATP-2 Project would hopefully bring about changes in the traditional scenario of Bangladesh agriculture towards modern agricultural system based on the application of information and communication technology tools and renewable energy technologies including mobile technology. NATP-2 has important segment for creating market access network through value and supply chain activities for the farmer holders' community. The overall objective of NATP is to support GoB's strategy to improve national agricultural productivity and farm income, with particular focus on small and marginal farmers covering 35% female farmers as well within the NATP-2 project target area. Despite NATP-2 project has the potentialities to the development of the farmers' wellbeing, there is a lack of research measuring the livelihood improvements contributed by this project. Therefore, this study tried to fill the void by investigating its impact to the farmers' livelihoods.

1.5 Assumptions of the Study

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

i. The respondents selected of the study were competent to satisfy the queries designed by the investigator.
ii. The responses furnished by the respondent will be valid and reliable.
iii. Information furnished by the beneficiaries, included in the sample, is the representative of the whole population of the study.
iv. The researcher who acted as interviewer was well adjusted to the social environment of the study area. Hence, the data collected by her from the respondents were free from bias and prejudice.
v. The findings of the study are expected to be useful in planning and execution of the various programs in connection with the livelihood improvement of the farmers.

vi. The researcher who acted as interviewer was well adjusted to the social environment of the study area. Hence, the respondents furnished their correct opinions without hesitation.

vii. The findings of the study will have general implication to any part of the country where, physical, socio-economic and cultural conditions do not differ much from the study area.

1.6 Scope of the Study

The study was initiated in order to have an understanding about the NATP-2 project on farmers' perceived livelihood improvement. The findings of the study are applicable in Pirgonj upazila under Thakurgoan district. However, the findings may also be applicable for other areas of the country having similar physical, socio economic, cultural and geographical conditions of the study area. The study was conducted in Saidpur and Khongoan union of Pirgong upazila under Thakurgoan district. Thus the study may give pertinent information for making sound management and decision making for livelihood improvement of NATP-2 project farmers.

1.7 Limitation of the study

The study was undertaken with a view to have an understanding of the livelihood improvement of the farmers' through participation in NATP Phase-2 project. In order to conduct the research in a meaningful and manageable way it becomes necessary to impose some limitations in regard to certain aspects of the study. Considering the time, money and other resources of the researchers, the following limitations have been observed throughout the study:

i. There were many farmers in the study area but only the NATP-2 project farm families were selected for the study.

ii. The investigation was depended on the data furnished by the selected farmers during their interview.

iii. Characteristics of the rural farmers are many and varied, but due to COVID-19 pandemic, time, money and other resources did not permit the researcher to include all of them in the study. Hence, only ten characteristics of the farmers were selected for investigation in this area.

iv. Reluctance of the farmers to provide information was overcome by establishing proper rapport.

v. The findings of the study were particularly applicable to the study area. However, these may also have general implications for other areas.

1.8 Definition of some key terms

For clarity of understanding certain terms frequently used throughout the study are defined and interpreted as follows:

Livelihood: The livelihood of a household or individual can be interpreted as their means of living. Their means of living is based on their capabilities, assets (financial, physical, human, natural resource and social) and activities (DFID, 2002).

Livelihood assets: Livelihood assets are the means of production available to a given individual household or groups that can be used in their livelihood activities (DFID, 2002). These assets are the base on which livelihoods is built and, in general, the greater and more varied the assets base the higher and more durable the level of social security. Households with plenty of assets such as land, water, livestock, equipment and money, as well as higher education and skills and better socio-political networks, generally have a wider range of livelihood options than households with fewer assets.

Natural capital: Natural capital are natural assets in their role of providing natural resource inputs and environmental services for economic production. Context: Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems.

Human capital: Human capital refers to the stock of skills and knowledge embodied in the ability to perform labor so as to produce economic value. The skills, knowledge, ability to labor and good health important to the ability to pursue livelihood strategies.

Physical capital: In general physical capital refers to any non-human asset made by humans and then used in production. Often, it refers to economic capital in some ambiguous combination of infrastructural capital and natural capital. The basic infrastructure (transport, shelter, water, energy and communications) and production equipment and means which enable people to pursue their livelihoods.

Social capital: Social capital can be defined simply as the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them. The horizontal and vertical social resources (networks,

memberships groups, relationships of trust, access to wider institutions of society) upon which people draw in pursuit of their livelihood. In addition, security perspective and to some extent social norms, values, beliefs also belong to social capital.

Financial capital: The financial resources which are available to people (whether savings, supplies of credit, or regular remittances or persons) and which provide them with different livelihood option.

NATP Project: National Agricultural Technology Project (NATP) is an agricultural multi-agency project of Bangladesh Government. The Project is developed with the support and financial assistance from the Government of Bangladesh, World Bank, and International Fund for Agricultural Development (IFAD).

Participation: The process during which individuals, groups and organizations are consulted about or have the opportunity to become actively involved in a project or program of activity.

Education: Education referred to the development of desirable Knowledge, skill and attitude in the individual through reading, writing and other related activities. It was measured in terms of actual grades or class passed by a respondent.

Extension contact: It referred to an individual's exposure to or contact with different communication media and sources and personalities being used for dissemination of new technologies among the farmers.

Farm size: It referred to the total area on which a farmer's family carries on farming operation. The area is estimated in terms of full benefit to the farmer's family. Technology: The combination of all the management practices used for producing and otherwise managing of a given crop, crop mixture, livestock and other farm activities.

Training experience: It referred to the total number of days that a respondent received training in his entire life from different organizations under different training program.

CHAPTER II

REVIEW OF LITERATURE

The intent of this Chapter is to review the after-effects of a portion of the past examinations and prominent articles having pertinence to this investigation. The researcher made and elaborated search of available literature for this research. Attempt has been made in the present Chapter to review some interlinked literature on this aspect from home and aboard. The interlinked reviews conveniently presented on the major objectives of the study as far as possible. There are three sections in this Chapter. Concepts of sustainable livelihood have been presented in the first section, while the second section deals with literature on relationships between the selected characteristics of the farmers and their perceived livelihood. The final section presents the conceptual framework of the study.

2.1 Concept of Sustainable Livelihood and the Framework

The sustainable livelihoods framework is an effort to conceptualize livelihoods in a holistic way, capturing the many complexities of livelihoods, and the constraints and opportunities that they are subjected to. These constraints and opportunities are shaped by numerous factors, ranging from global or national level trends and structures over which individuals have no control, and may not even be aware of, to more local norms and institutions and, finally, the assets to which the households or individual has direct access. In the development literature, often household is considered as the unit of analysis of an investigation. However, it is important to note that not all individuals within a household have equal decision-making power, or benefit equally from household assets or income. According to Department for International Development (DFID) the livelihoods framework is a tool to improve our understanding of livelihoods, particularly the livelihoods of the poor (1999). It was developed over a period of several months by the Sustainable Rural Livelihoods Advisory committee, building on earlier work by the Institute of Development Studies. The concept of livelihood has been defined as the economic activities poor people undertake in their totalities (Ashley and Carney, 1999). DFID (1999) illustrated a livelihood framework with agricultural technologies as illustrated in Figure 2.1. The individual components of the framework are described shortly in the following page.

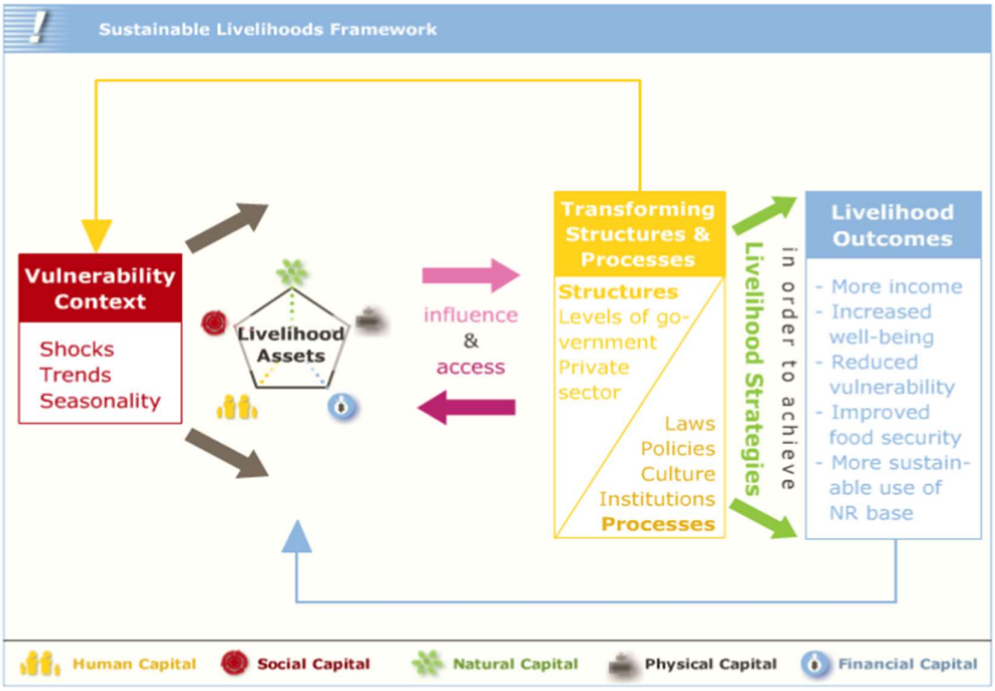

Figure 2.1 Sustainable livelihood frame work (DFID, 1999)

The framework illustrated here is a strong approach given by DFID to present the main factors and relationships that affect poor people's livelihoods. Limitations of poverty profile have been overcome by this framework through providing a way of analysis how people use the resources at their disposal in a given policy and institutional framework to deal with vulnerability. The above stated framework shows how three interacting elements (vulnerability context, livelihood assets, policies, institutions and processes i.e. people's ability) lead to diverse livelihood strategies and outcome.

2.1.1 Vulnerability context

Vulnerability context frames the external environment in which people exist. The livelihoods of the people and the wider availability of assets are fundamentally affected by critical as well as by shocks and seasonality-over which they have limited or no control (DFID 2002). Some examples are: *Trend*: Population trends, resource trends, national/international economic trends, trends (including politics) and technological trends. *Shocks*: Human health shocks, natural shocks, economic shocks conflict and crop livestock stock health shocks. *Seasonality*: Prices, production, health and employment opportunity.

2.1.2 Livelihood assets

Livelihood framework identifies five core asset categories or types of capital upon which livelihoods are built. Increasing access, which can take the form of ownership or the right to use these assets, is a primary concern for DFID in its support of livelihoods and poverty elimination (DFID, 2002). These assets are widely known as 'asset pentagon' is stated below:

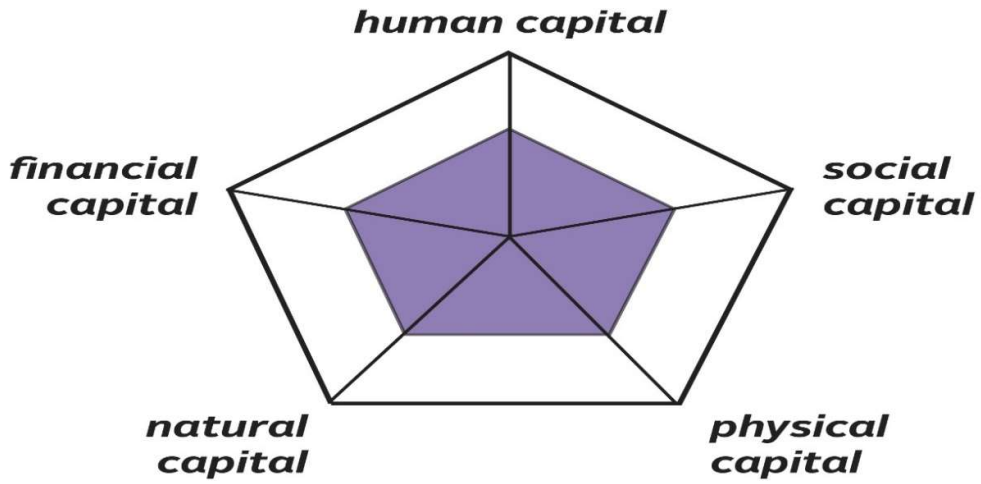

Figure 2.2 Different Capitals of livelihood

Human capital: Human capital represents the skills, knowledge, ability to labor and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.

Financial capital: Financial capital denotes the financial resources that people use to achieve their livelihood objectives. The definition used here is not economically robust in that it includes flows as well as stocks and it can contribute to consumption as well as production. However, it has been adopted to try to capture an important livelihood building block, namely the availability of cash or equivalent that enables people to adopt different livelihood strategies.

Social capital: There is much debate about what exactly is meant by the term 'social capital. In the context of the sustainable livelihoods framework it is taken to mean the social resources upon which people draw in pursuit of their livelihood objectives. These are developed through: networks and connectedness, membership of formalized groups, relationships of trust etc.

Natural capital: There is a wide variation in the resources that make up natural capital, from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production (trees. land, etc.).

Physical capital: Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. The components of infrastructure are usually essential for sustainable livelihoods. Affordable transport secures shelter and buildings, adequate water supply and sanitation, clean, affordable energy; and access to information (communications).

2.1.3 Transforming structures and processes

Transforming structures and processes within the livelihoods framework are the institutions, organizations, policies and legislation that shape livelihoods. Their importance cannot be overemphasized. They operate at all levels, from the household to international area, and in all spheres, from the most private to the most public (DFID, 2002).

Structure: Structures in the framework are the hardware-the organizations, both private and public that set and implement policy and legislation deliver services, purchase, and trade and perform all manner of other functions that affect livelihoods. They draw their legitimacy the basic governance framework.

Public sector: Political (legislative) bodies at various levels from local through to national, Executive agencies (ministries, departments), judicial bodies/ quasi-governmental agencies.

Private sector: Commercial enterprises and corporations, civil society or membership organizations (of varying degrees of formality), NGOs (international, national, local).

Process: If structures can be thought of as hardware, processes can be thought of as software. They determine the way in which structures and individuals-operate and interact. Like software, they are both crucial and complex: not only are there many types of processes operating at a variety of different levels, but there are also overlap and conflict between them. The important examples of the transforming processes of importance to livelihoods shown below

Policies: Macro, sectorial, redistributive and regulatory.

Legislation: International agreements and domestic.

Institutions: Markets, institutions that regulate access to assets and rules of game within structures.

Culture: Societal norms and beliefs.

Power relations: Age, gender, caste and class.

2.1.4 Livelihood strategies

The livelihoods approach seeks to promote choice, opportunity and diversity. This is nowhere more apparent than in its treatment of livelihoods strategies the overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals including productive activities, investment strategies, reproductive choices, etc.

2.2 Relationships between the Selected Characteristics of the Respondents and their perceived Livelihood Improvement

The selected characteristics of the farmers' participated in of NATP-2 project were selected as explanatory variables of the study. The available literature regarding relationships between the selected characteristics of the respondents and their perceived livelihood improvement are presented below:

2.2.1 Age and perceived livelihood improvement

Hoque (2011) found a negative relationship between age and livelihood status in his study on socio-economic improvement of the commercial fish Farm families due to transformation from crop farming to aquaculture.

Rahman (2005) observed that age of the respondent was positively significant with their improvement in food availability, negatively significant with their improvement in income but not significant with their improvement in housing.

Sharmin (2005) observed that age of the respondents did not show any significant relationship with their livelihood improvement.

Mortuza et al. (2004) observed in his study that age had no significant relationship with their livelihood in the coastal region in Bangladesh.

Saifuddin (2004) found that age of the rural women had positive relationship with their improvement of socio-economic status due to climatic preventive activities.

Islam (2003) found that there was a significant positive relationship between age of the beneficiaries of seed production program of Proshika and their living

status in terms of annual income, food consumption, housing condition, household assets, drinking water source and medi-care facilities in their technological intervention.

Based on the above discussion, it is hypothesized that with the increased of age the perceived livelihood improvement of the farmers participated in NATP-2 project positively influenced.

2.2.2 Education and perceived livelihood improvement

Billah (2013) observed in his study that level of formal education had significant relationship with their livelihood status in the adoption of farming practices due to climate change

Rashid (2012) found a positive relationship between years of schooling and livelihood status in his study on status of fruit cultivation by the Farm families of Satkhira district in response to climate change.

Hoque (2011) found a negative relationship between level of education and livelihood status in his study on socio economic improvement of the commercial fish Farm families due to transformation from crop farming to aquaculture.

Mortuza et al. (2004) found that family education had significant relationship with their livelihood.

Rokanuzzaman (2004) found that education had no significant relationship with their livelihood status due to joining CBFM-2 project activities of the beneficiaries.

Saifuddin (2004) found that education level of the rural women had no significant relationship with their improvement of socio economic status.

Kabir (2003) conducted a study and found that there was no relationship between education of the beneficiaries of PDBF and their living condition.

According to the above discussion, it is hypothesized that with the increased of education the perceived livelihood improvement of the farmers participated in NATP-2 project positively associated.

2.2.3 Family size and perceived livelihood improvement

Billah (2013) observed in his study that family size had no significant relationship with their livelihood status in adaptation of farming practices by the smallholder Farm families in response to climate change.

Rashid (2012) found a positive significant relationship between family size and livelihood status in his study on status of fruit cultivation by the Farm families of Satkhira district in response to climate change.

Hoque (2011) found a negative relationship between household size and livelihood status in his study on socio economic improvement of the commercial fish Farm families due to transformation from crop farming to aquaculture.

Saufiddin (2004) stated that household size of the rural woman had significant and positive relationship with their improvement of socio economic status.

Mortuza et al. (2004) found that family size of group member had no significant relationship with livelihood status of the respondents.

Rokanuzzaman (2004) found that family size had no significant relationship with their livelihood status due to joining the CE3FM-2 project activities of the beneficial.

Based on the above discussion, it is hypothesized that with the increased of family size the perceived livelihood improvement of the farmers participated in NATP-2 project positively influenced.

2.2.4 Farm size and perceived livelihood improvement

Mortuze et al. (2004) found that farm size of group member had no significant positive relationship with their livelihood.

Rokanuzzaman (2004) found that farm size had no significant relationship with their livelihood status due to joining the CBFM-2 project activities of the beneficiaries.

Ali (2003) conducted a study on impact of micro-credit in the poverty alleviation of BRAC women beneficiaries in a selected area of Dinajpur district. He found a significant positive relationship between farm size of the BRAC‟s beneficiaries and their livelihood condition.

Islam (2002) conducted study on poverty alleviation of the rural women through some of the selected activities of Grameen Bank. He reported that there was no significant relationship between farm size of the beneficiaries of Grameen Bank and their living statuaries.

Based on the above discussion, it is hypothesized that with the increased of farm size the perceived livelihood improvement of the farmers participated in NATP-2 project positively influenced.

2.2.5 Annual income and perceived livelihood improvement

Billah (2013) reported in his study that annual income had positive significant relationship with their livelihood status on the adoption of farming practices by the smallholder Farm families in response to climate change.

Rashid (2012) found a positive relationship between annual income and livelihood status in his study on status of fruit cultivation by the Farm families of Satkhira district in response to climate change.

Hoque (2011) found a positive significant relationship between family income and livelihood status in his study on socio-economic improvement of the commercial fish Farm families due to transformation from crop farming to aquaculture.

Hossain (2010) conducted a study on human living status and their income generating activities, he reported that annual income is positively significant with their living status in a coastal district.

Mortuza et al. (2004) found that family income had significant positive relationship with livelihood.

Based on the above discussion, it is hypothesized that with the increased of annual income the perceived livelihood improvement of the farmers participated in NATP-2 project positively associated.

2.2.6 Training experience and perceived livelihood improvement

Hoque (2011) found a positive relationship between training experience and livelihood status in his study on socio-economic improvement of the commercial fish Farm families due to transformation from crop farming to aquaculture.

Hossain (2010) conducted a study on human living status and their income generating activities, he reported that training experiences is positively significant with their living status in a coastal district.

Saifuddin (2004) found that training experiences of the rural woman had no significant relationship with their improvement of socio-economic status.

Based on the above discussion, it is hypothesized that with the increased of training experience the perceived livelihood improvement of the farmers participated in NATP-2 project positively association.

2.2.7 Use of technology and perceived livelihood improvement

Hussen (2001) conducted investigation on use of modem sugarcane cultivation practices by the farmers of Daweangonjupazila in Jamalpur district. The study revealed that about ninety one percent (91 percent) of the farmers had medium adoption compared to 7 percent having low adoption and only 2 percent having high adoption of modem sugarcane cultivation practices.

Rahman (2001) conducted an investigation on knowledge attitude and adoption of Aalok-6201 hybrid rice by the farmers of sadarupazila in Mymenshingh district. The study revealed that the majority (75 percent) of the farmers had medium adoption while 18 percent and 7 percent had high and low adoption in Aalok-6201 hybrid rice cultivation respectively.

Islam (2002) conducted a study on adoption of modem agricultural technologies by the farmers of Sandwip. The study revealed that 69 percent of the farmers had medium adoption while 13 percent had low adoption and 18 percent had high adoption of modem agricultural technologies.

Podder (1999) concluded a research study on the adoption of Mehersagar Banana by the farmers. He found 47 percent of the respondents had medium adoption compared to 14 percent having low and 39 percent high adoption.

Rahman (1999) conducted an investigation on adoption of balanced fertilizer by the farmers of Ishargonjupazila in Mymensingh district. The study revealed that the majority (71 percent) of the respondents had medium adoption compared to 29 percent having below optimum level.

Chowdhury (1997) conducted an investigation on adoption of selected BINA technologies by the farmers of Boura union in Mymensingh district. The study revealed that the majority (53 percent) of the respondents had no adoption of BINA technologies and 42 percent were adopted BINA technologies.

Based on the above discussion, it is hypothesized that with the increased of using of the modern technology perceived livelihood improvement of the farmers participated in NATP-2 project positively influenced.

2.2.8 Extension contact and perceived livelihood improvement

Bezbora (1980) studied adoption of improved agricultural technology by the farmers of Assam. The study indicated a positive relationship between extension contact and adoption of improved cultivation practices.

Osunloogunet al. (1986) studied adoption of improved agril. Practices by cooperative farmers in Nigeria. The findings of the study indicated a positive relationship between extension contact and adoption of improved practices.

Rahman (1986) conducted a study on correlates of adoption of improved practices in transplanted aman rice by the farmers. He observed a significant and positive relationship between the farmers‟ extension contact and their adoption of improved practices in transplanted aman rice.

Heong (1990) observed that the lack of adoption of IPM technologies in rice was frequently attributed to lack of sufficient extension contact.

Juliana et al. (1991) found that mass media exposure of the farmers were positively associated with their extent of adoption of integrated pest management practices.

Singh (1991) observed in his study that mass contact of the farmers had significant relationship with their level of adoption of plant protection measures.

Alam (1997) studied the use of improved farm practices of rice cultivation by the farmers of Anwara Thana of Chittagong district. The study indicated no significant relationship of extension contact of the farmers with their use of improved farm practices in rice cultivation.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the fanners regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that extension contact of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Sardar (2002) concluded that the extension contact had positively significant relationship with their adoption of IPM practices.

Haque (2003) concluded that extension contact of the farmers had a significant positive relationship with their adoption of modem maize cultivation technologies.

Hossain (2003) concluded that communication exposure of the farmers had a significant and positive relationship with their adoption of modem Boro rice cultivation.

Hossain (2006) concluded that the extension contact of the farmers had positive significant relationship with their adoption of selected HYV rice.

Based on the above discussion, it is hypothesized that the extension contact of the farmers' participated in NATP-2 project has positive significant relationship with their perceived livelihood improvement.

2.3 Conceptual Framework of the Study

The purpose of the study is to determine the farmers' perceived livelihood improvement through participation in NATP-2 project within the framework of sustainable livelihoods. There are some livelihood models developed by various authors which are more or less alike to each other with some slight modification into the structural build up. The conceptual framework of each model has got the background of potential thoughts and ideas and encompasses the explanation of every bit of livelihood elements. These models already been drawn to make people understands the livelihood complexity. These frameworks to elucidate the linkage between different factors show how these factors influence the livelihood and find the point where the intervention is to be made. The DFID (1999) framework is going to be illustrated here is a strong approach given by DFID to present the main factors and relationships that affect poor people's livelihoods. Thus the researcher used the DFID (1999) framework for conceptualizing the present study.

The conceptual framework of Rahman (2002) and Rashid (2006) was kept in mind while framing the structural arrangement for the focus and explanatory variables of this research. This study was concerned with focus variable named livelihood improvement and the selected individual characteristics of NATP-2 project participants as explanatory variables. There are many factors which influence livelihood improvement.

According to DFID (2000), there are five core assets or types of capital upon which livelihood status built. These asset pentagon are: a) human capital, b) natural capital, c) financial capital, d) physical capital, and e) social capital. These five capitals are used for measuring the livelihood improvement of the natp-2 project participants.

There are many characteristics which influence the livelihood improvement of NATP-2 project participants. In a single study, it is neither possible nor desirable to investigate all the factors taken into consideration that are responsible for livelihood improvement. Therefore, after careful consideration of respondents' situation, only nine characteristics have been selected for investigation in the present study. The selected characteristics are: age, education, family size, farm size, annual income, training experience, use of different NATP-2 technologies and extension media contact. Considering the past research and main theme of present study, a conceptual model was constructed, and is presented in Figure 2.3.

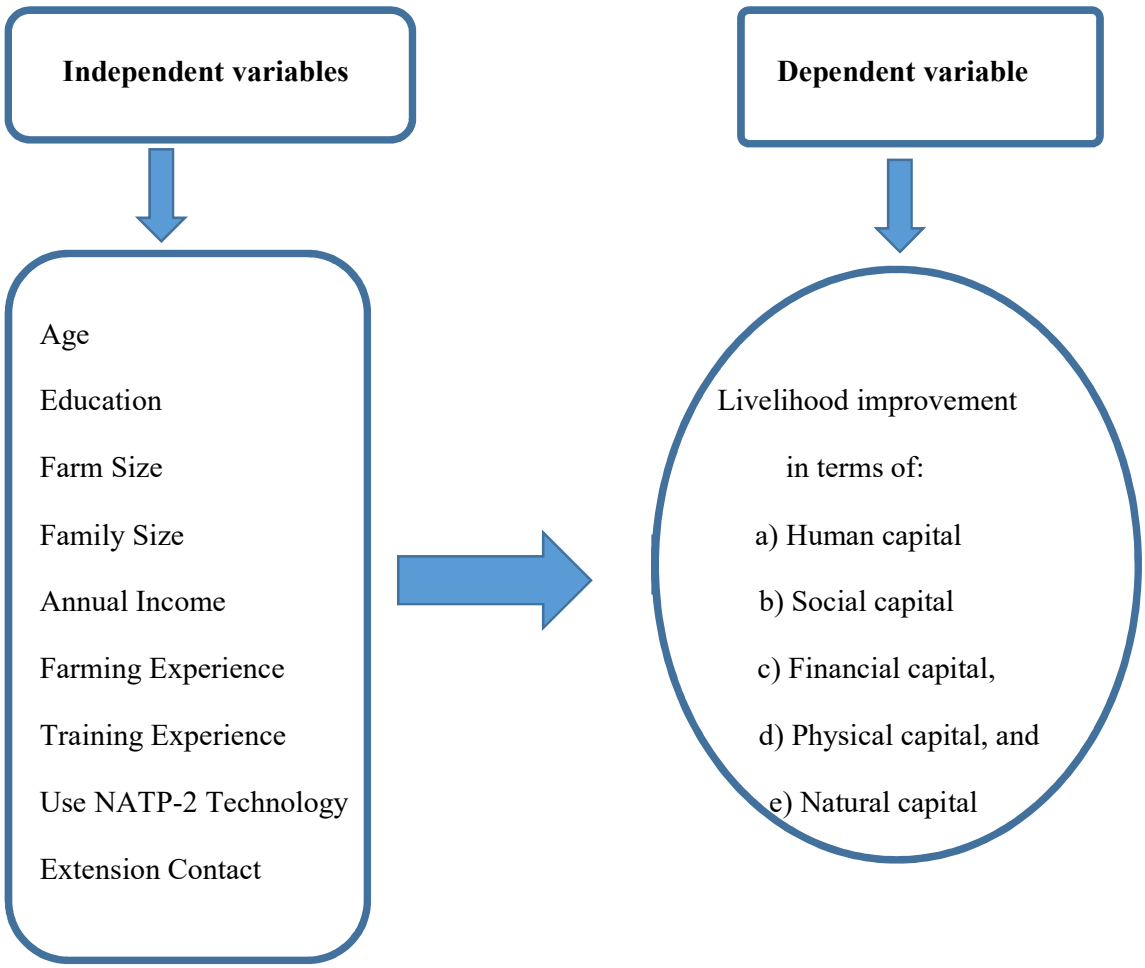

Figure 2.3 Conceptual framework of the study

CHAPTER III

METHODOLOGY

In any scientific research, methodology deserves a very careful consideration. Methodology should be such that it enables will the researcher to collect valid information and by analysis the same will help to arrive at appropriate decisions. The methods and procedures followed in conducting this research have been discussed in this Chapter.

3.1 Locale of the Study

Pirgonj upazila under Thakurgoan district was selected as the study area. There are 53 unions under Thakurgoan district. Each of them 2 union was selected randomly. Two blocks from each union were selected randomly as the study area. The selected 2 unions are Saidpur and Khongoan of Pirgong upazila under Thakurgoan district. Figure 3.1 show the map of pirgonj upazila of Thakurgoan district.

Figure 3.1 Map of Pirgonj upazila showing the study areas (Bangladesh inset)

3.2 Population and Sampling Frame

An update list of NATP-2 farmers of the selected area was collected from the local office of the UAO. The total numbers of NATP-2 farmers in these blocks were

420.Among them total of 111 farmers were selected as respondent using sample size determination by *www.surveysystem.com*. Data were collected from the selected sample size using proportionate random sampling procedure. A reserve list of NATP-2 farmers (10% of the sample list) was also prepared so that the respondents of this list could be used for interview if the respondents included in the original sample were not available during the data collection period Table 3.1. All the respondents were informed beforehand to collect the data and data were collected in a face-to-face situation during a period from.

Table 3.1 Population and sample size and reserve list of the study

Union name	Block name	Population size	Sample size	No. of farmers included in reserve list
Khongoan	Bonbari	120	32	3
	Joshaipara	90	23	2
Saidpur	Niyamotpur	120	33	4
	Ekhtiyar pur	90	23	2
Total		420	111	11

3.3 Measurement of the Variables of the Study

Measurement of the variables constitutes an important task of any social research. In this study, the livelihood improvement of participants was the focus variable. The selected characteristics of sampled NATP-2 project farmers' were considered as the Explanatory variables. These were age, education, family size, farm size, annual income, training experience, technology adoption, extension media contact and perceived effectiveness.

3.3.1 Measurement of independent variables

3.3.1.1 Age

The age of a respondent was determined in terms of the actual years passed from his/her birth to the day of interview. A score of one was assigned to each year of age.

3.3.1.2 Education

The education was measured on the basis of grade (class) passed by a respondent. A score of one (1) was scored for each year of schooling in formal institution. For

example, if a respondent passed the final exam of class V, his/her education score was taken as 5. Score 0.5 was given to the respondent who could sign his/her name and a zero (0) was given to the respondent who could not read and write.

3.3.1.3 Family size

The total number of the family members measured by assigning a score of one for each member of the family. For example, if a family contained three (3) members, the score of the family was three.

3.3.1.4 Farm size

Farm size of the respondent referred to the total area of land on which his/her family carried out farming operations. It measured in the hectares for each respondent using the following formula

FS = A + B +1/2 (C + D) + E

Where, FS = Farm size

A = Homestead area

B = Own land under own civilization

C = Land taken from others as lease

D = Land taken from others as borga

E = Land given to others as borga.

3.3.1.5 Annual income

Annual income was the total financial return of a household from farming (crops, forestry, fisheries, livestock and poultry) and from non-farm sources (service, small business and others) in last year. The earnings from these sources were added together for computation of annual income score. Annual household income was expressed in (000) thousand Taka.

3.3.1.6 Farming experience

Agricultural work experience means the experience which was gained by an individual from active farming. The experience of a farmers means the experience he gained directly by performing various farming activities and it was expressed in years. i.e score of 1 was given for each year of experience.

3.3.1.6 Training experience

Training experience was determined by total number of days of training received by the Farm families from any organization in their entire lifetime.

3.3.1.7 Use of technologies under NATP-2 project

Use of agricultural technologies was the independent variable of this study. It was measured on the basis of the extent of using of 8 selected agricultural technologies by the farmers for three year. The different technologies under NATP-2 project using by the farmers' are following:

i. High value crop
ii. Community seed production
iii. Yield gap
iv. Verrmicomposed
v. Sex pheromone trap
vi. Trico composed
vii. Integrated pest management
viii. Drought tolerant variety cultivation

3.3.1.7 Extension contact

Extension contact of a respondent may be defined as one's extent of contact to different communication media. The extent of contact was determined against 4 point rating scales as regularly, occasionally, rarely and not at all and score was assigned as 3, 2. 1 and 0 respectively. For all the 10 selected communication media, it has been described as follow:

Extent of contact	Assigned score
Not at all	0
Rarely	1
Occasionally	2
Often	3
Regularly	4

The extension contact of a respondent was therefore, determined by adding the total responses against 18 selected communication media. The extension contact score could range from 0 to 54. Where 0 indicating no extension contact and 54 indicating very high contact.

3.3.2 Measurement of dependent variable

Livelihood improvement status of the NATP-2 farm families is the focus variable of this study. This variable was measured by computing a composite livelihood improvement score based on each of the five components of livelihood asset pentagon (DFID, 2000): (i) human capital (ii) social capital (iii) financial capital (iv) physical capital and (v) natural capital. Each of the capitals was measured against two statements. Each of the statements was put against 5 point rating scale: strongly agree, agree, no opinion, disagree and strongly disagree and score given as 5, 4, 3, 2, and 1. The overall score for perceived livelihood improvement was computed by adding the scores obtained by all of the capitals of livelihood asset pentagon.

Extent of perception	Score assigned
Strongly disagree	1
Disagree	2
No opinion	3
Agree	4
Strongly agree	5

Perceived livelihood improvement for each 10 selected items was computed by using the following formula: PLI = (No.SA×5) + (No.A×4) + (No.NO×3) + (No.DA×2) + (N0.SDA×1)

Where,

SA= strongly Agree

A=Agree

NO=No Opinion

DA=Disagree

SDA=Strongly Disagree

3.4 Instrument for Data Collection

In order to collect relevant data, an interview schedule was carefully prepared, keeping the objectives of the study in mind. The interview schedule contained both open and closed form of questions. The draft interview schedule was pre-tested in actual field situation before using the same for collection of data. This pre-test facilitated the researcher to identify faulty and ambiguous questions. Ten participants

from different parts of the study area were interviewed for the pre-test. Necessary alteration, additions and adjustments were made in the schedule on the basis of the pre-test result. The interview schedule was then printed in its final form for collection of data.

3.5 Data Collection

The prime task in materializing objectives of the study was to collect data by interviewing 111 respondents. Data were collected by the researcher herself using structured interview schedule through face-to-face contact. The researcher was first established rapport with the respondents and clearly explains the objectives of the study by using local language as far as possible. As a result, the respondents were furnished proper responses to the questions and statements without any hesitation. Data were collected during the period from

3.6 Compilation of Data

At the end of data collection, the collected data was coded, compiled, tabulated and analyzed. The local units were converted into standard units. The qualitative data was transferred into quantitative data by appropriate scoring technique. The response of the respondents that was recorded in the interview schedule was transferred into a master sheet for entering the data into the computer

3.7 Statistical Analysis

The collected data were compiled, tabulated, coded and analyzed for statistical analysis according to the objectives of the research. The coded data were put into the computer for statistical analysis. The SPSS (Statistical Package for Social Sciences) computer program was used for analyzing the data. Various descriptive statistical measures such as frequency, number, percentage, mean and standard deviation were used for categorization and describing the variables. Pearson's Product Moment Correlation coefficient (r) was used for testing the relationships between the concerned variables. Five (5) percent level of significance was used as a basis for rejecting any null hypothesis throughout of the study.

3.8 Hypothesis

Hypothesis is a conjectural statement of the relation between two or more variables. There are two criteria for good hypothesis and hypothesis statements. Hypothesis is statements about the relations between variables and hypothesis carry clear

implication for testing the stated relations. Hypothesis may be broadly divided into two categories; namely, research hypothesis and null hypothesis.

3.8.1 Research hypothesis

The following research hypothesis was put forward to test relationships between each of the nine characteristics of the Farm families namely- age, education, family size, farm size, annual income, training experience, agricultural knowledge, use of information sources, preference of information sources and the livelihood improvement of the Farm families through participation in National Agricultural Technology Program -2 project.

H_1: Each of nine characteristics was related to the livelihood improvement of the Farm families through participation in NATP-2 project.

3.8.2 Null hypothesis

Each of research hypotheses was converted into null form for the purpose of statistical testing. The null hypothesis was as followed-

H_0: There is no relationship between each of the selected characteristics of Farm families and their livelihood improvement through participation in NATP-2 project.

CHAPTER IV

RESULTS AND DISCUSSION

The findings of the study and their interpretation have been presented in this Chapter. This Chapter has been divided into three sections. The first section deals with the selected individual characteristics of the farmers according to the objective of the study, while the second section deals with the farmers perceived livelihood improvement through participation in NATP-2 project. Finally, in the thirds section deals with contribution of the farmers selected characteristics of the farmers on their perceived livelihood improvement has been discussed.

4.1 Selected Characteristics of the Farmers

The findings of the farmers' selected characteristics have been presented and discussed (Table 4.1) in this section. The selected characteristics are: age, education qualification, farm size, family size annual family income, training received, adoption of different agricultural technology, extension media contact, and perceived livelihood improvement through NATP-2 project.

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

Characteristics	Measuring scale	Range		Mean	SD
		Minimum	Maximum		
Age	No. of year	20	71	41.48	8.733
Education qualification	Year of schooling	.5	16.0	8.081	4.9094
Farm size	Hectare	.065	1.680	.297	.351
Family size	No. of members	4	10	5.44	1.270
Annual income	‘000’taka	30	360	140.14	68.296
Farming experience	No of year	5	40	20.31	7.688
Training experience	No of day	2	4	2.67	.528
Use of technology	No of year	8	23	14.207	2.605
Extension contact	Score	10	15	13.387	.788

4.1.1 Age

Age of the NATP-2 participants was found to range from 20 to 71 years. The average age was 41.48 years with the standard deviation 8.733. On the basis of age, the farmers were classified into three categories as shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Category	Respondents		Mean	SD
	Name	Percent		
Young age (up to 35 years)	32	28.8	41.48	8.733
Middle age (36 to 50 years)	64	57.7		
Old age (>50) years	15	13.5		
Total	111	100.0		

Data presented in Table 4.2 indicate that the highest proportion (57.5 percent) of the respondents was in medium aged category compared to 13.5 percent old age and 28.8 percent young aged category. However, data also revealed that 86.5 percent of the growers in the study area were middle to young aged. . Data of Table 4.2 also indicates that an overwhelming majority of the NATP-2 project participants were young and medium aged. Rural society of Bangladesh maintain traditional norms, values, custom and this is very much favorable for young aged NATP-2 participants to become involve in various organizational activities. Also they are likely to influence highly for family and community decision-making because they are energetic and well acquainted with farm and non-farm activities

4.1.2 Education qualification

Education scores of NATP-2 participants ranged from 0.5 to 16. The average score was 8.081 with the standard deviation 4.909. Based on their score, the growers were classified into five categories as shown in Table 4.3.

Table 2.3 Distribution of the farmers according to their education

Category	Respondents		Mean	SD
	Number	Percent		
Illiterate (o to .5)	28	25.2	8.081	4.909
Primary level (1-5)	10	9.0		
Secondary level (6 to 10)	23	20.7		
Above secondary level (>10)	50	45.0		
Total	111	100.0		

Data presented in Table 4.3 also indicate that 45 percent NATP-2 project Farm families had above secondary level of education followed by 25.2 percent under illiteracy, 20.7 percent under secondary level and 9.0 percent under primary level category. For this reason, it can be assumed that the education of the sample farm families may be higher rather national average literacy rate. Exposure to formal education is very important for shaping-up the behavior of an individual. This might help an individual to intensely participate in development activities like NATP-2 project.

4.1.3 Farm size

The farm size of the NATP-2 participants in the study area ranged from 0.065 to 1.680 hectares (ha). The average farm size was .297 ha with the standard deviation .351. Based on their farm size, the growers were classified into three categories as shown in Table 4.4.

Table 4.4 Distribution of the respondents according to their farm size

Category	Respondents		Mean	SD
	Number	Percent		
Marginal (up to 0 .2 ha)	75	67.6	.297	.351
Small (0.21 to 1.0 ha)	27	24.3		
Medium (1.01 to 3.0 ha)	9	8.1		
Total	111	100.0		

Data presented in (Table 4.4) show that the majority of the respondents are under marginal farm sized category (67.6 percent) where the rest part of the respondents belong under small farm size (24.3 percent) and medium farm size (8.1 percent). It indicates that the NATP-2 project farmers are less land holders which is the prime selection criteria to be a participant of NATP-2 project**.** Because this project particularly targets the resource poor people of the rural areas and their livelihood improvement.

4.1.4 Family size

The family size of the NATP-2 participants ranged from 4 to 10. The average score was 5.44 with the standard deviation 1.270. On the basis of their family size, the growers were classified into three categories as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their family size

Category	Respondents		Mean	SD
	Number	Percent		
Small family (up to 4)	28	25.2	5.44	1.270
Medium family (5-8)	81	73.0		
Large family (>8)	2	1.8		
Total	111	100.0		

Data presented in Table 4.5 reveal that the highest proportion (73.0 percent) of the farmers fell under the medium family category compared to 25.2.2 percent small family and 1.8 percent large family category, respectively. The data also indicate that the average family size (5.44 percent) of the respondents in the study area was lower than the national average of 4.9 (BBS, 2003). This may be due to the effect of proper adoption of family planning measures and knowledge about family planning among the respondents or the prevalence of joint family planning among area.

4.1.5 Annual income

The annual family income score of the respondents ranged from 30 to 360 with a mean of 140.14 and a standard deviation of 68.269. On the basis of annual income the respondents were classified into three groups as shown in table 4.6.

Table 4.6 Distribution of farmers according to their Annual Income

Category	Respondent		Mean	SD
	Number	Percent		
Low Income (up to 60)	4	3.6	140.14	68.269
Medium Income (61 -200)	91	82.0		
High Income (>200)	16	14.4		
Total	111	100		

Data presented in the table 4.6 show that the highest proportion of the respondents (82.0 percent) had medium family income while 3.6 percent of the respondents had low annual income. The average family income of the respondents was 140.14 thousand, which is very much lower than the national average family income (106.36 thousand, BBS, 2004). The findings indicate that the socio-economic status of most of the farmers of NATP-2 project in the study area were in medium income range. They didn't have enough scope of earnings. NATP-2 project farmers of the study area were mainly marginal farmers.

4.1.6 Farming experience

The farming experience of the respondents varied from 5 to 40 with a mean of 20.31 and a standard deviation of 7.688. The respondents were classified into three categories based on their farming experiences scores: low farming experience (0-12), medium farming experience (13-25) and high farming experience (above >25). The categories and the distribution of the farmers according to their farming experience in NATP-2 project are shown in Table 4.7.

Table 4.7: Distribution of the farmers according to their farming experience under NATP-2 project

Category	Respondents		Mean	SD
	Number	Percent		
Low experience (up to 1 2)	18	16.2	20.31	7.688
Medium experience (13 to25)	71	64.0		
High experience (>25)	22	19.8		
Total	111	100.0		

Data presented in the Table 4.7 show that majority (64.0 percent) of the NATP-2 participants had medium farming experience; while 16.2 percent respondents had low farming experience and remaining 19.8 percent had high farming experience. The findings indicate that high portion of the NATP-2 participants had medium farming experience i.e., farmers participated in NATP-2 project who had medium farming experience are more active than others.

4.1.7 Training experience

The training of the respondents varied from 2 to 4 with a mean of 2.67 and a standard deviation of .528. The respondents were classified into three categories based on their training experiences scores: low training experience (0-2), medium training experience (2-3) and high training experience (above 3). The categories and the distribution of the farmers according to their training experience in NATP-2 project are shown in Table 4.8.

Table 4.8 Distribution of the farmers according to their training experience under NATP -2 project

Category	Respondents		Mean	SD
	Number	Percent		
Low experience (up to 2)	40	36.0	2.67	.528
Medium experience (2 to 3)	68	61.3		
High experience (> 3)	3	2.7		
Total	111	100.0		

Data contained in Table 4.8 indicate that the highest proportion (61.3 percent) of the respondents had medium training experience, while 36.0 percent had less training experience and rest of the respondents 2.7 percent had high training experience. Training experience plays an important role in motivating the individuals in participating NATP-2 project activities. The present study shows that there was not enough training opportunity for NATP-2 farmers. This is why, most of the respondents had medium training experience.

4.1.8 Use of technology

Use of technology under NATP-2 project score was found to range from 8 to 23. The average score was 14.207 with a standard deviation of 2.605. Based on the scores of using of NATP-2 project technology, the farmers were classified into three categories as low adoption (≤ 12), medium adoption (13-16)) and high adoption (> 16). The distribution of the respondents according to their using of agricultural technology has been presented in Table 4.9.

Table 4.9 Distribution of the farmers according to their use of NATP-2 project technology

Category	Respondents		Mean	SD
	Number	Percent		
Low use (up to 12)	29	26.1	14.207	2.605
Medium use (13-16)	67	60.4		
High use (>16)	15	13.5		
Total	111	100.0		

Data contained in (Table 4.9) indicate that the majority (60.4 percent) of the respondents had medium uses compared to 26.1 percent felt in low uses and 13.5 percent possesses high uses. It therefore revealed that majority of the NATP-2 project farmers (86.5 percent) in the study area were under low to medium uses categories.

4.1.9 Extension media contact

The computed extension contact scores of the respondents ranged from 10 to 15 with an average of 13.387 and standard deviation of 0.788. On the basis of extension contact scores, the respondents were classified into three categories: low extension contact (up to 12), medium extension contact (13- 16) and high extension contact (>16). The distribution of the respondents according to their extension contact is shown in Table 4.10.

Table 4.10 Distribution of the farmers according to their extension contact

Category	Respondents		Mean	SD
	Number	Percent		
Low(up to 12)	8	7.2	13.387	0.788
Medium (13-14)	99	89.2		
High (>14)	14	3.6		
Total	111	100.0		

Data presented in Table 4.10 indicate that the highest proportion (89.82 percent) of the farmers had medium extension contact, while 3.6 percent had high extension contact and the proportion of respondents having low extension contact was 7.2 percent. The findings of the study indicate that most of the respondents had medium and low extension contact with various information sources for getting necessary agricultural information. Practically there was very little extension program for NATP-2 project farmers in specific. Although the situation is now changing through the intervention of GOs and NGOs and more attention is needed.

4.2 Perceived livelihood improvement

This section deals with the livelihood improvement of the NATP-2 project farmers. The livelihood improvement in terms of five capitals of livelihood and the overall livelihood improvement are described in this section

Table 4.11 Capital wise distribution of the participants (N=111)

SL No	Statements	Strongly agree	Agree	No opinion	Disagree	Strongly Disagree	Scale index
A. Human capital							
i	I could get updated with modern farm technologies through NATP-2 project	17 (15.3%)	87 (78.4%)	7 (6.3%)	0	0	454
ii	Since I have been joining in the NATP-2 project, my farming skill got better	22 (19.8%)	51 (45.9%)	23 (20.7%)	15 (13.5%)	0	413
B. Financial capital							
iii	My financial status has been increased since I have joined in the NATP-2 project	13 (11.7%)	54 (48.6%)	28 (25.2)	16 (14.4%)	0	397
iv	NATP-2 project helps developing marketing facilities for farmers	11 (9.9%)	58 (52.3%)	40 (36.0%)	2 (1.8%)	0	411
C. Natural capital							
v	NATP-2 project helps to reduce post-harvest losses	6 (5.4%)	69 (62.2%)	33 (29.7%)	3 (2.7%)	0	411
vi	NATP-2 project helps to increase intensive cropping for more production	47 (42.3%)	61 (55%)	3 (2.7%)	0	0	488
D. Physical capital							
vii	NATP-2 project helps to increased access to quality for seeds, fertilizers & intensive care of crops	35 (31.5%)	67 (60.4%)	9 (8.1%)	0	0	470

viii	NATP-2 project ensure the improved environment for poultry and livestock production	19 (17.1%)	83 (74.8%)	9 (8.1%)	0	0	454
E. Social capital							
ix	Participation in NATP-2 project helps farmers' socio-economic status	6 (5.4%)	73 (65.8%)	31 (27.9%)	1 (.9%)	0	417
x	NATP-2 project promotes the farmer groups and producer organizations by facilitating their stronger participation in commodity value chain	4 (3.6%)	84 (75.7%)	23 (20.7%)	0	0	425

* Overall mean of this variable = 3.9

Physical capital Based on perceived livelihood improvement index first perceived livelihood improvement is in physical capital (total 924). According to farmers' responses, most of the farmers can improve their physical capital than others through participation in NATP-2 project. The findings indicate that NATP-2 project farmers generally have high physical assets. Therefore, the effect would be higher to a great extent is actually logical. The framers got enough seeds, fertilizer for their seasonal cultivation. Farmers got better intensive crop care through joining in NATP-2 project. The farmers also have a safe place for their cattle, can continue with any horticulture on their homestead and most importantly are able to remain living in their home during periods of flood. Thus perceived livelihood improvement poses medium effect on physical capital.

Natural capital Second perceived livelihood improvement is in natural capital, total score of farmers' perception is 899.If we interpret the findings, it would be clear that after involving in NATP-2 project, they got better to increase intensive cropping for more production (488) and improve their livelihood status. But due to lack of proper

knowledge and training campaign, farmers couldn't control yield losses after and before harvesting as expectation.

Human capital Third perceived livelihood improvement is in human capital (total 867). According to farmers' responses, most of the farmers get better human capital facilities after joining NATP-2 project. If we interpret the findings, it would be clear that after involving in NATP-2 project, farmers were more aware of their living condition.NATP-2 project farmers received training in modern agricultural technology and it was the second highest score among the other statement of capital wise distribution (454). Thus farmers' perceived livelihood exerts some sorts of medium effect on human capital of the NATP-2 project farmers.

Social capital Fourth perceived livelihood improvement is in social capital (total 842). Farmers' perceptions are that they can improve moderately their social capital by participating in NATP-2 project.

Poverty, social pressures and the continual yield loses make it difficult environment for farmers to increase their well-being and support each other. The NATP-2 aims to develop the community cohesion and social capital of its farmers, encouraging them to provide support to one another. NATP-2 project promotes the farmer groups and producer organizations by facilitating their stronger participation in commodity value chain.

Financial capital Last improvement is in financial capital (total 808).farmers get better marketing facilities for their goods and products and can improve their socio-economic status (411).

The NATP-2 project farmers have intensive type of assistance to generate significant and sustainable increase in the household incomes of the poorest households living in this marginal environment. NATP-2 project has not initiated Asset Transfer Program (ATP), accompanied by a package or other social and market development inputs yet. With greater knowledge of the livelihoods of extreme poor farmers, NATP-2 project seems to be less successful at reaching the very poorest households on project area.

4.3 Contribution of the Socio-economic Determinants of the farmers to the perceived livelihood improvement through participation in NATP-2 project

In order to determine the contribution of socio-economic determinants of NATP-2 project farmers' to their extent of participation of perceived livelihood improvement, regression analysis was carried out which is presented in Table 4.12.

Table 4.12 Multiple regression coefficients of the selected factors indicate the perceived livelihood improvement of the farmers of NATP-2 project.

Dependent variable	Independent variables	β	ρ	R^2	Adj. R^2	F
Perceived livelihood improvement of NATP-2 project farmers	Age	-0.029	0.892	0.370	0.314	6.600
	Education qualification	-0.028	0.818			
	Farm size	0.538	0.000**			
	Family size	0.027	0.738			
	Annual income	-0.062	0.649			
	Farming experience	0.155	0.470			
	Training experience	0.067	0.411			
	Use of technology	0.238	0.009**			
	Extension media contact	0.212	0.015*			

** Significant at $p < 0.01$; * Significant at $p < 0.05$

Among the nine hypothesized relationships, three (3) variables namely farm size, extension media contact and use of technology were found significantly contribution to the perceived livelihood improvement of the project farmers (Table 4.12) while rest of the variables showed no significant contribution. All the factors jointly contribute 37.0% of the variance of the improvement ($R^2 = 0.370$). Each predictor may explain some of the variance in respondents' perceived livelihood improvement of NATP-2 project farmers simply by chance. The adjusted R^2 value (0.314) penalizes the addition of extraneous predictors in the model, but values of 0.314 still show that the variance in respondents' perceived livelihood improvement of farmers' can be

attributed to the predictor variables rather than by chance, and that both are suitable models (Table 4.12). In summary, the models suggest that the respective authority should consider the respondents farm size, extension media contact and adoption of technology for perceived livelihood improvement of NATP-2 project farmers.

4.3.1 Significant contribution of farm size in improvement of perceived livelihood by the farmers of NATP-2 project

The contribution of farm size in improvement of perceived livelihood by testing the following null hypothesis; "there is no contribution of farm size in improvement of NATP-2 project farmers Saidpur and Khongoan union of Pirgong upazila under Thakurgoan district". The p-value of the concerned variables was found .000. 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 farm size was at 1% significance level. So, the null hypothesis could be rejected.

Farmer's farm size had positive influence on farmers perceived livelihood improvement. It had the 1st most significant (significant at $p<0.000$) contribution on their improvement. It could be said that usually perceived livelihood improvement were not seen by marginal farm size compared to medium farm size and they might face obstacles sometimes to take new decision for going outside from traditional practices considering benefit. These also support the study conducted by the farmers having more farm size are more concerned about new agricultural technologies and improved practices. Therefore, they can apply their knowledge in their knowledge and thus perceived higher usefulness of NATP-2 project

4.3.2 Significant contribution of use of agricultural technology on perceived livelihood improvement of NATP-2 project farmers.

From the multiple regression, it was concluded that the contribution of use of new NATP-2 technologies on perceived livelihood improvement was measured by the testing the following null hypothesis; 'there is no contribution of adoption of agricultural technologies on perceived livelihood improvement of NATP-2 project farmers'.

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

b. The contribution of the adoption of agricultural technologies on perceived livelihood improvement of NATP-2 project farmers was significant at 1% level (0.009).
c. So, the null hypothesis could be rejected.

The p-value is of the adoption of agricultural technologies on perceived livelihood improvement of NATP-2 project farmers is (0.238). So, it can be stated that as adoption of agricultural technologies on perceived livelihood improvement of NATP-2 project farmers increased by one unit, perceived livelihood improvement of NATP-2 project farmers increased by 0.206 units. Considering the effects of all other predictors are held constant. Based on the above finding, it can be said that farmers had adopted more agricultural technologies for their perceived livelihood improvement. So adoption of agricultural technologies has high significantly contributed to the farmers' perceived livelihood improvement.

4.3.3 Significant contribution of extension media contact on perceived livelihood improvement of NATP-2 project farmers.

The contribution of extension media contact for perceived livelihood improvement of farmers through participation in NATP-2 project by testing the following null hypothesis; "there is no contribution of extension media contact on perceived livelihood improvement of NATP-2 project farmers'. The p-value of the concerned variable was found .0212. 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 extension media contact was at 5% significance level. So, the null hypothesis could be rejected.

Farmer's extension media contact for perceived livelihood improvement had positive influence on farmers' participation in NATP-2 project. This implies that with the increase of extension media contact of the farmers will increase their perceived livelihood improvement. This findings support the study conducted by the person having more extension contact about innovation of agricultural technologies and improved practices. Therefore, they can apply their knowledge in their farming and thus perceived higher usefulness of NATP-2 project

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This Chapter deals with the summary of findings, conclusions and recommendations of this study. Regression analysis was used to test the proposed hypotheses using SPSS v.23. In this Chapter, the summary of this study is presented.

5.1 Summary of the Findings

The major findings of the study are summarized below:

5.1.1 Selected factors influencing the farmers' perceived livelihood Improvement

Age

The middle aged NATP-2 project farmers comprised the highest proportion (57.7 percent) followed by old aged category (13.5 percent) and the proportion were made by the young aged category (28.8 percent).

Education

Farmers above secondary level education category constituted the highest proportion (45.0 percent) compared to 25.2 percent cannot sign category, 20.7 percent secondary level category. On the other hand the lowest (9.0 percent) belonged to under primary level category.

Family Size

Greater more than half (73.0%) of the respondent had medium family compare to 1.8% and 25.2% had large and small family size.

Farm Size

The marginal land holder constituted the highest proportion (67.6 percent) of the farmers followed by 24.3 percent with small land holder and remaining 8.1 percent with medium land holder.

Annual income

Considering annual income the heights percent 82.0 of the respondent farmers had medium income followed by 14.4 percent had high income and 3.6 percent had low annual income.

Farming experience

It was found that the highest proportion (64.0 percent) of the respondents had medium farming experience while 16.0 percent had low farming experience, 19.9 percent had high training experience.

Training experience

It was found that the highest proportion (61.3 percent) of the respondents had medium training experience while 36.0 percent had low training experience, 2.7 percent had high training experience.

Use of agricultural technology

The highest proportion (60.4 percent) of the respondents had medium use of agricultural technology, while 26.1 percent had low use and the rest 13.5 percent had high use of agricultural technology.

5.1.2 Perceived livelihood improvement

Based perceived livelihood improvement index farmers' had highest improvement in physical capital scored 926, secondly in human capital scored 897 and thirdly in social capital among livelihood assets category.

5.1.3 Contribution of the selected characteristics of the farmers to their perceived livelihood improvement

Farm size, extension media contact and adoption of technology had significant positive contribution with the perceived livelihood Improvement. Age, education qualification, family size, annual income, farming experience, training experience had no contribution on farmers' perceived livelihood improvement through participation in NATP-2 project.

5.2 Conclusions

Conclusions drawn on the basis of the findings of this study and their logical interpretation in the light of the other relevant factors are furnished below:

i. The variation regarding different assets of livelihood was minimum, highest status of livelihood improvement was observed in case of physical capital and that was the lowest in case of natural capital. The overall livelihood improvement is a bit promising and satisfactory as the project is

in operation for last few years and it might have a high satisfactory performance at long run.

ii. The findings indicate that 67.6 percent respondents belonged to marginal farm size category and it may be concluded that if farm size increases it provides a unique opportunity which is essential for greater livelihood improvement practices in NATP-2 project.

iii. The findings indicate that 60.4 percent of the respondents belong to medium adoption of agricultural technology. So, the manifesto of NATP-2 project of technology integrated with adoption is performing well at field level.

iv. Majority (89.2percent) of the respondents belonged to medium extension contact of NATP-2 project farmers' categories. Therefore, it may be concluded that the extension contact of NATP-2 project farmers is performing well at field level.

5.3 Recommendations

5.3.1 Recommendations for policy makers

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

i. Proper motivational programs might be provided by the Upazila Agriculture Office and DAE for involving more farmers in NATP-2 project activities. The selection of the participants should be made following the guideline of participant selection of NATP-2 project.

ii. Agricultural technologies through NATP-2 project need to be made available and accessible form by supplying sufficient equipment, balanced provision of credit and need-based training for the rural farmer to improve their capacity.

iii. Farmer having small farm size and less or no training experience should be the focused as target population for providing agricultural interventions through NATP-2 project. Because, they felt the need for building their capacity in different agricultural activities but cannot develop them by themselves.

iv. Marketing facilities should be improved and sales centers, and processing centers should be established in the rural areas through NATP-2 project. This

will be more influential for livelihood improvement through participation in NATP-2 project.

v. Need based training programs and training facilities though NATP-2 project should be developed and implemented extensively for increasing the knowledge, management skill and operational ability in practicing agricultural activities.

5.3.2 Recommendations for further research

The study conducted in some specific location cannot provide all the information for proper understanding about farmers' livelihood improvement and related matters. The following recommendations are suggested for further study in this connection:

i. The present study was conducted in Pirgonj upazila underThakurgoan district. It is recommended that similar studies should be conducted in other areas of the country.

ii. This study investigated the relationship of only nine characteristics of the farmers with their perceived livelihood improvement. Therefore, it is recommended that further study should be conducted with other independent and dependent variables**.**

iii. The research conducted her in NATP-2 project farmers. So, further study can be taken with farmer group or/and compare among these group.

iv. Researcher will have opportunity or scope to identify the factors causing hindrance towards adaptation of farming practices by farmers in agriculture.

v. Research should be undertaken on the effectiveness of agricultural extension services and other related organizations in helping farmers for participating in NATP-2 project.

vi. Further study needs to investigate the difference between low to high income group in term of perceived livelihood improvement.

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APPENDIX- A

An English Version of Interview Schedule

Department of Agricultural Extension & Information System

Sher-e-Bangla Agricultural University, Dhaka-1207

An interview schedule for collection of data on

Farmers' Perceived Livelihoods Improvement through Participation in NATP-2 Project

Serial no ……

Name of the respondent: …… Village: ……

Union: …….Upazila: ……...

District: ……

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

1. **Age:** How old are you? ……..… Years.
2. **Educational Qualification:** Please mention your educational status from the following:
   i. Can't read and write
   ii. Can sign name only
   iii. Studied up to class: ……..
   iv. I did not formally study but my education is equivalent to class……

3. **Farm Size:** Please indicate area of your land according to use

SL. No.	Types of land ownership	Area of Land	
		Local unit	Hectare
i.	Homestead area		
ii.	Own land under own cultivation		
iii.	Land taken from others as lease		
iv.	Land taken from others as borga		
v.	Land given to others as borga		
Total=A+B+1\2(C+D)+E			

4. **Family Size:** Please mention the number of your family members…….

5. **Annual Income:** Please indicate the production and income of your family has earned last year from different sources

Source of income	**Income (Tk.)**
A) Agricultural sources	
Rice	
Other crops	
Livestock	
Poultry	
Fisheries	
B) Non-agricultural sources	
Business	
Service	
Labor	
Remittance	
Others (please specify)……..…	
Total(A+B)=	

6. **Farming experience:** How long have you been involved in agriculture? ……years

7. **Training Experience:** Have you received any training related to agriculture? Yes/No
   If yes, please give the following information:

Sl. No	**Name of training**	**Duration of training (days)**
i		
ii		
iii		
iv		
v		
Total		

8. Use of different NATP-2 technologies by the farmers

Sl. No.	Name of technologies	Year of the adoption		
		2018	2019	2020
i	High value crop			
ii	Community seed production			
iii	Yield gap			
iv	Vermicomposting			
v	Sex pheromone trap			
vi	Tricho compost			
vii	Integrated Pest Management			
viii	Drought Tolerant Variety Cultivation			

9. Agricultural Extension Contact: Please state the extent of your contact with the following communication media.

Sl. No	Extension Media	Extent of contact				
		Regularly (4)	Often(3)	Occasionally (2)	Rarely (1)	Not at all(0)
i	Model/Progressive Farmer	>5 times/ Month	4-5 times/ month	2-3 times/ Month	1 time/ month	
ii	Sub-Assistant Agriculture Officer (SAAO)	>5 times/ Month	4-5 times/ month	2-3 times/ Month	1 time/ month	
iii	NGO worker	>5 times/ month	4-5 times/ month	2-3 times/ Month	1 time/ month	
iv	Upazila Agricultural Officer (UAO)	>6 times/ year	5-6 times/ year	3-4 times/ year	1-2 times/ year	
v	Agricultural Extension Officer (AEO)	>6 times / year	5-6 times/ year	3-4 times/ year	1-2times / year	
vi	Listening agricultural program in radio	>5 times/ week	4-5 times/ week	2-3 times/ week	1-2 times/ week	
vii	Watching agricultural	>5 times/ week	4-5 times/	2-3 times/ week	1-2 times/	

	program on TV		week		week	
viii	Reading printed media(e.g. agricultural news, poster, leaflet)	>6 times / month	3-4 times/ month	2-3 times/ month	1-2 times/ month	
ix	Participation in group discussion	>6 times / month	4-5 times/ month	1-3 times/ Month	1-2 times/ month	
x.	Participation in demonstration meeting	>3 times/ month	2-3 times/ month	1-3 times/ month	1-2 times/ month	

10. Perceived livelihood improvement through NATP-2 project: Please mention the level of agreement or disagreement with the following statements based on your experience in participating NATP-2 project.

SL No	**Statements**	**Strongly agree**	**Agree**	**No opinion**	**Disagree**	**Strongly Disagree**
A. Human capital						
i	I could get updated with modern farm technologies through NATP-2 project					
ii	Since I have been joining in the NATP-2 project, my farming skill got better					
B. Financial capital						
iii	My financial status has been increased since I have joined in the NATP-2 project					
iv	NATP-2 project helps developing marketing facilities for farmers					
C. Natural capital						
v	NATP project helps to reduce post-harvest losses					

vi	NATP-2 project helps to increase intensive cropping for more production					
D. Physical capital						
vii	NATP-2 project helps to increased access to quality for seeds, fertilizers & intensive care of crops					
viii	NATP-2 project ensure the improved environment for poultry and livestock production					
E. Social capital						
ix	Participation in NATP project helps farmers' socio-economic status					
x	NATP project promotes the farmer groups and producer organizations by facilitating their stronger participation in commodity value chain					

Thank you.

Signature of the interviewer----------

Respondent's Contact/Cell No.