FARMERS' KNOWLEDGE AND PRACTICE ON FISH FARMING

A Thesis
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CERTIFICATE

This is to certify that the thesis entitled. **"Farmers' Knowledge and Practice on Fish Farming"** 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 **KAMELIA MONDAL, Registration No. 19-10016** 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 source of information, received during the course of this study has been dully acknowledged.

Dated: June, 2021
Place: Dhaka, Bangladesh

……..
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Dedicated
to
My Beloved
Parents

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The Author

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ABBREVIATION AND ACRONYMS

DAE	Department of Agricultural Extension
BBS	Bangladesh Bureau of Statistics
DoF	Department of Fisheries
GDP	Gross Domestic Product
SIS	Small Indigenous Species
SPSS	Statistical Package for Social Sciences
NGOs	Non-governmental Organizations
et al.	And Others (at elli)
ha	Hectare
TK	Taka

FARMERS' KNOWLEDGE AND PRACTICE ON FISH FARMING

ABSTRACT

The present study was aimed to assess farmers' knowledge and practice on fish farming and explore the relationships between the seven (7) selected characteristic of the fish farmers with their i) knowledge and ii) practices on fish farming. The relevant data were collected through interviewing randomly selected 77 farmers from the population of 394 farmers of four (4) selected villages (Wazirpur, Bahirdanga, Tularampur & Benahati) of sadar upazilla of Narail district. Data were collected during the period from 01 to 30 January, 2021. Descriptive statistics such as mean, standard deviation, range and percentage were used to describe the variables under consideration and Pearson's Product Moment Co-efficient of Correlation was used to examine the relationship of the selected characteristics of the farmers with their i) knowledge and ii) practice on fish farming. The findings of the study revealed that two-thirds (66.2 percent) of the farmers had low to medium knowledge on fish farming. Again two-thirds (66.2 percent) of the farmers had low to medium practice on fish farming. Correlation analysis indicated that among the selected characteristics of the farmers' education, fish farming area, annual income from fish farming and extension contact had positively significant relationship with their knowledge on fish farming. Again fish farming area, annual income from fish farming and extension contact had significant relationship with their practice on fish farming. Two-thirds proportion of the farmers having low to medium knowledge and practice on fish farming leads to conclude to increase the knowledge and practice of fish farming by increasing contact with the farmers to increase their area of fish farming and income from fish farming.

CHAPTAR 1

INTRODUCTION

1.1 General background

Bangladesh is blessed with vast natural resources of many rivers and tributaries across her deltaic plains in which aquaculture is a potential sector to meet dietary needs of protein as well as to maintain people's livelihood. It is an agro-economy based developing country in South Asia. Bangladesh is bordered by India to the west-north and north-east while Myanmar on the south-east. Bay of Bengal lies to the south, and to the north is the Himalayan mountain range (BBS, 2020).

Rapidly growing population throughout the world and malnutrition are two serious problems being faced by millions of people in developing countries. To combat with these issues fish farming has been expected to play pivotal role in providing sustainable food (Muddassir et al., 2019). The economy of Bangladesh is largely dependent on crop agriculture although aquaculture is gaining importance in recent years (Barmon & Rahman, 2010). Fish is the second most valuable agricultural crop in Bangladesh and its production contributes to the livelihoods and employment of millions of people (Das et al., 2018). Bangladesh ranked 3rd in inland open water capture production and 5th in world aquaculture production. Currently Bangladesh ranks 4th in tilapia production in the world and 3rd in Asia. The national fish *hilsa* (*Tenualosa ilisha)* as a single species has been making the highest contribution (12.15 percent) to the country's total fish production (DoF, 2019).

The country became self-sufficient in fish production providing 62.58 g of fish per person in daily dietary consumption (Fagun et al., 2020). In 2018-19, fisheries sector contribute 3.50 percent to the national GDP and more than one-fourth (25.72 percent) to the agricultural GDP. More than 12 percent of the 166 million population of Bangladesh depend on fisheries and aquaculture related activities on full time and part time basis for their livelihoods (DoF, 2019). The culture and consumption of fish therefore has important implications for national income and food security. Bangladeshi people are popularly referred to as "Mache Bhate Bangali" or "fish and rice makes a Bengali (Ghose, 2014).

Bangladesh is a land of water resources bestowed with rivers, beel, khal, floodplains, canals and thousands of small wetlands and ponds. Majority of those water bodies are suitable for the freshwater fish culture (Das et al., 2018). The diversified fisheries resources of the country are divided into three groups, i.e., inland capture, inland culture and marine capture. Inland culture includes mainly pond/ditch, baor, shrimp/prawn farm, seasonal cultured water-body, pen and cage culture etc (DoF, 2019). In 1983-1984, the contribution of inland capture, culture and marine fisheries to total fish production were 62.59 percent, 15.53 percent and 21.88 percent, respectively; whereas in 2018-19, inland capture fisheries contributes only 28.19 percent, inland culture fisheries contributes 56.76 percent and marine fisheries contributes 15.05 percent to total fish production (DoF, 2019).

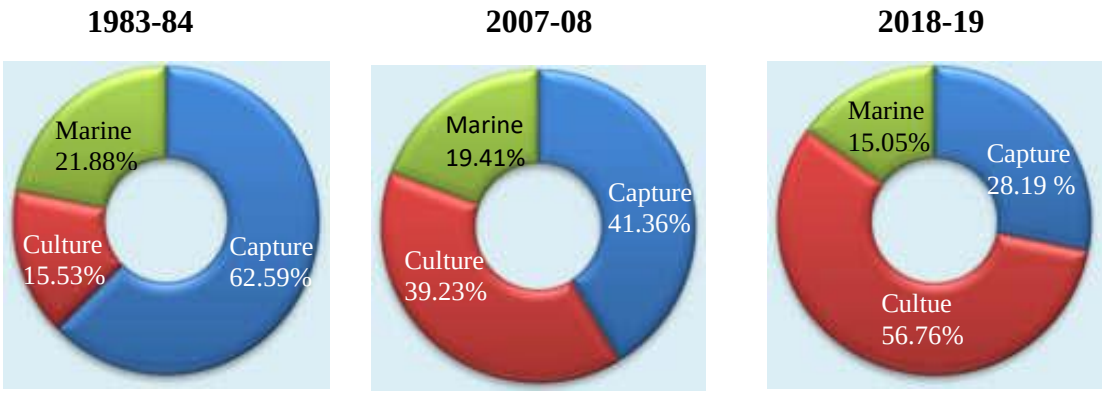

Fig. 1.1: The contribution of inland capture, culture and marine fisheries to total fish production.

Freshwater aquaculture involves pond aquaculture especially the polyculture of native and exotic species. Inland aquaculture of indigenous and exotic carp species as well as *pangas* (*Pangasius hypophthalmus*), *tilapia* (*Oreochromis niloticus*) and *koi* (*Anabas cobojius*) has been expanded massively and farming of valuable, nutrient-rich indigenous species like *koi* (*Anabas cobojius*), *shingi* (*Heteropneusti fossilis*), magur (Clarias batrachus), *pabda* (*Ompok pabda*), *gulsha* (*Mystus bleekeri*), *mola* (*Amblypharyngodon microlepis*) etc. drew special attention among the farmers as well. Inland capture fishery comprising rivers and estuaries, Sundarbans water resource in the forest, beels, Kaptai Lake, and floodplain is very rich in biodiversity with almost 260 freshwater fish species have historically dominated the fish production of Bangladesh. Coastal aquaculture comprised of both shrimp/prawn and

finfish and shrimp farming in *ghers* (ponds/enclosures) has been expanding in coastal belt (DoF, 2019).

Bangladesh is one of the world's leading fish producing countries. Over the last three decades, the total fish production of Bangladesh has been increased about six times more (7.54 Lakh MT in 1983-84 to 43.84 Lakh MT in 2018-19) where aquaculture production contributes 56.76 percent of the total fish production (DoF, 2019).

It is also remarkable that fish alone contributes about 60percent of animal protein to the diet of the people of country (Hossen et al., 2020). All fresh fish provides higher proportions of protein (14- 20g /100g raw edible parts) compared to plant sources (2.7g/100g cooked rice and 8.7g/100g cooked bean). Besides this, small fish species are rich in micronutrients like vitamin A, calcium, iron and zinc. On the other hand, fat composition of fish is unique in respect of other animal food sources due to presence of poly unsaturated fatty acid (PUFAs) (Kawarazuka, 2010). Those PUFAs reduce the risk of heart disease (Sakib et al., 2014). Aquaculture also contributes to the livelihood of the poor farmers through improved food supply, income and employment. It has been estimated that about 138.68 lakh people are involved with fish farming in Bangladesh (Hossen et al., 2020).

The main production systems for freshwater aquaculture in Bangladesh are semi-intensive and extensive pond poly-culture of carps which accounts for 80percent of the total freshwater aquaculture production. The rest 20 percent are mainly from *pangas* (*Pangasius hypophthalmus*), *tilapia* (*Oreochromis niloticus*), small indigenous species (SIS) of fish and rice-fish farming (Hossen et al., 2020). Aquaculture is not only the key supplier of animal protein for the masses of Bangladesh; it has the potential to earn foreign currency through expert to abroad. Many factors are responsible for lower yields of fish production. Knowledge and practices level might have the influence on fish farming (Tran et al., 2019). So, to improve the present status of aquaculture practice in this country, it is necessary to assess the knowledge and practice of the fish farmers of Bangladesh.

1.2 Statement of the Problem

Fish culture is increasing in Bangladesh day by day. A significant role for reducing protein deficiency and malnutrition, generating employment and earnings foreign exchange has already been observed by this sector in Bangladesh (Quddus & Sen, 2020). Most of the farmers have lack of knowledge and information about proper fish farming process. Bangladesh is one of the poorest countries in the world in terms of per capita income. To ensure a balanced socio-economic development of the country improvement and to find out farmers' knowledge on fish farming and how the farmers change their farming practices, following research questions was designed:

i. What is the extent of knowledge of farmers on fish culture?
ii. What is the extent of practice of farmers on fish culture t?
iii. Is there any relationship between farmers' selected characteristics, and their knowledge and practice on fish culture?

1.3 Objectives

1. To assess the extent of farmers' knowledge and practice on fish farming
2. To assess some selected characteristics of the farmers
3. To explore the relationship of each of the selected characteristics of the farmers with their knowledge and practice on fish farming

1.4 Justification of the Study

The major focus of the study is to assess farmers' knowledge and practice on fish culture. In order to meet the increased domestic demand for fish, the Department of Fisheries (DoF) and some non-government organizations (NGOs) are encouraging people to increase fish production in closed water bodies (Quddus & Sen, 2020). But these highly productive resources are not in proper use due to lack of knowledge in adopting modern technologies and applying scientific procedures in production system. The producers in Bangladesh are poor and they are attentive to produce maximum outputs from minimum inputs. Farmers are not interested to use improved technology by investing a large amount of money. So, evaluation of knowledge and skill of the concerned fish farmers is necessary. Considering the above scenarios, the

researcher became interested to undertake a study to determine knowledge and practice of fish farmers of Bangladesh.

1.5 Assumption of the Study

An assumption is the supposition that an apparent fact or principle in true in the light of the available evidence (Goode, 1945). The researcher had following assumption in mind while undertaking this study.

i. The selected respondents were competent enough to reply the queries made by the researcher.
ii. The responses furnished by the respondents were valid and reliable.
iii. Information furnished by the respondents included in the sample was the representative opinion of the whole population of the study area.
iv. The researcher was well adjusted to the social environment of the study area since she hails from the same community. Hence the data collected by her may be reliable.

1.6 Limitation of the Study

i. The study was confined only in four villages (Wazirpur, Bahirdanga, Tularampur and Benahati) of Sadar Upazila of Narail district.
ii. Only seven (7) personal and socio-economic characteristics of the respondents were selected for investigation in this study.
iii. The researcher relied on the data furnished by the fish farmers from their memory during interview.
iv. Information, facts and figures supplied by the respondents were applicable to the situations prevailing in the locality during the year 2019-2020.

1.7 Definition of Terms

Age

Age of respondent was defined as the span of his/her life and was operationally measured by the number of years from his birth to the time of interview.

Education

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, morals, beliefs, habits, and personal development. Educational methods include teaching, training, storytelling, discussion and directed research. It was operationalized by the formal education of the respondents by taking into account of years he/she spent in formal educational institutions.

Fish Farming Area

It referred to the area under fish farming of the farmers. It was expressed in hectare.

Annual Income from Fish Farming

It referred to the annual earning of the respondent from selling of fish and fish fry and it was expressed in Thousand Taka.

Training Exposure

Training refers to the teaching and learning activities carried on for the primary purpose of helping members of an organization acquire and apply the knowledge, skills, abilities, and attitudes needed by a particular job and organization. It also refers to the total number of days attended by the respondent in his/her life to the various subject matters of interest including agricultural training program.

Extension Contact

It referred to an individual's (farmer) exposure to or contact with different communication media, source and personalities being used for dissemination of new technologies.

Problem faced in Fish Farming

Problem is defined as a matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome. It referred to the extent of problems faced by the farmers on fish farming in terms of social, technical, economical, marketing and psychological problems.

Knowledge

Knowledge is defined as what is learned, understood or aware of.

Practice

Practice refers the actual application or use of an idea, belief, or method, as opposed to theories relating to it.

CHAPTER 2

REVIEW OF LITERATURE

In this chapter, reviews of the literatures related to the study are presented. The researcher intensively searched internet, websites, available books, journals and printed materials from different sources of home and abroad. It may be relevant here to mention that a good number of research activities concerning farmers' knowledge and practice on fish farming have been made in many countries of the world.

However, the literatures have been organized into following four sections to set the context of the study:

First section	: Concept and past research related to knowledge and practice.
Second section	: Relationships between selected characteristics of the farmers and their knowledge on fish farming or other innovations.
Third section	: Relationships between selected characteristics of the farmers and their practice of fish farming or other innovations.
Fourth section	: Conceptual model of the Study.

2.1 Concept and Past Research related to Knowledge and Practice on Fish Farming

According to Bolisani and Bratianu (2018) knowledge is justified true beliefs shown to have the limitations given by the justification condition and the truth nature.

Hunt (2003) indicated that knowledge is often defined as a belief that is true and justified.

The findings of Samah and Kamaruddin (2015) has revealed that the level of good aquaculture practices among brackishwater pond farmer is satisfactory where almost 84 percent of farmer practicing good aquaculture practices at the level of 60 percent.

Chowdhury and Khairun (2014) found that only-shrimp farmers were found having high to very high rank of knowledge (70 percent) in pond preparation which was much better than rice-shrimp.

Sakib et al. (2014) revealed that about half of the farmers (45.5 percent) had low knowledge on fish culture and more or less similar portion of them possessed high knowledge category (42.70 percent), whereas only 11.80 percent of them showed medium category knowledge.

Rahman et al. (2013) found that traditional '*Gher*' aquaculture had been practiced in the coastal areas of Bangladesh to grow shrimp and other fishes long before the introduction of current shrimp culture practices.

Akankali et al. (2011) showed in their articles reviews the fish pond management processes, stocking of ponds, feeding of fish, types of culture, fish farming combined with other branches of agriculture, rearing of fish for purposes other than food, other fish culture, types of fish used for fish culture in central East Africa, general biology of the species of value in fish culture and suitable combinations of fish for stocking to reawaken the minds of individuals, companies and government on the need to develop pond fish culture in Nigeria.

Chandra et al (2010) indicated in their study that shrimp farming was not a very old practice in Bagerhat district. Among the interviewed farmers only 8.95 percent started shrimp farming before 1995. About 30.80 percent, 54.47 percent and 6.50 percent farmers started shrimp farming in the year ranging 1995-99, 2000-04 and after 2004 respectively. The highest number of farms (80 percent) was established in the year between of 2000 to 2004 in Sadar Thana.

Parvez et al. (2006) examined the study area, most of the shrimp farming was practiced in traditional way. However the changes of shrimp farming practices were found after disease. In field preparation, use of plough was rare before disease but after disease (2000 - 2001), 36 percent of the farmers and recently (2003 - 04), 90 percent of the farmers were found using plough for field preparation.

2.2 Relationship between Selected Characteristics of the Farmers and Their Knowledge on Fish Farming or other Innovations

2.2.1 Age and Knowledge

Hossain (2017) summarized that age of the farmers had no significant relationship with their knowledge in disseminating farm information.

Alam et al. (2017) examined that age of the fish farmers had no relationship with farmers' fish culture knowledge.

Abdullah et al. (2015) revealed that age had significant positive relationship with their knowledge on pond fish farming.

Sakib et al. (2014) provided the information about the relationship nature between the independent and dependent variable where age had a positive and significant relationship with the knowledge of the farmer about the aquaculture practice at the one percent level of significance.

2.2.2 Education and Knowledge

Alam et al. (2017) summarized that education of the fish farmers had positive and significant relationship with farmers' fish culture knowledge.

Hossain (2017) showed that education of the farmers had positive and significant relationship with their knowledge in disseminating farm information.

The findings of Abdullah et al. (2015) indicated that education of the pond farmers had no significant relationship with their knowledge on pond fish fanning.

Sakib et al. (2014) informed about the relationship nature between the independent and dependent variable where education of the farmers had a positive and significant relationship with the knowledge of the farmer about the aquaculture practice at the one percent level of significance.

Azad (2013) told that there was a positive significant relationship between farmers' level of education and knowledge.

Rahman (2006) found that education of the farmers' had significant positive relationship with their knowledge on prawn farming.

2.2.3 Fish farming area and Knowledge

Abdullah et al. (2015) summarized that the pond size of the farmers had positively significant relationship with their knowledge on pond fish fanning.

Sakib et al. (2014) informed that fish farming area of the farmers had a positive and significant relationship with the knowledge of the farmer about the aquaculture practice at the 1 percent level of significance.

2.2.4 Annual income from fish farming and Knowledge

It was informed by Chowdhury et al., (2016) that annual income from fish farming of the farmers had positive and significant relationship with their knowledge on fish farming.

Abdullah et al. (2015) summarized that annual income from fish farming of the farmers had no significant relationship with their knowledge on pond fish fanning.

2.2.5 Training exposure and Knowledge

Hossain (2017) examined that a positively significant relationship was found between farmers training exposure and their knowledge in disseminating farm information.

The aquaculture training experience was observed to be significant and positively related with farmers' knowledge on fish culture (Alam et al., 2017). Same finding was informed by Abdullah et al. (2015).

Yeasmin et al., (2013) informed that knowledge with IFF (Integrated Fish Farming) had significant positive relationships with their extent of training needs on IFF (Integrated Fish Farming).

Azad (2013) summarized that there had positive and significant relationship between training exposure of the farmers and their knowledge on postharvest practices of vegetables.

Ahmed (2008) found that there was a positively significant relationship between farmers training exposure and their knowledge on prawn culture.

Rahman (2006) found that training exposure of the farmers' had no significant relationship with their knowledge on prawn farming.

2.2.6 Extension contact and Knowledge

Alam et al. (2017) observed that extension media contact of the fish farmers had positively significant relationship with their fish culture knowledge.

The findings of Hossain (2017) indicated that extension contact of the farmers had positive and significant relationship with their knowledge in disseminating farm information.

Chowdhury et al., (2016) in their study concluded that extension contact had no significant relationship with farmers' knowledge on fish farming.

Anu (2016) examined that extension contact of the farmers had positively significant relationship with their knowledge on plant nursery management.

Abdullah et al. (2015) revealed that extension contact had no significant relationship with farmers' knowledge on pond fish farming.

Ahmed (2008) showed that extension contact of the farmers and knowledge on prawn culture had positively significant relationship. Sana (2003) also showed the same findings.

2.2.7 Problem faced and Knowledge

Anu (2016) examined that problems faced by the farmers had no significant relationship with their knowledge on plant nursery management.

Abdullah et al. (2015) in their study concluded that problem faced of the farmers had negatively significant relationship with their knowledge on pond fish culture.

Mondal (2014) observed in her study that problem faced on strawberry cultivation of farmers had negative significant relationship with knowledge on strawberry cultivation.

Azad (2013) reported that there had negatively significant relationship between problems faced by the farmers and their knowledge on postharvest practices of vegetables.

Ahmed (2008) found that problems faced by the farmers and knowledge on prawn culture had positively significant relationship.

2.3 Relationship between Selected Characteristics of the Farmers and Their Practice on Fish Farming or other Innovations

2.3.1 Age and Practice

Goswami et al., (2020) provided the information about the relationship nature between the independent and dependent variable where age had no significant relationship with the use of fish farming practices of the farmer.

Yeasmin et al. (2018) found that age of the farmers and practice of pesticide use had positively significant relationship.

Hossain (2017) summarized that age of the farmers had no significant relationship with their practice in disseminating farm information.

Anu (2016) in his study concluded that age of the farmers had no significant relationship with their practice on plant nursery management.

Samah and Kamaruddin (2015) showed that age of the farmer has a positively significant relationship with the level of good aquaculture practices.

Mondal et al. (2016) observed in her study that age of farmers in strawberry cultivation had no significant relationship with their practice of strawberry cultivation.

2.3.2 Education and Practice

Goswami et al., (2020) reported that education of the farmers had no significant relationship with their practice on fish farming.

Prodhan and Khan (2018) reported that education of the farmers and practices on scientific aquaculture management had positively significant relationship.

Yeasmin et al. (2018) in their study explored that education of the farmers had a positive and significant relationship with their practice of pesticide use.

Hossain (2017) showed that education of the farmers had positive and significant relationship with their practice in disseminating farm information.

It was found by Samah and Kamaruddin (2015) that the level of education for aquaculture farmers from brackish water pond system has a negative significant

relationship on the level of good aquaculture practices. Aquaculture farmers with high education level have lower GAqP (good aquaculture practices) level than the less educated farmers.

Rahman (2006) revealed that education of the farmers and practice on prawn culture had positively significant relationship.

2.3.3 Fish farming area and Practice

Goswami et al., (2020) reported that pond size of the farmers had positively significant relationship with their practice on fish farming.

Mondal et al. (2016) examined that strawberry cultivation area of the farmers had no significant relationship with their extent use of improved practices in strawberry cultivation.

Abdullah (2013) summarized that the pond size of the farmers had positively significant relationship with their practice on pond fish farming.

2.3.4 Annual income from fish farming and Practice

Goswami et al., (2020) concluded that annual income from fish farming of the farmers had no significant relationship with their use of fish farming practices.

Mondal et al. (2016) informed that annual income from strawberry cultivation of the farmers had positive and significant relationship with their extent use of improved practices of strawberry cultivation.

Abdullah (2013) summarized that annual income from fish farming of the farmers had no significant relationship with their practice on pond fish farming.

2.3.5 Training exposure and Practice

Prodhan and Khan (2018) reported that training exposure of the farmers and practices on scientific aquaculture management had positively significant relationship at the 1 percent level of significance.

Yeasmin et al. (2018) in their study concluded that training exposure of the farmers had positive and significant relationship with their practice of pesticide use.

Hossain (2017) examined that a positively significant relationship was found between farmers training exposure and their practice in disseminating farm information.

Mondal et al. (2016) concluded that training exposure of the farmers had positively significant relationship with their extent use of improved practices of strawberry cultivation.

Rahman (2006) revealed that training exposure had positively significant relationship with farmers' practice on prawn culture.

2.3.6 Extension contact and Practice

Prodhan and Khan (2018) found in their study that extension services had positively significant relationship with farmers' practices on scientific aquaculture management at the 10 percent level of significance.

Yeasmin et al. (2018) showed that extension contact had positive and significant relationship with their practice of pesticide use.

The findings of Hossain (2017) indicated that extension contact of the farmers had positive and significant relationship with their practice in disseminating farm information.

Mondal et al. (2016) concluded that extension contact of the farmers had no significant relationship with their extent use of improved practices of strawberry cultivation.

2.3.7 Problem faced and Practice

Mondal et al. (2016) in their study found that problems faced by the farmers had negative and significant relationship with their extent use of improved practices of strawberry cultivation.

Abdullah (2013) found that problems faced by the farmers had negatively significant relationship with their practice on pond fish farming.

Anu (2016) reported that problems faced in the nursery had no significant relationship with farmers' practice on plant nursery management.

2.4 A Conceptual Framework of the Study

After consulting with the relevant experts and reviewing of past related literatures, seven selected characteristics of the farmers' were considered for the study, which might have contribution on knowledge and practice on fish farming at coastal area. The present study tried to focus three concepts: the first, the selected characteristics of the farmers; the second, farmers' knowledge on fish farming and the third, farmers' practice on fish farming. In view of prime findings, the researcher constructed a conceptual framework of the study which is presented in Figure 2.1

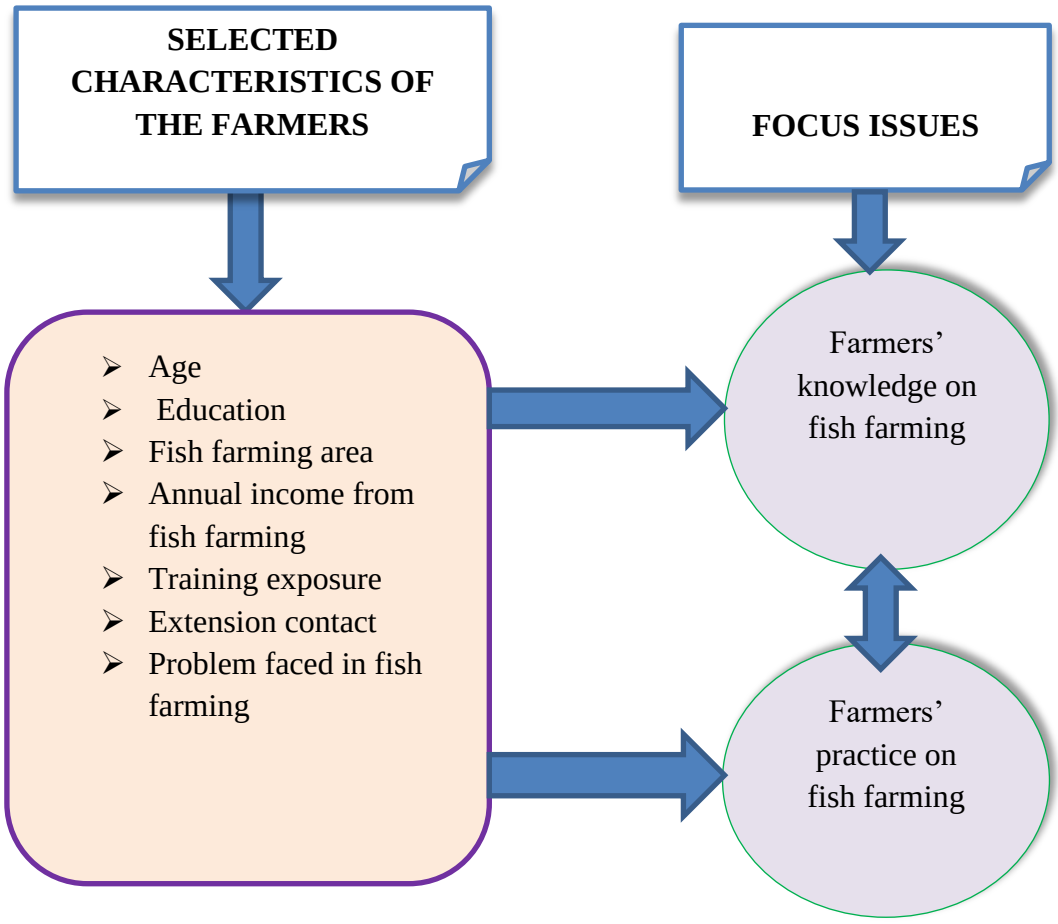

Fig. 2.1 The conceptual framework of the study

CHAPTER 3

METHODOLOGY

Research methodology involves the systematic procedures by which the researcher starts from the initial identification of the problem to its final conclusions. The role of the methodology is to carry on the research work in a scientific and valid manner (Singh, 2006). It involves such general activities as identifying problems, formulating hypotheses, procedure for testing hypotheses, measurement, data collection, analysis of data, interpreting results and drawing conclusions. Thus, research methodology consists of all general and specific activities of research (Singh, 2006).

3.1 Locale of the Study

The study was conveyed from some selected areas of Sadar Upazila of Narail district. Out of 13 Unions of this Upazila, Tularampur Union and Narail Municipality was randomly selected. There are about 16 villages under that Union and Municipality. From these, 4 villages (Wazirpur, Bahirdanga, Tularampur and Benahati) were selected randomly where Tularampur & Benahati villages are under Tularampur Union and Wazirpur and Bahirdanga villages are under Narail Municipality respectively. A map of Narail district showing Narail Sadar upazila and a map of Narail Sadar upazila showing the study area have been shown in Figure 3.1 and 3.2 respectively.

Figure 3.1: A Map of Narail district showing Narail Sadar upazilla

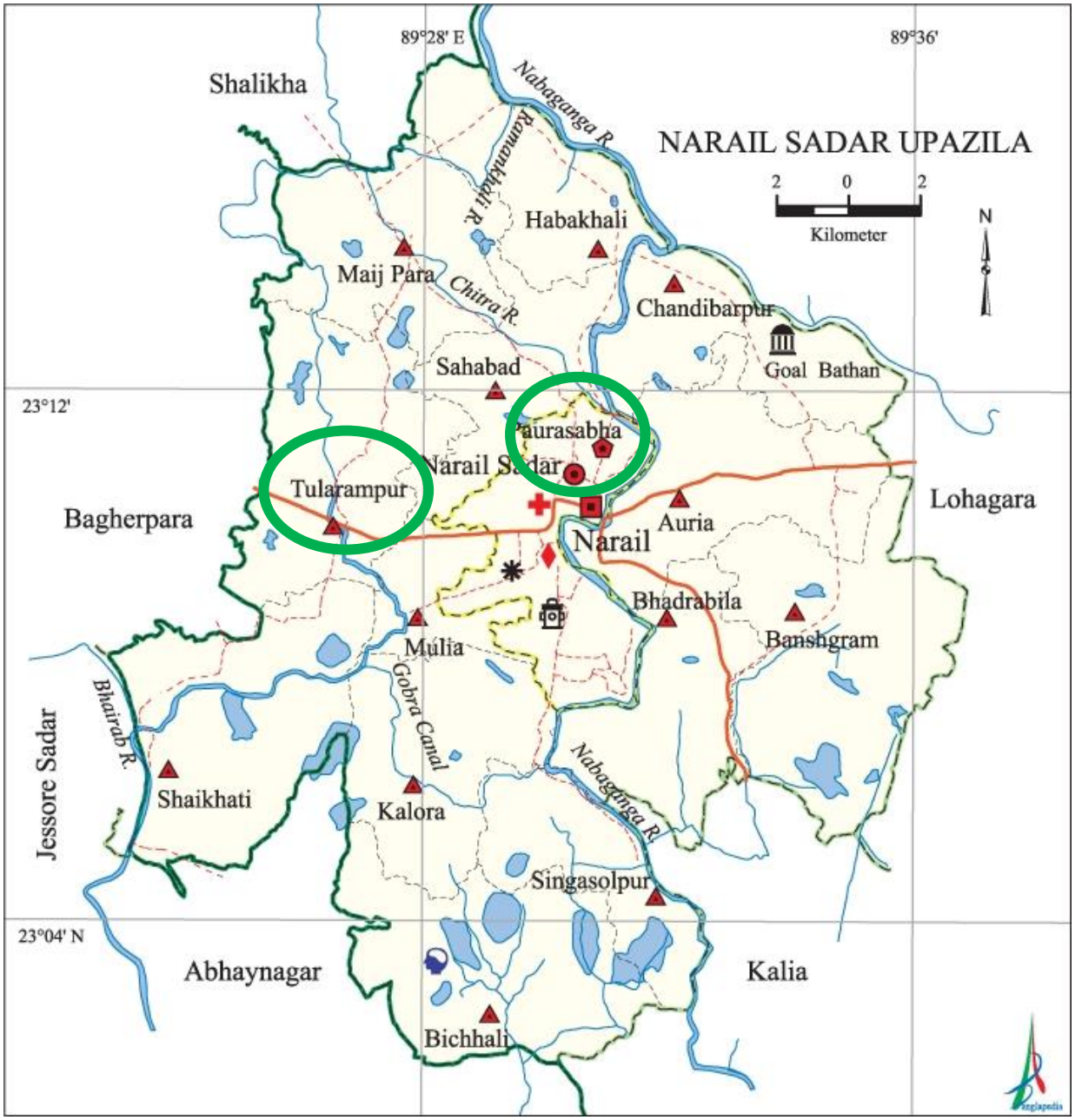

Figure 3.2: A Map of Narail Sadar Upazilla showing the study area

3.2 Population and Sample

The fish farmers of selected 4 villages under Sadar upazilla of Narail district were considered as the population of the study. A list of fish farmers who are currently growing fish and fish fry in their pond was prepared with the help of Upazilla Fisheries Officer, his field staffs and some local people. The number of fish farmers of the selected four villages was 394 which constituted the population of the study.

By using sample size calculator developed by Creative Research System (1984), the sample size was determined as 77, which was selected proportionally from the selected villages.

Thus, the total sample size stood at 77. A reserved list of 12 fish farmers was prepared by taking 3 from each village for use when the fish farmers under original sample were not available during data collection. The distribution of the population, sample fish farmers with reserve list of the selected villages is shown in the Table 3.1.

Table 3.1 Distribution of the population, sampled and reserve list farmers in the study area

Municipality/Union	Villages	Population size	Sample size	Reserve list size
Municipality	Wazirpur	102	20	3
	Bahirdanga	77	15	3
Tularampur	Tularampur	40	8	3
	Benahati	175	34	3
Total		**394**	**77**	**12**

3.3 Measurement of Variables

Seven (7) characteristics of the respondents farmers mentioned above were considered for the study which might have relationship with their knowledge and practice on fish farming. The following procedures were followed for measuring the variables.

3.3.1 Age

Age of a respondent was measured by the period of time from his/her birth to the time of interview and it was measured in terms of complete years on the basis of his/her response. A score of one (1) was assigned for each year age.

3.3.2 Education

The education of a fish farmer was measured by the number of years of schooling completed in an educational institution. A score of one (1) was given for each year of schooling completed. If a farmer didn't t know how to read and write, his education score was zero (0), while a score of 0.5 was pond given who could sign his name

only. If a farmer did not go to school but studied at home or adult learning center, his education status was determined as the equivalent to a formal school student.

3.3.3 Fish farming area

Fish farming area referred to the total area of pond/gher, on which the farmer carried out fish farming operations. The size was estimated in terms of hectare.

3.3.4 Annual income from fish farming

Annual income from fish farming refers to the earning of the respondent from selling of fish and fish fry. It was measured in Thousand Taka. A score of one was given for each Tk. 1,000 to compute the annual income scores of the respondents.

3.3.5 Training exposure

Training exposure of a farmer was measured by the total number of days he/she participated in different training programs on fish farming. A score of one (1) was assigned for each day of training received.

3.3.6 Extension contact

This variable was measured by computing an extension contact score on the basis of a respondent's extent of contact with 5 selected media as obtained in response to item no.6 of the interview schedule (Appendix A). Each respondent was asked to indicate the nature of his/her contact with each of the selected media with four alternative responses as 'regularly', 'occasionally', 'rarely' and 'not at all' basis and weights were assigned as 3, 2, 1 and 0 respectively. The extension contact score of a respondent was determined by summing up his/her scores for contact with all the selected media. Thus possible extension contact score could vary from zero (0) to 15, where Zero indicated no extension contact and 15 indicated the highest level of extension contact.

3.3.7 Problem faced in fish farming

This variable was measured by computing the extent of various problems of the respondents with 8 selected problems as obtained in response to item no. 7 of the interview schedule (Appendix A). Each respondent was asked to indicate the extent of his/her problem as severe problem, moderate problem, low problem and not at all problem and score was assigned as 3, 2, 1 and 0 respectively.

The problem faced score of a respondent was determined by summing up his/her scores for all the problems. Thus, possible faced score could vary from zero (0) to 24, where zero indicated no problem and 24 indicated the highest level of problem.

3.3.8 Knowledge on fish farming

After thorough consultation with relevant experts and reviewing of related literature, 23 questions regarding fish farming were selected and those were asked to the respondent to determine their knowledge on fish farming. Two (2) score was assigned for each correct answer and zero (0) for wrong or no answer. Partial score was also assigned for partially correct answer. Thus, the knowledge on fish farming score of the respondent could range from o to 46, where zero indicating very poor knowledge and 46 indicating the very high knowledge on fish farming.

3.3.9 Practice on fish farming

A good number of innovations are being practiced now a day by the fish farmers for coastal area fish farming. Based on pre-test experience and thorough consultation with relevant experts, 11 innovations regarding fish farming were consider for this study. The respondent were asked to indicate their extent of practice of these 11 innovations with four alternative responses as regularly, occasional, rare and never and weights were assigned to the alternative responses as 3, 2, 1 and 0 respectively. Practice on fish farming of the respondents was computed by summing up all the scores obtained by them from all the 11 innovations. Thus, practice on fish farming score of the respondent could range from 0-33, where '0' indicating no practice and '33' indicating highest fish farming practices.

3.4 Statement of the Hypothesis

Goode and Hatt (1952) defined hypothesis as "proposition which can be put to a test to determine its validity". It may prove to be correct or incorrect in any event, however, it leads to empirical test. Hypothesis may be broadly divided into two categories, namely, research hypothesis and null hypothesis.

3.4.1 Research hypothesis

Research hypothesis states a possible relationship between the variables being studied or a difference between experimental treatments that the researcher expects to emerge. The following research hypothesis was put forward to know the relationships between

each of the seven selected characteristics of the fish farmers and their i) knowledge and ii) practice on fish farming.

"There is relationship between each of the selected characteristics of farmers and their i) knowledge and ii) practice on fish farming".

3.4.2 Null hypothesis

A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was undertaken for the present study

"There is no relationship between each of the selected characteristics of farmers and their i) knowledge and ii) practice on fish farming".

3.5 Data Collection Instrument

In order to collect relevant data from the respondents an interview schedule was prepared in Bangla keeping the objectives of the study in mind. Both open and closed form questions were included in the schedule based on the measurement procedures discussed earlier in section 3.3.

Before finalization, the interview schedule was pre-tested with 20 respondents of the study area. On the basis of the pre-test experiences necessary corrections, modifications and alterations were made before finalizing the interview schedule for final data collection. During modification of the schedule, valuable suggestions were received from the research supervisors and relevant experts. The interview schedule was then printed in its final form and multiplied. A copy of interview schedule in English version is placed in Appendix A.

3.6 Collection of Data

Data were collected personally by the researcher herself through face to face interview from the selected respondents. But to familiarize researcher with the study area and for getting local support, the researcher took help from the local leaders and the field staff of Upazila Fisheries Office. Interviews were usually conducted with the respondent in their homes. While starting interview with any respondent the researcher took all possible care to establish rapport with him/her so that he/she did not hesitate to furnish proper responses to the questions and statements in the schedule. However, if any respondent failed to understand any question the researcher

took care to explain the issue. She received excellent cooperation from the respondents and others concerned during the time of interview. The entire process of collecting data was completed within the period from 01 to 30 January, 2021.

3.7 Data Processing

3.7.1 Editing

The collected raw data were examined thoroughly to detect errors and omissions. As a matter of fact the researcher made a careful scrutiny of the completed interview schedule to make sure that necessary data were entered as complete as possible and well arranged to facilitate coding and tabulation. Very minor mistakes were detected by doing this, which were corrected promptly.

3.7.2 Coding and tabulation

Having consulted with the research supervisor and co-supervisor, the investigator prepared a detailed coding plan. In case of qualitative data, suitable scoring techniques were followed by putting proper weightage against each of the traits to transform the data into quantitative forms. These were then tabulated in accordance with the objective of the study.

3.7.3 Categorization of data

Following coding operation, the collected raw data as well as the respondents were classified into various categories to facilitate the description of the variables. These categories were developed for each of the variables by considering the nature of distribution of the data and extensive literature review. The procedures for categorization have been discussed while describing the variables under consideration in chapter 4.

3.8 Statistical Procedures

The data were analyzed in accordance with the objectives of the study. Qualitative data were converted into quantitative data by means of suitable scoring technique wherever necessary. The statistical measures such as range, means, standard deviation, number and percentage distribution were used to describe the variables. Pearson's Product Moment Coefficient of Correlation (r) was used in order to explore the relationships between the concerned variables. Five percent (0.05) level of

probability was the basis for rejecting any null hypothesis throughout the study. The SPSS computer package was used to perform all these process.

CHAPTER 4

RESULT AND DISCUSSION

In this chapter, the result of the study has been interpreted and also necessary discussion of the findings has been presented. In accordance with the objectives of the study, presentation of the findings has been made in three sections of this Chapter.

Section 1: Knowledge and Practice of the Farmers on Fish Farming

Section 2: Selected Characteristics of the Farmers

Section 3: Relationship between the Selected Characteristics of the Farmers and their

i) Knowledge and ii) Practice on Fish Farming

4.1 Knowledge and Practice of the Farmers on Fish Farming

4.1.1 Knowledge of the Farmers on Fish Farming

Knowledge of the farmers on fish farming was theoretically ranged from 0 to 46 with 23 statements. However, their observed knowledge scores ranged from 15 to 46, the mean being 30.19 and standard deviation of 10.99. On the basis of knowledge scores, the farmers were classified into three categories namely, 'low knowledge', 'medium knowledge' and 'high knowledge'. The distribution of the farmers based on their knowledge on fish farming is presented in Table 4

Table 4.1 Distribution of the farmers according to their knowledge on fish farming

Categories	Basis of categorization (Score)	Respondents (n=77)		Mean	Standard Deviation
		Number	Percentage		
Low knowledge	<25 (<Mean-0.5sd)	30	39	30.19	10.99
Medium knowledge	25-36 (Mean ± 0.5sd)	21	27.2		
High knowledge	Above 36 (>Mean+0.5sd)	26	33.8		
Total		77	100.0		

Data in Table 4.1 reveals that majority (39 percent) of the farmers were put under low knowledge category followed by 33.8 percent in high knowledge category and 27.2 percent in medium knowledge category. Findings again revealed that two-thirds (66.2 percent) of the fish farmers had low to medium knowledge on fish farming. Knowledge is an asset that is invisible, intangible and cannot be directly observed.

4.1.2 Practice of the Farmers on Fish Farming

Possible practice scores of the farmers ranged from 0 to 33. But their observed practice scores ranged from 12 to 31, the mean being 24.74 and standard deviation being 5.85. Based on the practice scores, the farmers were classified into three categories namely low (<22), medium (22-28) and high (>28). Distribution of the farmers under each of the three categories has been shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their practice on fish farming

Categories	Basis of categorization (Score)	Respondents (n=77)		Mean	Standard Deviation
		Number	Percentage		
Low practice	<22 (<Mean-0.5sd)	22	28.6	24.74	5.85
Medium practice	22-28 (Mean ± 0.5sd)	29	37.6		
High practice	Above 28 (>Mean+0.5sd)	26	33.8		
Total		77	100.0		

Data presented in Table 4.2 indicated that majority (37.6 percent) of the farmers belonged to medium practice group as compare to 33.8 percent high and 28.6 percent low practice group. Thus, the researcher found that two-thirds of the farmers (71.4 percent) had low to medium practice on fish farming.

4.2 Selected Characteristics of the Farmers

In this section the findings on the selected characteristics of farmers have been discussed. Different farmers possess different characteristics which are focused by their behavior. Seven characteristics of the farmers were selected to find out their

relationships with their knowledge and practice on fish farming. The selected characteristics included their age, education, fish farming area, annual income from fish farming, training exposure, extension contact and problem faced on fish farming. Measuring unit, range, mean and standard deviations of those characteristics of the farmers are described in this section. Data contained in the Table 4.3 provides a summary profile of the farmers' characteristics.

Table 4.3 Salient features of the characteristics of the fish farmers

Sl. No.	Characteristics	Unit of measurement	Range		Mean	SD
			Possible	Observed		
1.	Age	Year	Unknown	22-73	46.66	12.21
2.	Education	Level of schooling	Unknown	0-18	7.299	5.53
3.	Fish Farming Area	Hectare	Unknown	0.08-4.05	0.81	0.84
4.	Annual Income from Fish Farming	'000' Tk.	Unknown	8-525	161.69	107.82
5.	Training Exposure	No. of days	Unknown	0-120	4.73	14.82
6.	Extension Contact	Score	0-15	2-12	5.39	2.30
7.	Problem Faced on fish farming	Score	0-24	9-21	14.90	2.10

4.2.1 Age

Age of the farmers varied from 22 to 73 years, the average being 46.66 years with the standard deviation of 12.21. On the basis of the age, the farmers were classified into three categories: "young aged" (≤35 years), "middle aged" (36-50 years) and "old aged" (above 50 years). The distribution of the farmers according to their age is shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their age

Categories	Basis of categorization (Years)	Farmers (N=77)	
		Number	Percentage
Young aged	≤35	17	22.1
Middle aged	36-50	35	45.4
Old aged	>50	25	32.5
Total		77	100

Data presented in Table 4.4 indicated that majority (45.4 percent) of the farmers belonged to the middle aged category compared to 22.1 percent young aged and 32.5 percent old aged. It was found that middle aged respondents were more interested in fish farming.

4.2.2 Education

In accordance with the year of schooling educational background of the farmers ranged from 0-18 where the average education score of the farmers was 7.299 with the standard deviation of 5.53. Based on the education scores, the farmers were classified into five categories namely illiterate (0), can sign only (0.5), primary level (1-5 years), secondary level (6-10 years) and above secondary level of schooling. The distribution of the farmers according to their educational qualification is shown in Table 4.5.

Table.4.5. Distribution of the farmers according to their education

Categories	Basis of categorization (schooling year)	Respondents (N=77)	
		Number	Percentage
Illiterate	0	14	18.2
Can sign only	0.5	8	10.4
Primary level	1-5	6	7.8
Secondary level	6-10	33	42.8
Above secondary level	Above 10	16	20.8
Total		77	100.0

Data presented in Table 4.5 show that highest percentage (42.8 percent) of the farmers were under secondary level of education compared to 20.8 percent, 18.2 percent, 10.4 percent, and 7.8 percent of the farmers belonged to the categories above secondary, illiterate, can sign only and primary level of education respectively. The findings also indicate that most of the farmers (71.4 percent) were under different level of education.

4.2.3 Fish Farming Area

The fish farming area ranged from 0.08 to 4.05 ha. The mean was 0.81 and the SD was 0.84. Based on fish farming area the farmers were classified into three categories as “small fish farm” (less than 0.39 ha), “medium fish farm” (0.39-1.23 ha) and “large fish farm” (above 1.23 ha). Distribution of farmers according to their fish farming area is mentioned in Table 4.6.

Table 4.6. Distribution of the farmers according to their fish farming area

Categories	Basis of categorization (ha)	Respondents (N=77)	
		Number	Percentage
Small fish farm	<0.39 (<Mean-0.5sd)	22	28.6
Medium fish farm	0.39-1.23 (Mean ± 0.5sd)	42	54.5
Large fish farm	>1.23 (>Mean+0.5sd)	13	16.9
Total		77	100.0

Data presented in Table 4.6 stated that the maximum (54.5 percent) farmers had medium farm followed by 28.6 percent, and 16.9 percent of small farm and large farm respectively. So, the findings indicated that maximum farmers in this locality had medium fish farming area.

4.2.4 Annual Income from Fish Farming

Annual income from fish farming of the farmers ranged from 8 to 525 thousand taka with a mean and standard deviation of 161.69 and 107.82 respectively. According to the annual income from fish farming, the farmers were categorized into three groups as low income (<107.78), medium income (107.78-215.6) and high income (>215.6) as shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their annual income from fish farming

Categories	Basis of categorization ('000' tk.)	Respondents (n=77)	
		Number	Percentage
Low income	<107.78 (<Mean-0.5sd)	27	35.1
Medium income	107.78-215.6 (Mean ± 0.5sd)	36	46.7
High income	Above 215.6 (>Mean+0.5sd)	14	18.2
Total		77	100.0

Data presented in Table 4.7 indicated that majority (46.7 percent) of the farmers belonged to medium income group as compare to low (35.1 percent) and high (18.2 percent) income group. So the findings mean that overwhelming majority (95.5 percent) of the farmers had low to medium income from fish farming.

4.2.5 Training

The score of training exposure of the farmers ranged from 0 to 120 days, the average being 4.73 with the standard deviation of 14.82. Based on the training experience scores, the farmers were classified into three categories: "no training experience" (0), "low training experience" (1-7) and "medium training experience" (above 7). Distribution of farmers according to their training exposure related to fish farming is mentioned in Table 4.8.

Table 4.8 Distribution of farmers according to their training

Categories	Basis of categorization (No. of days)	Respondents (N=77)	
		Number	Percentage
No training	0	45	58.4
Low training	1-7	22	28.6
Medium training	Above 7	10	13
Total		77	100

Table 4.8 stated that, majority (58.4 percent) of the farmers had no training exposure; while 28.6 percent of the farmers had low and rest of the farmers (13 percent) had medium training exposure. The findings also indicate that farmers in this locality were not so serious about training program. Training might help a lot to increase the knowledge and practice of the fish farmers.

4.2.6 Extension contact

Computed extension contact scores of the farmers ranged from 2 to 12 against the possible range of 0-15 with a mean of 5.39 and standard deviation of 2.30. According to extension contact, the farmers were classified into three categories such as 'low contact' (0-5), 'medium contact' (6-10) and 'high contact' (11-15). The distribution has been shown in the Table 4.9.

Table 4.9 Distribution of farmers according to extension contact

Categories	Basis of categorization (score)	Respondents (N=77)	
		Number	Percentage
Low contact	0-5	43	55.8
Medium contact	6-10	32	41.6
High contact	11-15	2	2.6
Total		77	100

Data shown in Table 4.9 stated that majority of farmers (55.8 percent) had low extension contact followed by medium contact (41.6 percent) and high contact (2.6

percent). It was found that most of the farmers (97.4 percent) had low to medium extension contact and very few were under high extension contact level (2.6 percent).

4.2.7 Problem faced in Fish Farming

Scores obtained on problem faced in fish farming varied from 9 to 21 against the possible range of 0-24 with average of 14.90 and standard deviation of 2.10. Based on problem faced in fish farming, the farmers were classified into two categories. These categories were medium problem faced (≤16) and high problem faced (above 16). The distribution of the pond farmers according to their problem faced is presented in Table 4.10.

Table 4.10 Distribution of the farmers according to their problem faced in fish farming

Categories	Basis of categorization (score)	Respondents (N=77)	
		Number	Percentage
Medium	≤16 (Mean ± 0.5sd)	63	81.8
High	Above 16 (>Mean+0.5sd)	14	18.2
Total		77	100

It is shown that overwhelming majority (81.8 percent) of the farmers faced medium problem compared to 18.25 percent of them faced high problem. As most of the farmers of the locality faced medium problem they can minimize it with appropriate monitoring.

4.3 Relationship between the Selected Characteristics of the Farmers and Their Knowledge & Practice on Fish Farming

To find out the relationship between the selected characteristics of the farmers and their knowledge and practices on fish farming, Pearson Product Moment Correlation (r) was computed. To reject or accept the null hypothesis at 0.05 level of probability was used. A statistically significant relationship was observed when the computed value or "r" was greater or smaller than the tabulated value. The relationships between

selected characteristics of farmers and their knowledge and practices were examined by testing the following null hypothesis: "There is no relationship between the selected characteristics of the farmers and their knowledge and practices on fish farming. However, the result of 'r' between knowledge and practice on fish farming may be seen in Appendix B.

4.3.1 Relationship between the Selected Characteristics of the Farmers and Their Knowledge on Fish Farming

The results of the correlation analysis between each of the selected characteristics of the farmer with their knowledge are shown in Table 4.11. The findings presented in the Table indicated that education, fish farming area, annual income from fish farming and extension contact of the farmer had significant positive relationships with their knowledge on fish farming. It indicates that if there is increase in education, fish farming area, annual income from fish farming and extension contact of the farmers their knowledge on fish farming is increased.

Age and knowledge on fish farming

From the table 4.11 it was found that the calculated value of 'r' (-0.121) between the concerned variables was found to be smaller than the tabulated value (r 0. 217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a negative trend between the concerned variables. Based on that finding it was concluded that age of the farmers had non-significant negative relationships with knowledge of the farmers on fish farming. Alam et al. (2017) and Hossain (2017) reported similar results in their respective studies. It is justified to think that not age but year of experiences may increase informal knowledge on fish farming.

Table 4.11 Co-efficient of correlation (r) between selected characteristics of the farmers and their knowledge on fish farming (n=77)

Characteristics of the farmers	Correlation of co-efficient (r) with Knowledge	Table value significant at (df= 75)	
		0.05 level	0.01 Level
Age	-0.121^{NS}	0.217	0.283
Education	0.539**		
Fish Farming Area	0.304**		
Annual Income from Fish Farming	0.251*		
Training Exposure	0.186^{NS}		
Extension Contact	0.418**		
Problem Faced in Fish Farming	0.013^{NS}		

*Correlation is significant at the 0.05 level of probability
** Correlation is significant at the 0.01 level of probability
NS: Non significant

Education and knowledge on fish farming

From the Table 4.11 it was found that the calculated value of 'r' (0.539) between the concerned variables was found to be greater than the tabulated value (r = 0. 283) with 75 degrees of freedom at 0.01 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that education of the farmers had positively significant relationships with their knowledge on fish farming. It can be said that increased knowledge on fish farming of the farmers depends on their education. Alam et al. (2017) also summarized that education of the fish farmers had positive and significant relationship with farmers' fish culture knowledge. Hossain (2017) showed the same findings. Farmers of coastal areas have non-formal and traditional knowledge on fish farming. Their knowledge and education also matter to fish farming practices.

Fish farming area and knowledge on fish farming

From The table 4.11 it was found that the calculated value of 'r' (0.304) between the concerned variables was found to be greater than the tabulated value (r =0. 283) with 75 degrees of freedom at 0.01 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables.

Based on that finding, it was concluded that fish farming area of the farmers had positive significant relationships with their knowledge on fish farming. Similar type of result was also found by Abdullah et al. (2015). It is also understand that if fish farming areas increase, it involves lot of investment. So, the large farm owners should gather more knowledge on fish farming.

Annual income from fish farming and knowledge on fish farming

From the Table 4.11, it was found that the calculated value of 'r' (0.251) between the concerned variables was found to be greater than the tabulated value (r =0. 217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that annual income from fish farming of the farmers had positive significant relationships with their knowledge on fish farming. It is said that if new knowledge helps farmer to gain more income, they will search for new knowledge to increase income farther from his farm.

Training exposure and knowledge on fish farming

Data presented in Table 4.11, showed that the calculated value of 'r' (0.186) between the concerned variables was found to be smaller than the tabulated value (r =0. 217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that training exposure of the farmers had non-significant positive relationships with their knowledge on fish farming. Rahman (2006) reported similar results in his respective studies. Many a times, farmers rely on external experts for formal training which add knowledge to this practice.

Extension contact and knowledge on fish farming

From the Table 4.11, it was found that the calculated value of 'r' (0.418) between the concerned variables was found to be greater than the tabulated value (r =0. 283) with 75 degrees of freedom at 0.01 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that extension contact of the farmers had positive significant relationships with their knowledge on fish farming. It can be said

that increased knowledge on fish farming of the farmers depends on their extension contact. Hossain (2017), Alam et al. (2017) and Sana (2003) also showed the same findings. Actually, extension contact assist people in the fish farm through educational procedures, practical exposures in improving production efficiency and improving their socio-economic conditions.

Problem faced and knowledge on fish farming

From the Table 4.11, it was found that the calculated value of 'r' (0.013) between the concerned variables was found to be smaller than the tabulated value (r 0. 217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that problem faced by the farmers had non-significant positive relationships with their knowledge on fish farming. Similar type of finding was also obtained by Ahmed (2008). It can be mentioned here that problems and solutions walk side by side and any creative personnel can turn problem into a solution with new knowledge.

4.3.2 Relationship between the Selected Characteristics of the Farmers and Their Practice on Fish Farming

The purpose of this section is to examine the relationship of each of the selected characteristics of the farmers with their practice on fish farming. To explore the relationships between the selected individual characteristics of the farmers with their practice on fish farming, Pearson's product moment co-efficient of correlation (r) has been used. Results of the co-efficient of correlation between each of the selected characteristics of the farmers and their practice on fish farming are shown in Table 4.12.

Table 4.12 Co-efficient of correlation (r) between selected characteristics of the farmers and their practice on fish farming (n=77)

Characteristics of the farmers	Correlation of co-efficient (r) with Practice	Table value significant at (df= 75)	
		0.05 level	0.01 Level
Age	-0.068^{NS}	0.217	0.283
Education	0.038^{NS}		
Fish Farming Area	0.248*		
Annual Income from Fish Farming	0.269*		
Training Exposure	0.167^{NS}		
Extension Contact	0.234*		
Problem Faced in Fish Farming	-0.036^{NS}		

*Correlation is significant at the 0.05 level of probability
** Correlation is significant at the 0.01 level of probability
NS: Non significant

Age and practice on fish farming

From the Table 4.12, it was found that the computed value of 'r' (-0.068) was smaller than the tabulated value (r=0.217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a negative trend between the concerned variables. Based on that finding it was concluded that age of the farmers had non-significant negative relationships with their practice on fish farming. Yeasmin et al. (2018) and Hossain (2017) reported similar results in their respective studies. According to Langy and Mekura (2005) the older farmers was more prepared in terms of both financial and relationship with development agencies and these factors make them more willing to accept a technology. In our country, it is observed that young farmers are coming forward with fish farming as an entrepreneur. According to Salau et al., (2014) farmers who have little experience are less proficient in the management of aquaculture farms.

Education and practice on fish farming

From the Table 4.12, it was found that the computed value of 'r' (0.038) was smaller than the tabulated value (r=0.217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a

positive trend between the concerned variables. Based on that finding it was concluded that education of the farmers had non-significant positive relationships with their practice on fish farming. According to Ifejika et al., (2007); Solomon and Kerere (2013), education have an impact on the modernization of the techniques of fish farming where it will help farmers to obtain and understand information about a technology that is often changed.

Fish farming area and practice on fish farming

From the table 4.12 it was found that the computed value of 'r' (0.248) was greater than the tabulated value (r=0.217) with 75 degrees of freedom at 0.05 level of probability. So the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that fish farming area of the farmers had positive significant relationships with their practice on fish farming. Abdullah (2013) also summarized that the pond size of the farmers had positively significant relationship with their practice on pond fish fanning. It is relevant to maintain that aquaculture industries of Bangladesh have been expanded tremendously but most of the aquaculture farms are small and their productivity is not as high as expected. In general, *pangas* (*Pangasius hypophthalmus*) fish farming was found to be profitable where the large size farms were more profitable than the smalls (Aktar et al., 2018).

Annual income from fish farming and practice on fish farming

From the Table 4.12, it was found that the calculated value of 'r' (0.269) was greater than the tabulated value (r= 0. 217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that annual income from fish farming of the farmers had positive significant relationship with their practice on fish farming. It can be said that increased practice on fish farming of the farmers depends on their annual income from fish farming. The fish farming practices are seen as the best option to catch fish to feed the growing masses; provide them with alternative livelihood opportunities for their socio-economic upliftment, as well as generate much needed foreign exchange to serve foreign debt.

Training exposure and practice on fish farming

From the Table 4.12, it was found that the computed value of 'r' (0.167) was smaller than the tabulated value (r=0.217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that training exposure of the farmers had non-significant positive relationship with their practice on fish farming. Training is an important tool by which effective communication is made to a prefixed target group for bringing about desired changes in their knowledge for adopting improved practices in their fish farming system.

Extension contact and practice on fish farming

From the Table 4.12, it was found that the calculated value of 'r' (0.234) was greater than the tabulated value (r =0.217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was rejected and the relationship showed a positive trend between the concerned variables. Based on that finding, it was concluded that extension contact of the farmers had positive significant relationships with their practice on fish farming. It can be said that increased practice on fish farming of the farmers depends on their extension contact. Similar type of result was also found by Prodhan and Khan (2018). The aquaculture extension persuade and help aquafarmers and fishing communities to improve their socio-economic condition and quality of life by making improvement in their farming practices resulting in increased fish production and income.

Problem faced and practice on fish farming

From the Table 4.12 it was found that the computed value of 'r' (-0.036) was smaller than the tabulated value (r=0.217) with 75 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and the relationship showed a negative trend between the concerned variables. Based on that finding, it was concluded that problem faced by the farmers had non-significant negative relationship with their practice on fish farming. Anu (2016) reported similar results in their respective studies. Internal problems consisted of all the internal weakness of fish farmers that affected their income and other activities which can be removed or lessened by improved technologies and practices.

CHAPTER 5
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Knowledge of the Farmers on Fish Farming

The average score of knowledge of the farmers on fish farming was 30.19 with the standard deviation of 10.99 and observed range was 15 to 46 scores. Two-thirds (66.2 percent) of the farmers had low to medium knowledge on fish farming.

5.1.2 Practice of the Farmers on Fish Farming

The average practice score of the farmers on fish farming was 24.74 with the standard deviation of 5.85 and observed practice scores ranged from 12 to 31. Two-thirds (66.2 percent) of the farmers had low to medium practice on fish farming.

5.1.3 Selected Characteristics of the Farmers

Age: The highest proportion (77.9 percent) of the farmers was middle to old aged.

Education: The highest proportion (42.8 percent) of the farmers had secondary level of education. Most of the farmers (71.4 percent) had different level of education.

Fish Farming Area: About (54.5 percent) of the farmers had medium farm followed by 28.6 percent and 16.9 percent had small farm and large farm respectively.

Annual Income from Fish Farming: Majority (46.7 percent) of the farmers belonged to medium income group as compare to low (35.1 percent) and high (18.2 percent) income group.

Training Exposure: Majority (58.4 percent) of the farmers had no training exposure while 28.6 percent of the farmers had low and rest of the farmers (13 percent) had medium training exposure.

Extension Contact: Majority (55.8 percent) of the farmers had low extension contact while 41.6 percent and 2.6 percent had medium and high extension contact respectively.

Problem Faced in Fish Farming: Majority (81.8 percent) of the farmers faced medium problem compared to 18.25 percent of them having high problem in fish farming.

5.1.4 Relationship of the Selected Characteristics with Knowledge and Practice

It was found that knowledge of the farmers on fish farming had significant positive relationship with their practice on fish farming. Out of seven (7) selected characteristics of the farmers, education, fish farming area, annual income from fish farming and extension contact had positively significant relationship with knowledge on fish farming. Rest of the characteristics i.e. age, training exposure and problem faced had no significant relationship with knowledge on fish farming.

Fish farming area, annual income from fish farming and extension contact of the farmers had positive significant relationship with their practice on fish farming, while rest of the characteristics i.e. age, education, training exposure and problem faced had no significant relationship with practice on fish farming.

5.2 Conclusions

Findings of the study and logical interpretations of their meaning in the light of other relevant facts prompted the researchers to draw the following conclusions:

- Findings of the study revealed that two-thirds (66.2 percent) of the farmers had low to medium knowledge on fish farming. Therefore, it may be concluded that there is scope to increase the knowledge of the farmers on fish farming.
- Two-thirds (66.2 percent) of the farmers had low to medium practice on fish farming. Good practice can ensure a sustainable growth and return from fish production. So, it may be concluded that there is necessity to increase the practice of the farmers for maintaining fish farming as well as to maintain sustainable agricultural production practices in Bangladesh.
- Education of the farmers had positive significant relationship with their knowledge but a non-significant but positive relationship with their practice on fish farming. So, it may be concluded that education was an important factor in case of their knowledge on fish farming.

- Fish farming area, annual income from fish farming and extension contact of the farmers had positive significant relationship with their knowledge and practice on fish farming. It was thus proved that these factors were very important to increase farmers' knowledge and practice on fish farming.

5.3 Recommendations

5.3.1 Recommendations for Policy Implications

- Two-thirds of the farmers' had low to medium knowledge and practice on fish farming. So it is necessary to increases the knowledge level of the farmers on fish farming. So, it may be recommended that attempts should be taken by the Department of Fisheries (DoF) and other fisheries advisory service providing organizations to increase the knowledge and practice of the farmers on fish farming by providing necessary trainings and motivations.
- Education of the farmers had significant relationship with their knowledge on fish farming. It is therefore recommended that attempts should be taken to increase the education level of farmers by establishing adult learning centre for the illiterate farmers.
- Fish farming area, annual income from fish farming and extension contact of the farmers had positive significant relationship with their knowledge and practice on fish farming. It is thus, strongly recommended that attempts should be taken by DoF and other fisheries advisory service providing organizations to increase their contact with the farmers for increasing the area of fish farming as well as income from fish farming by increasing their knowledge and practice on fish farming.

5.3.2 Recommendations for Further Study

- The study was conducted in sadar upazila of Narail District. So, to get a clear picture of the whole country, it is necessary to conduct similar studies in other parts of the country which will be helpful for effective policy formulation.
- It is difficult to determine the relationship of the selected characteristics of the farmers with their knowledge and practice on fish farming. The researcher taken only seven characteristics for the study. Further research should be

conducted to explore relationships of many other characteristics of the farmers with their knowledge and practice.

- In the study, fish farming area, annual income from fish farming and extension contact had positively significant relationship with farmers' knowledge and practice towards fish farming. In this connection, further verification is necessary.
- Farmers' knowledge and practice on fish farming has been investigated in this study. It is also necessary to study the farmers' knowledge and practice on other agricultural practices.

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APPENDICES

Appendix - A

(English Version of the Interview Schedule)

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

Interview schedule for collection of data to determine

FARMERS' KNOWLEDGE AND PRACTICE ON FISH FARMING

Name of the respondent: ---------- Sl. No. ----------

Father's Name: ---------- Date: ----------

Village: Upazila:

Union: District:

Please answer the following questions

1. **Age**
   What is your present Age?---------- Years.

2. **Level of Education**

a) Cannot read and write: ----------
b) Can sign only: ----------
c) I read up to class: ----------
d) I passed ---------- class
e) I didn't receive any formal education but my standard of education was up to ---------- class

3. **Fish Farming Area**

   Please indicate your pond/gher size: …… (Local unit)/ …… ha

4. **Annual Income from Fish Farming**
   Please mention the following information regarding your fish farming:

Total yearly cost of fish farming (tk.)	Total Yields (kg)	Unit price (tk./kg)	Value of total yield (tk.)	Quantity of sold fish (kg)	Value of sold fish (tk.)

Yearly Fish Farming Income: ……(Value of sold fish – Total cost) tk.

5. Training exposure

Do you have participated any training on fish farming?

Yes …….No. ……..

If yes, mention the following information

Sl. No.	Subject of training	Duration of training (Days)
1		
2		
3		
4		
5		

6. Extension Contact

Please state the extent of your contact with the following personnel.

Sl. No.	Items	Extent of Participation			
		Regularly (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1	Model fish farmer				
2	Input dealer				
3	NGO worker				
4	Field worker of fisheries department				
5	Upazilla Fisheries Officer				

7. Problem Faced in Fish Farming

Please state the extent of the following problems faced in fish farming

Sl. No.	Problem	Extent of problem			
		Severe (3)	**Moderate (2)**	**Low (1)**	**Not at all (0)**
1	Lack of proper marketing facilities				
2	Poor communication system				
3	Low price of fish in pick period				
4	Natural calamities				
5	Shortage of pond water in dry season				
6	Insufficient credit				
7	High price of fingerlings				
8	High price of fish feed				

<u>Knowledge on Fish Farming:</u>

Please answer the following questions

Sl. No.	Questions	Full marks	Marks obtained
1	Mention two of the harmful effects of aquatic weeds in fish culture in ponds/ gher.	2	
2	Name two predatory fish.	2	
3	Mention the necessity of using lime in the pond/ gher.	2	
4	Mention the dose of lime application in ponds/ gher per decimal	2	
5	Mention the advantage of applying cow dung in ponds/ gher	2	
6	How will you examine if there is enough natural food in the pond water?	2	
7	What is the suitable time for releasing fry in ponds/ gher?	2	
8	Mention the harmful effects for releasing too many fry without proper estimation	2	
9	What are the main advantages of polyculture in ponds/ gher?	2	
10	Mention two ways of identifying good quality fish fry	2	

11	Mention two natural fish feed	2	
12	Mention 2 ingredients for preparing feed	2	
13	How will you understand that gas has formed at the bottom of the ponds/ gher?	2	
14	How will you understand that there is lack of oxygen in gher water?	2	
15	Why is it necessary to netting a pond/ gher occasionally?	2	
16	Why disease occurs in fish?	2	
17	Mention two fish diseases?	2	
18	Mention two means of identifying diseased fish?	2	
19	What preventive measures are required be taken against fish disease?	2	
20	What curative measures are required be taken against fish disease?	2	
21	What is the suitable time of fish harvesting?	2	
22	Mention the disadvantages of harvesting all fishes at a time?	2	
23	Mention what matters are to be kept in mind while marketing fishes.	2	
	Total	46	

Practice on Fish Farming:

What is your level of practice for the following statement of fish farming?

Sl. No.	Statement	Extent of practice				Obtained score
		R (3)	O (2)	Ra (1)	N (0)	
1	Counting the fingerlings before releasing in the pond/gher.					
2	Applying cow dung in pond/ gher					
3	Using lime in pond/ gher.					
4	Using fertilizer in pond/ gher					
5	Applying supplementary feed in pond/ gher.					
6	Eliminating the undesired and predatory fish from pond/ gher					
7	Controlling weeds from pond/ gher					
8	Treating the fingerlings before releasing in the pond/ gher					
9	Sorting and grading of fish for better production					
10	Applying medicine if diseases attack in the fish					
11	Keeping record of income and expenditure for fish culture					
					Total	

*R=Regularly, O= Occasional, Ra= Rare, N= Never

Thank you for your kind co-operation in data collection.

Signature of interviewer

Date: .....

Appendix – B

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	Y_1	Y_2
X_1	1								
X_2	-0.332**	1							
X_3	-0.005	0.227*	1						
X_4	-0.018	0.139	0.710**	1					
X_5	-0.037	0.206	0.594**	0.322**	1				
X_6	0.089	0.129	0.199	0.239*	0.058	1			
X_7	-0.094	-0.038	0.146	0.067	0.112	-0.065	1		
Y_1	-0.121	0.539**	0.304**	0.251*	0.186	0.418**	0.013	1	
Y_2	-0.068	0.038	0.248*	0.269*	0.167	0.234*	-0.036	0.344**	1

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

VARIABLES

X_1= Age

X_2= Education

X_3= Fish farming area

X_4= Annual income from fish farming

X_5= Training

X_6= Extension contact

X_7= Problem faced in fish farming

Y_1= Knowledge

Y_2= Practice