PROBLEMS FACED BY THE FISH FARMERS OF DEBIDWAR UPAZILA UNDER CUMILLA DISTRICT

MD. NAZMUL HASAN

DEPARTMENT OF

AGRICULTURAL EXTENSION & INFORMATION SYSTEM

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

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PROBLEMS FACED BY THE FISH FARMERS OF DEBIDWAR UPAZILA UNDER CUMILLA DISTRICT

BY

MD. NAZMUL HASAN
Reg. NO. 19-10131

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Approved by:

M. Zahidul Haque	**Md. Abul Bashar**
Supervisor Professor Dept. of Agricultural Extension and Information System Sher-e-Bangla Agricultural University	Co-Supervisor Professor Dept. of Agricultural Extension and Information System Sher-e-Bangla Agricultural University

Prof. Mohammad Zamshed Alam
Professor
&
Chairman
Examination Committee
Dept. of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207

CERTIFICATE

This is to certify that the thesis entitled **"PROBLEMS FACED BY THE FISH FARMERS OF DEBIDWAR UPAZILA UNDER CUMILLA DISTRICT"** submitted to the department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e- Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Agricultural Extension, embodies the result of a piece of bona fide research work carried out by **MD. NAZMUL HASAN, Registration No. 19-10131** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Dhaka, Bangladesh

M. Zahidul Haque

Supervisor

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University
Sher-e- Bangla Nagar, Dhaka-1207

DEDICATED TO
MY
BELOVED PARENTS

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The Author

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LIST OF ABBREVIATIONS AND GLOSSARY

BOD	Biological Oxygen Demand
DoF	Department of Fisheries
DO	Dissolved Oxygen
et. al.	All Others
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
FSY	Fisheries Statistical Yearbook
PFI	Problem Faced Index
SPSS	Statistical Package for Social Science
UFO	Upazila Fisheries Officer

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ABSTRACT

The purpose of this study was to determine the extent of problems faced by the fish farmers and to explore the relationships between the selected characteristics of the fish farmers and their problems faced. The study was conducted on 101 fish farmers of 2 unions of Debidwar Upazila under Cumilla district. An interview schedule was used for data collection during the period from 15 January, 2021 to 14 February, 2021. Descriptive statistics such as mean, standard deviation, percentage and Pearson's Product Moment Coefficient of Correlation (r) were used for data analysis. About 44.55 percent of the fish farmers had medium problems compared to 32.67 percent of them having low problem and 22.77 percent having high problem. The vast majority (78.22 percent) of the fish farmers had low to medium problems. Farmer's education, land area, Pond size, Annual income from pond fish farming, extension media contact, Training exposure had significant negative relationship with the problems faced by the fish farmers. Farmer's Age, Family size and annual family income had no significant relationship with the problems faced by the fish farmers. As per Problems Faced Index (PFI), "Low price of fish in pick period" ranked highest problem and "Shortage of pond water in dry season" was in last position. It was recommended that an effective step should be taken by the concern authority for strengthening the farmers capacity for reducing the problems faced by the fish farmers.

CHAPTER I

INTRODUCTION

1.1 General background

Aquaculture is the fastest-growing food-producing sector in the World. World Aquaculture is rising with an annual rate of 8.9–9.1% since the 1970s (Delgado, 2003). Global aquaculture has grown dramatically over the past 50 years to around 52.5 million tons and accounting for around 50 per cent of the world's fish food supply (FAO, 2016). Asia dominates aquaculture production of the world and contributes around 87% to the global cultured fin-fish production of 25.7 million tons in 2005 (De Silva *et al*., 2006). Aquaculture production in our country is gradually increasing over years since 1970, after 1995 it has been growing at a high rate (FSY 14).

Bangladesh, covering an area of 147,000 km2 with a population of 164 million, is one of the most densely populated countries in the world (Abdullah & Chowdhury, 2016). Vast riverine network and enormous floodplains makes the aquatic resources of this county highly potential and diversified. Fish, the main aquatic resource of Bangladesh, plays a very important role in the daily life of numerous segments of people in Bangladesh. Annually Bangladesh produces more than 4.2 million tons of fish mostly through inland capture fisheries and aquaculture (Bartley *et al*.,2015). Pond farming represents the backbone of aquaculture in Bangladesh, accounting for 85.8% of total recorded production and 57.7% of the area under farming (Abdullah & Chowdhury, 2016). Unlike gher culture and seasonal floodplain aquaculture which are limited to a few key districts, pond farming is commonly practiced in nearly every district of the country (Abdullah & Chowdhury, 2016). Fish farming in Bangladesh is playing an important role to the total national income. As a south Asian country there are hardly any areas in Bangladesh where river or any other water source is not available. In another word, Bangladesh is surrounded by rivers and various types of water sources like pond, stream, lake, etc. which has a profound contribution on the livelihood of the people of Bangladesh. A major part of the total population of this country is directly or indirectly involved with fish or fish related business.

Aquaculture in Bangladesh, as elsewhere in the South Asian region, has taken place on an ad hoc basis without giving sufficient thought to the maintenance of biodiversity of its affluent aquatic resources (Zafri & Ahmed, 1981). Bangladesh is deliberated one of

the most compatible territory for fisheries in the world, with the world's largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India. The water bodies are parted into inland fisheries and marine fisheries and inland fisheries are parted into capture fisheries and culture fisheries (Shamsuzzaman *et al*., 2017). Bangladesh is one of the world's leading inland fisheries producers and has a huge water resource all over the country in the form of small ponds, ditches, lakes, canals, small and large rivers and estuaries covering about 4.34 million hectare (Ghose, 2014). Freshwater aquaculture involves pond aquaculture of native and exotic species. The country also has a coastal area of 2.30 million ha and a coastline of 714 km along the Bay of Bengal, which supports a large artisanal and coastal fisheries (Ghose, 2014).

Fisheries sector has been playing a vital role in mitigating protein scarcity, providing jobs for unemployed youth, earning foreign currencies and socio-economic development of Bangladesh. About 12.5 million people directly or indirectly involved on fisheries sector for their livelihood (Hossain, 2015). About 1.28 million fishermen live on fishing as their main profession in which 7.7 lac people are inland water fisherwomen (DoF, 2012, Shamsuzzaman *et al*., 2017). At the present time, Fish and Fisheries sector contributes about 3.00% of the total export earning, 3.5% to GDP and 25.72% to Agricultural Sector (DoF, 2018). Bangladesh has achieved 5th position in aquaculture production. Bangladesh is a small dense populated country where day by day protein requirement is rising due to population inflation. As a developing country fishes are the major sources of animal protein to most rural Bangladeshi's (DoF, 2012; Hossain *et al*., 2002).

Fisheries play a great role in fresh food security and livelihood and area source of income and social development in developing countries (Thilsted *et al*., 2016). Recently the sector attracted a great attention and its growing rapidly through the development of aquaculture (Kubecka *et al*., 2016). Fresh water aquaculture plays an important role in improving the economic status of the fish farmers in Bangladesh. The majority of aquaculture production of Bangladesh comes from rural fresh water aquaculture (Islam, 2001). Rural aquaculture is the extensive or improve extensive system, low-cost farming of aquatic organism by farming households or communities technology proper to their resource base (Edward & Demaine, 1997). The inland fisheries of Bangladesh are one of the most productive resources in the world (Islam &

Dewan, 1986). There are about a total of 13 Lac ponds in Bangladesh which covers about 3.05 Lac ha and 2400 km long rivers which covers about 10.32 Lac ha. In our country aquaculture is mostly represented by pond culture. Fish farming can be done in single specie ponds or composite fish culture system. Composite fish culture or polyculture is the production of two or more fish species within a particular aquaculture environment. Semi-intensive carp polyculture is an age-old popular method in south Asia, specifically in Bangladesh and India, where it is the major aquaculture production system (Miah *et al*., 1997; FAO, 1997; Reddy *et al*., 2002).

Fish farming in Bangladesh faces several challenges, fish production is more volatile than any other agricultural biological production (Tveteras, 1998). Bio-physical factors such as disease, temperature, oxygen deficiency etc. make the production process risky. Production risk is higher for the smallest farm this is partly due to input use. Although, due to high profitability in fish farming compared to rice, farmers are converting land but sustainability of fish farming depends on various factors. Supplementary feed which is the main input of fish production is expensive. The success of a sustainable aquaculture system depends on the fish feed and fish nutrition. The fish farmers who are engaged in fish farming at the farm sites far away from the potential market, often face a problem of lacking of potential market. Low selling price of fish is another important issue regarding market related challenges. The fish farmers, when unable to secure sufficient loans, they are forced to borrow from unorganized money lenders at relatively higher rates of interest. Among these causes, a disease is the most serious constrain that cause damage to the livelihood of farmers, loss of job, cut income and food insecurity studies showed that almost fifty percent of production loss is because of diseases which are more severe. All these problems entangled with knowledge inadequacy among the rural farmer beget overall decrease of fish production. On the basis of this scenario, the study is designed to find out the outermost problems faced by the pond fish farmers and the possible implications.

Actually in a country like Bangladesh where fish culture has a long practice, pond fish culture can be expected to play an important role in supplying ever-increasing fish needs of the people. It is very important to increase the production in pond fisheries with controlled water bodies like ponds and tanks through the launch of modern and intensive culture method. Department of Fisheries (DoF) is trying to proclaim fisheries

innovation to the pond farmers. Therefore, attempts were taken to investigate the problems faced by the farmers in pond fish farming.

1.2 Statement of the Problem

Bangladesh is surrounded by rivers and various types of water sources like pond, stream, lake, etc. which has a profound contribution on the livelihood of the people of Bangladesh. A major part of the total population of this country is directly or indirectly involved with fish or fish related business. Pond farming represents the backbone of aquaculture in Bangladesh, accounting for 85.8% of total recorded production and 57.7% of the area under farming (Abdullah & Chowdhury, 2016). Fisheries sector has been playing a vital role in mitigating protein scarcity, providing jobs for unemployed youth, earning foreign currencies and socio-economic development of Bangladesh.

Analyzing the issues from fish farmers, the study was designed to find out the following research questions of problems faced by the fish farmers:

i. What is the extent of problems faced by the fish farmers?
ii. What are the characteristics of the fish farmers?
iii. Is there any relationship of selected characteristics of the fish farmers with their problems faced?
iv. What is the severity of problems faced by the fish farmers?

1.3 Specific Objectives

1. To describe the selected characteristics of the fish farmers;
2. To determine the extent of problems faced by the fish farmers;
3. To explore the relationship between each of the selected characteristics of the fish farmers and their extent of problems faced;
4. To compare the severity of problems faced by the fish farmers;

1.4 Justification of the Study

Problems regarding fish farming are a critical issue for the fish farmers. Due to the problems, fish farming is in tremendous situation all over Bangladesh. In this conditions, fish farmers check monetary misfortune with sadness. The present study was designed to have an understanding of the problems faced by the fish farmers and to explore its relationship with their selected characteristics. Fish farming should get

adequate attention to meet the growing demand for fish for increased population of Bangladesh. Different government and non-government organizations (NGOs) are currently putting effort and allocating resources for production-oriented research and also encouraging the rural people to undertake fish farming. But research shows that most of the fish farmers in Bangladesh are not cultured in a scientific manner. Considering the previously mentioned focuses, the researcher became intrigued to lead research entitled "Problems Faced by the Fish Farmers of Debidwar Upazila under Cumilla District".

1.5 Assumption of the Study

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

1. The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.
2. The data collected by the researcher were free from any bias and they were normally distributed.
3. The responses furnished by the respondents were valid and reliable.
4. Data were normally and independently distributed with their means and standard deviation.
5. The researcher was well adjusted to himself with the social contiguous of the study area. Hence, the collected data from the respondents were free from favoritism.

1.6 Limitation of the Study

The study was undertaken with a view to having an understanding of the problems faced by the farmers regarding fish farming. However, from the research point of view, it was necessary to impose certain limitations as follows:

1. The study was confined to Debidwar upazila under Cumilla district.
2. Farmers have many varied characteristics but only 9 were selected to complete this study as stated in the objectives.
3. For information about the study, the researcher was depended on the data furnished by the selected respondents during data collection.
4. For some cases, the researcher faced unexpected interference from the over interested side-talkers while collecting data from the target populations.

However, the researcher tried to overcome the problem as far as possible with sufficient tact and skill.

5. There were embarrassing situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum proper information.

1.7 Definition of Terms

Farmers

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

Age

Age of a farmer is defined as the period of time from his birth to the time of interview of the farmers.

Education

Education referred to the desirable change in knowledge, skill and attitude of an individual, through reading, writing and other related activities. It was measured in terms of years of schooling of an individual.

Family size

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

Land area

Land area referred to the cultivated area either owned by the farmer or obtained from others on borga system, the area being estimated in terms of full benefit and half benefit to the farmer respectively. The self-cultivated owned land and cultivated area taken as lease or mortgage from others was recognized as full benefit.

Pond size

It referred to the area of pond of the farmers. It was expressed in decimal.

Annual family income

The term annual family income referred to the total earning by the earning members from agriculture, livestock, fisheries and other accessible sources (business, service, daily labor etc.) during a year. It was expressed in Thousand Taka.

Annual income from pond fish farming

Annual income from fish farming refers to total financial return from fish farming in one year. It was expressed in Thousand Taka.

Training exposure

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

Extension media contact

Extension media contact referred to an individual exposure to different information sources and personalities relate to aquaculture for dissemination of new technologies.

Problem faced

Problem faced referred to the degree of difficulties faced by concerned people in accomplishment of particular activities. In this study problem faced meant extent of problems faced by the fish farmers regarding fish farming.

CHAPTER II

REVIEW OF LITERATURE

This is an exclusively a thesis paper. So, specific methods of studies are involved to prepare this thesis paper. This thesis paper mainly depends on the primary and secondary data. Different published reports of different journals mainly supported in providing data for this paper. It has been prepared by comprehensive studies of various articles published in different journals, books and proceedings available in the libraries of Sher-e-Bangla Agricultural University, Department of Fisheries and Department of Agricultural Extension (DAE). Different information's has been collected through contact with respective persons, major professor and Internet facilities to enrich this information.

2.1 Literature related to problems faced by the fish farmers

Ahmed et al., (2014) studied were conducted to investigate the efficacy of inorganic and organic fertilizers on fish growth when applied individually or when combined with supplementary feed. These studied further exposed that administration of supplementary feed is mandatory for maximum yield though both fertilizers have been provided. Supplementary/artificial feed fulfills the nutrient deficiencies.

Bishwajit ghose (2014) stated that the fisheries sector is confronted with challenges posed by numerous natural and anthropogenic causes such as climate change, natural disasters, unbalanced urbanization and industrialization, overfishing and environmental pollution.

Das (2018) observer that the major areas were identified to improve the existing pond fish farming situation were access to low-interest loan, quality seed, supply of advanced technologies, need-based training, and marketing facilities. Along with improving the pond fish farming, community-based fisheries management and some aquaculture initiatives on private own seasonal floodplains should be taken on a priority basis to improve open water management and to flourish inland fish production in the study area.

Faruk et al., (2004) observed that a number of diseases like epizootic ulcerative syndrome, skin erosion, gill damage, tail and fin rot are common in farmed fishes of Bangladesh.

Ghose (2014) state that fish is a popular complement to rice in the national diet, giving rise to the adage Maache-Bhate Bangali ("a Bengali is made of fish and rice").

Hossain (2015) stated that two types of aquaculture practices are going on in Bangladesh such as, freshwater and aquaculture. Freshwater is mainly comprised of pond farming of carps (indigenous and exotic), Mekong pangas catfish, tilapia, Mekong climbing perch, and a number of other domesticated fish, In Bangladesh, aquaculture production systems are mainly extensive and improved extensive, with some semi-intensive, and intensive systems, in very few cases.

Iqbal et al., (2001) stated that the growth of fish culture has also raised issues of fish health. Bacterial hemorrhagic septicemia, lernaeasis, saprolegniasis and anoxia are the most commonly occurring fish diseases in pond fishes in Punjab.

Islam et al., (2016) reported that fisheries can broadly be classified into three categories: inland capture fisheries, inland aquaculture and marine fisheries, of which the inland aquaculture sector is contributing more than 55% of the total production. Bangladesh was the 5th in world aquaculture production, which accounted for half of the country's total fish production

Mahbubur et al., (2015) observed that a highest number of pond fish farmers (61.67%) were out of training facilities and a good portion (23.33%) had no education.

Salam (2003) in his study identified constrains in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: (i) low production due to limited use of fertilizer (ii) lack of organic matter in soil, (iii) lack of Govt. support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

Shamsuzzaman et al., (2017) reported that fisheries sectors play a very important role in the national economy, contributing 3.69% to the Gross Domestic Product (GDP) of the country and 22.60% to the agricultural GDP. In 2014–2015, total fishery production

of Bangladesh was 3,684,245 metric tons, of which 2,060,408 metric tons from inland aquaculture

Subasinghe et al., (2001) observed that current trend in aquaculture development is towards increased intensification and commercialization of aquatic production. Like other farming sectors, the likelihood of major disease problems increases as aquaculture activities intensify and expand. Disease is considered as a primary constraint to the culture of many aquatic species, impeding both economic and social development in many countries.

2.2 Review concerning the relationship between selected characteristics of the fish farmers and problems faced

2.2.1 Age and problem faced

Anisuzzaman (2008) found that age had no noteworthy association with their problem faced in tuberose cultivation. Akanda (1993) found that there was no relationship between age of farmers and their problem faced in using quality rice seed. Aziz (2006) found that age of the farmers had no significant relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district. Bashar (2006) found that age of the farmers had noteworthy negative association with their issue showdown in mashroom cultivation. Huque (2006) found that age of the farmers had no noteworthy association with their problem faced in utilizing coordinated plant supplement administration. Karim (1996) conducted a study and found that age had no significant relationship with problem faced. Mansur (1989) found that age of the farmers had no significant relationship with the feeds and feeding problem confrontation. Rahman (1995) conducted a study and found negative relationship between age of the cotton farmers and their problem faced.

2.2.2 Level of education and problem faced

Anisuzzaman (2008) found that education had negative huge associations with their problem faced in tuberose cultivation. Akanda (1993) in his study on problem confrontation of the farmers in respect of cultivating BR 11 rice found a significant negative relationship between education of the farmers and their problem faced. Aziz (2006) found that education of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazilla under Jessore district. Haque (2006) found that education of the farmers had profoundly

noteworthy negative association with their problem faced in utilizing incorporated plant supplement administration.

Bashar (2006) found that education of the farmers had huge negative association with their problem faced in mashroom cultivation. Haque (2006) found that education of the farmers had highly significant negative relationship with their problem faced in using integrated plant nutrient management. Karim (1996) in his study found that education of the farmers had significant negative relationship with their problem faced. Rahman (1995) in his study on problem faced by the pineapple growers found a significant negative relationship between education of the farmers and their problem faced.

2.2.3 Family size and problem faced

Anisuzzaman (2008) found that family size had no huge association with their problem faced in tuberose cultivation. Aziz (2006) found that family size of the farmers had high huge negative association with their requirements confronted in potato cultivation in Jhikargacha upazilla under Jessore locale. Basher (2006) found that family size of the farmers had no significant relationship with their problem confrontation in mushroom cultivation. Haque (2006) found that family size of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management. Rahman (1995) found that there was no significant relationship between family size of the pineapple growers and their problem confrontation. He also found negative tendency between the concerned variables.

2.2.4 Pond size and problem faced

Roy (2007) in his study found no significant relationship between farm size under maize cultivation and constraints faced by farmers in maize cultivation. Basher (2006) found that farm size of the farmers had significant negative relationship with their problem confrontation in mushroom cultivation. Haque (2006) found that farm size of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management. Rahman (2006) found that farm size of the farmers had no significant relationship with their constraints faced in Banana cultivation of Sonargaon Upazila under Narayangonj district. Rashid (2003) found that farm size of the rural youth had no relationship with problem confrontation in selected agricultural production activities.

2.2.5 Annual family income and problem faced

Anisuzzaman (2008) found that yearly family income had no huge association with their problem faced in tuberose cultivation. Haque (2006) found that annual family income of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management. Bashar (2006) found that annual family income high significant negative relationship with problem confrontation in mushroom cultivation. Hossain (1985) found an important association among income and problem faced of the land less laborers. Islam (1987) reported that the relationship between income and artificial insemination problem confrontation was negatively significant. Karim (1996) found that the annual income of the farmers had significant negative relationship with their problem confrontation.

2.2.6 Training exposure on fish farming and problem faced

Bashar (2006) found that training exposure of the farmers had high significant negative relationship with their problem confrontation in mushroom cultivation. Ahmed (2002) showed that training experience of the farmers had a significant negative relationship with their problem confrontation in jute seed production. Ali (1999) found that training experience of the rural youth had no relationship with the problem confrontation in self-employment by undertaking selected agricultural income generating activities. Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the sugarcane growers and their problem confrontation in sugarcane production. Saha (1997) found that training experience of the youth had no relationship with their problem confrontation.

2.2.7 Aquaculture Extension contact and problem faced

Haque (2006) found that extension media contact of the farmers had high noteworthy negative association with their problem faced in utilizing coordinated plant supplement administration. Akanda (2005) reported that there was significant positive relationship between communication exposure and technological gap in cultivating transplanted modern aman rice. Bashar (2006) found that extension media contact of the farmers had noteworthy negative association with their issue showdown in mushroom cultivation. Rahman (2006) found that extension media contact of the farmers had no significant relationship with their constraints faced in Banana cultivation of Sonargaon Upazila under Narayangonj district.

2.3 Conceptual Framework of the Study

The present study would be tried to focus two concepts, first, the fish farmers' selected characteristics and the second, problems faced by the fish farmers. Problems faced by the fish farmers may be influenced and affected through interacting forces in his surroundings Problems faced by the fish farmers may also be influenced by various characteristics. In this study, fish farmers' characteristics have only been taken into consideration. Moreover, it is deal with all the characteristics in a single study. It is therefore, necessary to limit the characteristics which include: age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure, aquaculture extension media contact. These characteristics are the independent variables of this study, while problems faced by the fish farmers being the main focus of the study constituted the only dependent variable. A simple conceptual framework in this connection has been presented in Figure 2.1.

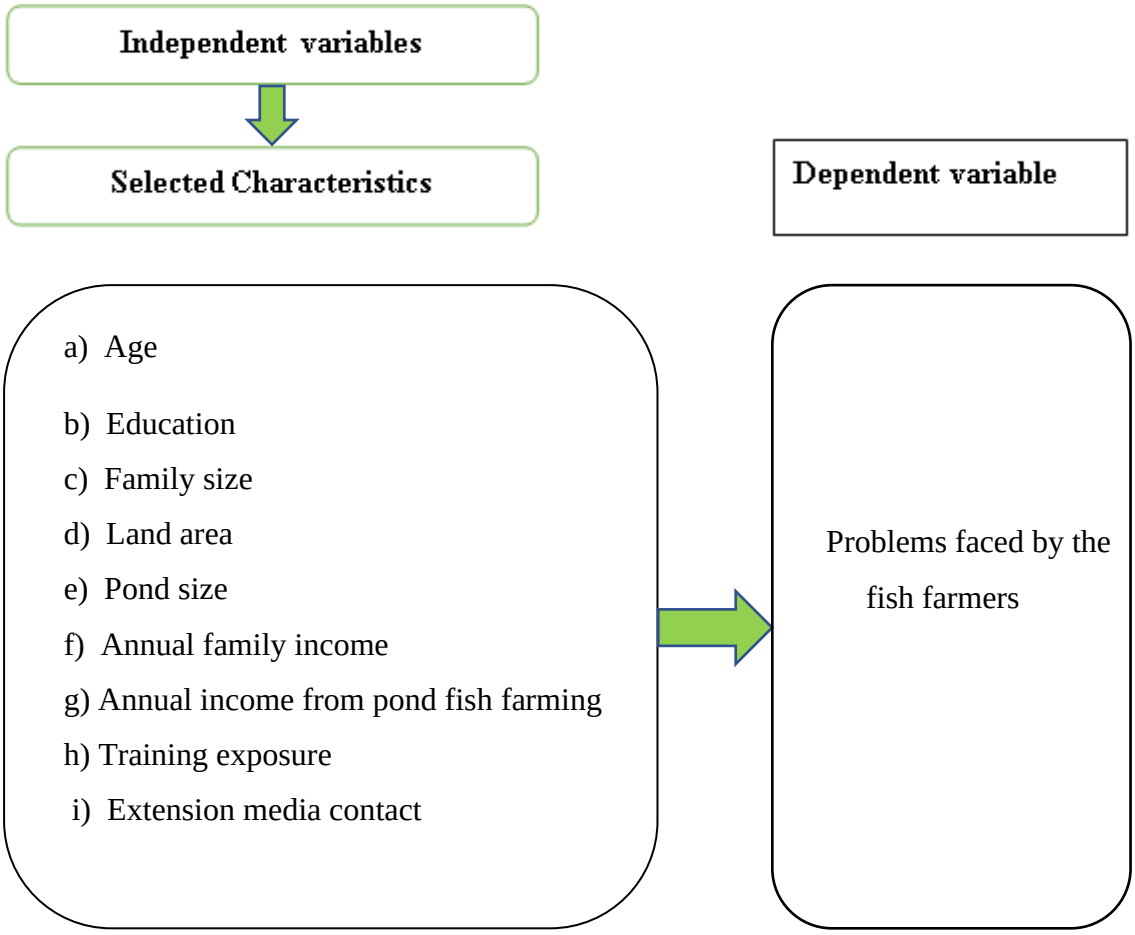

Figure 2.1: The Conceptual Framework of the Study

CHAPTER III

MATERIALS AND METHODS

In conducting a research study, methodological issue is one of the prime considerations for yielding of valid and reliable findings. Appropriate methodology enables the researcher to collect valid and reliable information and to analyze the information properly in order to arrive at correct conclusions. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 The Locale of the Study

The study was conducted in Debidwar Upazila under Cumilla district. Debidwar Upazila (Cumilla district) area 238.36 sq km, located in between 23°29' and 23°42' north latitudes and in between 90°59' and 91°05' east longitudes It is bounded by Muradnagar upazila on the north, Chandina upazila on the south, Burichang and Brahmanpara upazilas on the east, Muradnagar upazila on the west. The map of Cumilla district has been presented in Figure 3.1 and the specific study locations of Sultanpur and Bhani union in Burichang upazila under Cumilla district have also been shown in Figure 3.2

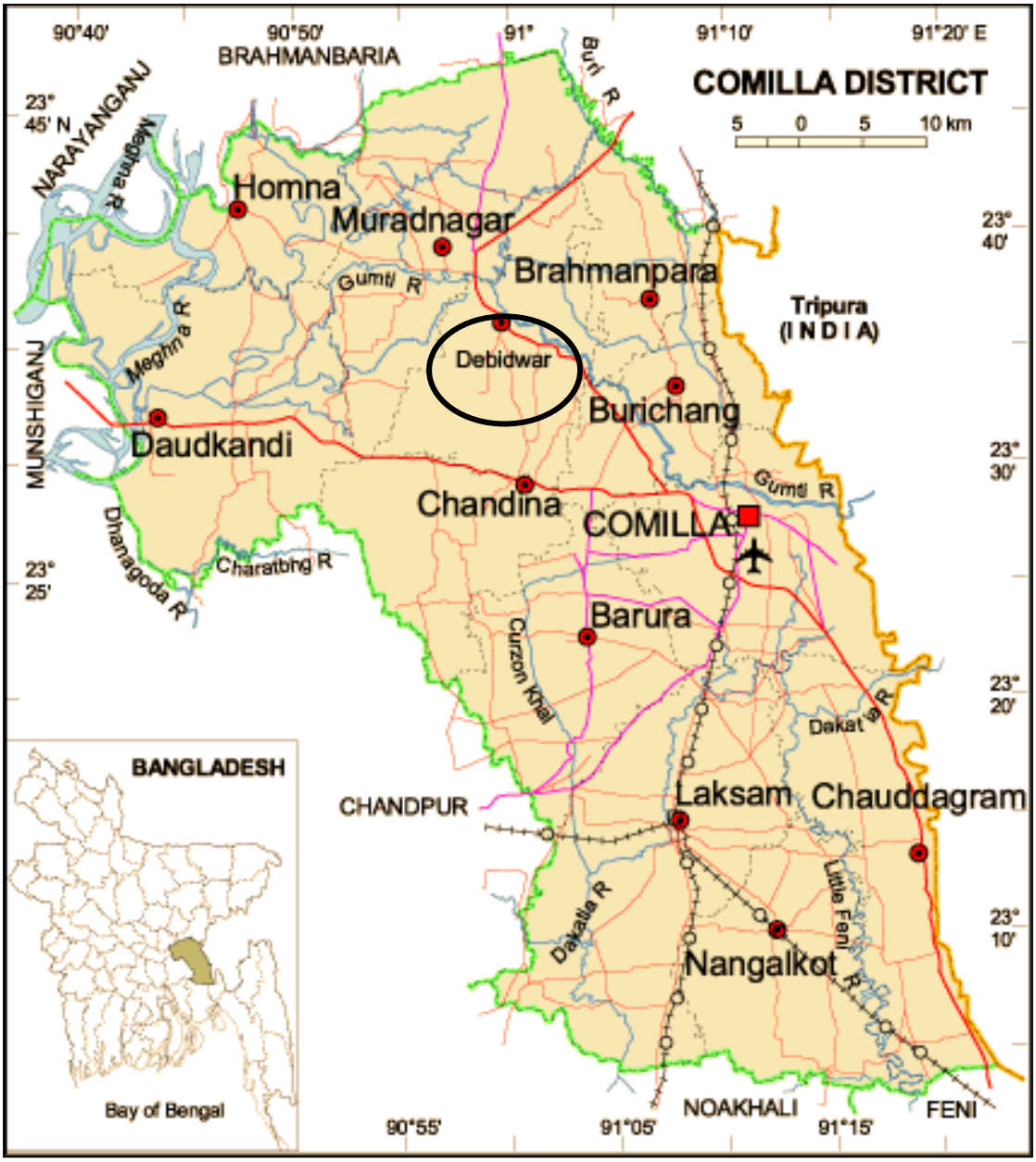

Figure 3.1: A map of Cumilla district showing Debidwar upazila

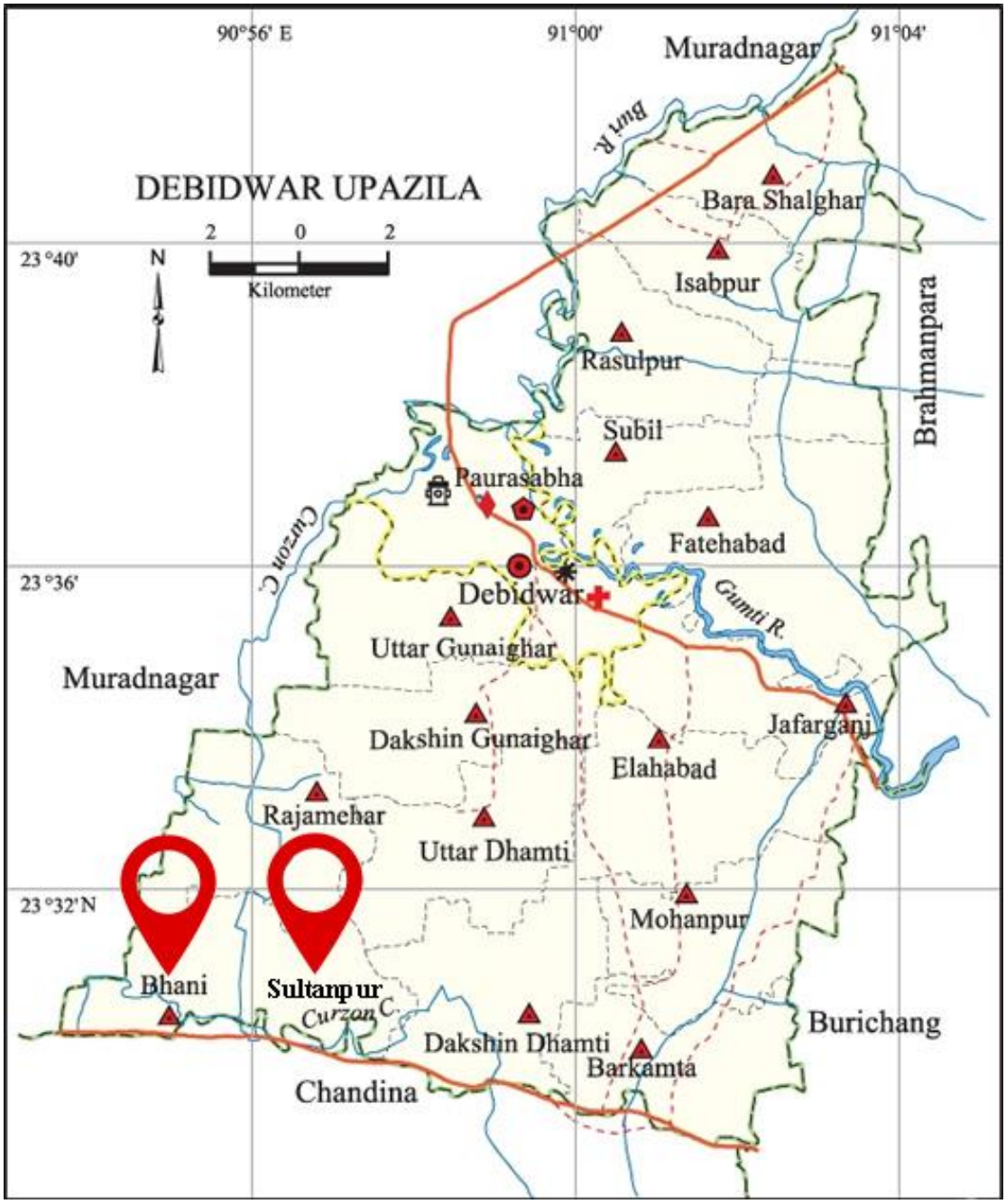

Figure 3.2: A map of Debidwar upazila showing the study area

3.2 Population and Sample of the Study

The fish farmers of Sultanpur and Bhani union of Debidwar Upazila under Cumilla District were the population of the study. However, representative sample from the population were taken for collection of data following random sampling technique was considered as the respondent. A purposive random sampling technique was followed to select one district from the whole of Bangladesh, and the same method was used to select the area of the district as well as the union as the study group. The total number of fish farmers of the selected union was 504; where 235 from sultanpur and 269 were from Bhani union which constituted the population of the study. The number of fish farmers of the selected two union was 504 which constituted the population of the study. Out of 504 fish farmers 20 percent of the total population was selected proportionally from the selected villages as the sample by random sampling method. Thus, the total sample size stood at 101, so, 101 fish farmers were taken as the sample of the study. Moreover, a reserved list of 12 fish farmers was prepared for use when the fish farmers under sample were not available during data collection. The distribution of the fish farmers included in the population, sample and those in the reserve list appears in the table no 3.1.

Table 3.1 Distribution of the fish farmers according to population, sample and reserve list

Selected upazila	**Selected union**	**Population**	**Sample size**	**Reserve list**
Debidwar	Sultanpur	235	47	5
	Bhani	269	54	7
Total		504	101	12

3.3 Data Collection Tools

Structured interview schedules were prepared to reach the objectives of the study. The schedule was prepared containing open and closed form of questions. The open questions allowed for the respondents to give answers using their own language and categories (Casley and Kumar, 1998). The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive. The instruments were first developed in English and then translated into Bengali. The survey tools were initially constructed based on an extensive literature reviews and pre-tested. The schedule was pre-tested with 15 randomly selected fish farmers in the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires were also checked for validity by supervisor and educational experts at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from field staff of different government and non-government organizations and local leader. The primary data were collected from 7 January to 12 January, 2021. Books, journals, reports and internet documents were used as secondary sources of data supporting or supplementing the empirical findings of the study. The final data collection was started from 15 January and completed in 14 February, 2021.

3.4 Variables and their Measurement Techniques

The variable is a characteristic, which can assume varying, or different values in successive individual cases. A research work usually contains at least two important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953).

At last, he had selected 9 independent variables and one dependent variable. The independent variables were: age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure and aquaculture extension media contact. The dependent variable of this study was the problems faced by the fish farmers of Debidwar Upazila under Cumilla District'. The methods and procedures in measuring the variables of this study are presented below:

3.5 Measurement of Independent Variables

The 9 characteristics of the fish farmers mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.5.1 Age

Age of the farmers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the rural people (MoYS, 2012). A score of one (1) was assigned for each year of one's age. This variable appears in item number 1 in the interview schedule as presented in Appendix-A

3.5.2 Education

Education was measured by assigning score against successful years of schooling by a farmer. One score was given for passing each level in an educational institution (Rashid, 2014). For example, if a fish farmer passed the final examination of class five or equivalent examination, his/her education score has given five (5). Each fish farmer of can't read and write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5.

3.5.3 Family size

The family size was measured by the total number of members in the family of a respondent fish farmer. The family members included family head and other dependent members like husband/wife, children, etc. who lived and ate together. A unit score of 1 was assigned for each member of the family. If a respondent had five members in his/her family, his/her family size score was given as 5 (Khan, 2004).

3.5.4 Land area

Land area of the respondent was measured as the size of his land (including vegetable and other crops) on which he continued his land practices during the period of study. Each respondent was asked to mention the homestead area including pond, own land under own cultivation, land given to others as borga system, land taken from others as borga system, and land taken from others on lease system. The area was estimated in terms of full benefit to the farmers or his family. The following formula was used in measuring the land area:

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

Where,

A = Homestead area including pond,

B =Own land under own cultivation,

C = Own land given to others as borga,

D = Land taken from others as borga,

E = Land taken from others as lease.

The unit of measurement was hectares. The data was first recorded in terms of local measurement unit i.e. acre or decimal and then converted into hectare. The total area, thus, obtained is considered as his land area score (assigning a score of one for each hectare of land)

3.5.5 Pond size

Pond size referred to the total area of pond, on which the farmer carried out fish farming operations. The pond size was estimated on consideration of full benefit of the pond owner in terms of decimal.

3.5.6 Annual family income

The term Annual income refers to the annual gross income of farmer and the members of his family from farming sources. It was expressed in taka. In measuring this variable, total earning taka of an individual farmer was converted into score. A score of one was given for every one thousand taka. This variable appears in item number 6 (six) in the interview schedule as presented in Appendix-A.

3.5.7 Annual income from pond fish farming

Annual income from pond fish farming refers to the total financial return from pond fish farming in one year. Annual income from pond fish farming was measured in Thousand Taka. One score was given for 1000 taka.

3.5.8 Training exposure

Training exposure of fish farmers was measured by the total number of days he participated in different training programmes. A score of one (1) was assigned for each day of training received.

3.5.9 Extension media contact

It was defined as one's extent of exposure to different communication media related to farming activities. 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. Each respondent was asked to indicate the frequency of his contact with each of the selected media. Each farmer was asked to indicate his nature of contact with four alternative responses like regularly, occasionally, rarely and never basis and score was assigned 3, 2, 1 and 0 respectively. Thus, extension contact in fish farming score of a respondent could range from 0 to 15 where 0 indicated no extension contact and 15 indicated highly extension contact in fish farming.

3.6 Measurement of Dependent variable

Problem faced by the fish farmers was the focus variables of the study. Problems faced in fish farming was measured on the basis of extent of problems faced by the fish farmers on 7 selected problems of fish farming. Each farmer was asked to indicate his nature of problems in fish farming with four alternative responses like severe, moderate, low and not at all problem basis and score was assigned as 3, 2, 1 and 0 respectively. Thus, problems faced in fish farming score of a respondent could range from 0 to 21 where 0 indicated no problems and 21 indicated severe problems faced in fish farming.

3.6.1 Measuring problems faced index of the problem items

Seven problems were selected and validated by experts to measure the extent of problems faced by the fish farmers. Four (4) point rating scale was used for each problem. Four alternative responses were not at all, low, moderate and severe. The weights were assigned to these responses as 0, 1, 2, and 3 respectively. Extent of problems of the respondents was measured by summing up all the responses to all the problems. The extent of problems score could range from 0-21 where '0' indicating no problem and '21' indicating severe problem.

To ascertain the severity of item-wise problems faced by the fish farmers, Problem Faced Index (PFI) was computed for each problem. Problem Faced Index (PFI) was computed by using the formula:

Problem Facing Index (PFI) = $P_s \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0$

Where,

P_s = Percent of respondent faced "severe problem"

P_m = Percent of respondent faced "moderate problem"

P_l = Percent of respondent faced "low problem"

P_n = Percent of respondent faced "no problem at all"

Problem Faced Index (PFI) for each problem item could range from 0 to 303, where 0 indicating no problem and 303 indicating severe problems faced by the fish farmers regarding fish farming.

3.7 Statement of the Hypothesis

According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between 2 or more variables. Hypothesis is always declarative sentence form and relate either generally of specifically variables to sentences form and relate either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories, namely research hypothesis and null hypothesis.

3.7.1 Research hypothesis

To find out the relationship between the independent and dependent variables the researcher first formulated research hypothesis. The following research hypothesis was formulated to explore the relationship. Each of the nine selected characteristics (age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure, aquaculture extension media contact) of the farmers has significant contributing factor with problems faced by the fish farmers.

3.7.2 Null hypothesis

A null hypothesis states that there is no relationship between the concerned variables. The following null hypotheses were formulated to explore the relationship. Each of the nine selected characteristics (age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure, aquaculture extension media contact) of the farmers has no significant contributing factor with problems faced by the fish farmers.

3.8 Data Processing

3.8.1 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 will be entered as complete as possible and well arranged to facilitate coding and tabulation. Very minor mistake was detected by doing this, which were corrected promptly.

3.8.2 Coding and tabulation

After completion of field survey, all the data were coded, compiled and tabulated according to the objectives of the study. Local units were converted into standard units. All the individual response to questions of the interview schedule were transferred into a master sheet to facilitate tabulation and categorization.

3.8.3 Categorization of data

The collected raw data as well as the respondents were classified into various categories to facilitate the description of the independent and dependent variables. These

categories were developed for each of the variable by considering the nature of distribution of the data and extensive literature review. The procedure for categorization has been discussed while describing the variables under consideration in Chapter 4.

3.9 Statistical Procedures

The data was analyzed in accordance with the objectives of the study. Qualitative data was converted into quantitative data by means of suitable scoring techniques wherever necessary. The statistical measures such as range, number, sum, mean, standard deviation, frequency, and percentage distribution were used for categorization and describing the variables. Multiple linear regression analysis was done to explore the contributing relationship between the selected characteristics of the farmers with the dependent variable. Statistical package for social sciences (SPSS) version 25 was used for the analysis of data. Five percent (0.05) level of probability was considered as the basis for rejecting any null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this chapter is to describe the findings of the present study. Recorded observations were presented in line with the objective of the study and what was found was discussed with justifiable and relevant comments under this chapter. These are presented in four sections according to the objectives of the study. The first sub-section deals with the selected characteristics of the farmers. The second sub-section deals with the extent of problems faced by the fish farmers. Relationship between the selected characteristics of the fish farmers and their problem faced has been discussed in the third sub-section, while the fourth sub-section deals with the comparative severity of the problems faced by the fish farmers.

4.1 Selected Characteristics of fish farmers

Nine characteristics of the farmers were selected to find out their contribution with problems faced by the fish farmers. The selected characteristics included their age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure, aquaculture extension media contact. These characteristics of the farmers are described in this section.

Data contained in the Table 4.1 reveal the salient features of the characteristics of the fish farmers in order to have an overall picture of these characteristics at a glance. However, for ready reference, separate tables are provided while presenting categorizations, discussing each of the characteristics in this chapter

Table 4.1 Salient features of the fish farmers with their characteristics (n=101)

Sl. no.	Characteristics	Unit of measurement	Possible range	Observed range	Mean	SD
1	Age	Years	Unknown	18-62	41.39	12.48
2	Education	Level of Schooling	Unknown	0-18	9.92	5.67
3	Family Size	Number of members	Unknown	4-10	5.96	3.60
4	Land Area	Hectare	Unknown	0.20-2.30	1.25	0.57
5	Pond size	Decimal	Unknown	17.3-172.9	96.38	42
6	Annual Family income	“000” BDT	Unknown	50-700	379.27	188.68
7	Annual income from pond fish farming	“000” BDT	Unknown	20-300	162.57	81.25
8	Training exposure	Days	Unknown	0-13	7.47	4.35
9	Extension media contact	Score	0-15	2-14	7.61	4.17

4.1.1 Age

The age of the farmers has been varied from 18 to 62 years with a mean and standard deviation of 41.39 and 12.48 respectively. Considering the recorded age, farmers are classified into three age groups namely "young", "middle aged" and "old". Their distribution according to the age of the farmers is shown in Table 4.2

Table 4.2 Distribution of the fish farmers according to their age

Category	Basis of categorization (age)	Fish Farmers		Mean	SD
		Number	Percent		
Young aged	up to 35	30	29.70	41.39	12.48
Middle aged	36-50	42	41.58		
Old aged	Above 50	29	28.71		
Total		101	100		

The highest proportion (41.58 percent) of the fish farmers were middle aged compared to 29.70 percent of them being young aged and only 28.71 percent old aged. Data also indicates that the young and middle aged category constitute almost 71.28 percent of total farmers. The young and middle aged farmers were generally more involved in fish farming than the older.

4.1.2 Education

The mean and standard deviation of fish farmers education scores was 9.92 and 5.67. Based on their education scores, the farmers were classified into five categories namely can't read and write 0), can sign only (0.5), primary education (1-5), secondary education (6-10) and above secondary education (above 10). The distribution of the fish farmers according to their education is shown in Table 4.3.

Table 4.3 Distribution of the fish farmers according to their level of education

Category	Basis of categorization (score)	Pond Farmers		Mean	SD
		Number	Percent		
Can't read and write	0	5	4.95	9.92	5.67
Can sign only	0.5	8	7.92		
Primary education	1-5	19	18.81		
Secondary education	6-10	24	23.76		
Above secondary	>10	45	44.55		
Total		101	100		

Table 4.3 shows that farmers in the above secondary education category have the highest proportion (44.55 percent), followed by secondary education (23.76 percent) and primary education category (18.81 percent). On the other hand, can sign only (7.92 percent) and 4.95 percent of respondents can't read and write.

4.1.3 Family size

Mean and standard deviation of fish farmers family size score was 5.96 and 3.60. According to family size, the respondent farmers were classified into three categories as shown in Table 4.4.

Table 4.4 Distribution of the fish farmers according to their family size

Category	Basis of categorization (members)	Pond Farmers		Mean	SD
		Number	Percent		
Small family	(members up to 4)	61	60.40	5.96	3.60
Medium family	(5 to 8 members)	25	24.75		
Large family	(above 8 members)	15	14.85		
Total		101	100		

Table 4.4 indicates that the small size family constitute the highest proportion (60.40 percent) followed by the medium size family (24.75 percent). Only 14.85 percent farmers had large family size. Thus, about (85.15 percent) of the farmers had small to medium family.

4.1.4 land area

The land area of the fish farmers ranged from 0.2 to 2.30 hectares and the mean was 1.25 hectares with standard deviation of 0.57. According to the land area of the fish farmers, they were classified into three categories as suggested by DAE (1999) “Marginal (up to 0.2)”, “Small (0.21-1)” and “Medium (1.1-3). The distribution of the fish farmers according to their farm size is shown in Table 4.5.

Table 4.5 Distribution of the fish farmers according to their land area

Categories according to land area (hectare)	Fish farmers (n=101)		Mean	SD
	Number	Percent		
Marginal (up to 0.2)	3	2.97	1.25	0.57
Small (>0.2-1.00)	75	74.26		
Medium (>1.00-1.80)	18	17.82		
Large (>1.80)	5	4.95		
Total	101	100		

Almost three–fourth (74.26 percent) of the fish farmer's possessed small land compared to 17.82 percent of them having medium land and only 2.97 percent had marginal land area. The average land area of the farmers of the study area (1.25 hectares) was higher than that of national average (0.60 hectare) of Bangladesh (BBS, 2020). Hasan (2015) found almost similar findings.

4.1.5 Pond size

The pond size of the farmers ranged from 17.3 decimal to 172.9 decimal with a mean and standard deviation of 96.38 decimal and 42 decimal respectively. Based on pond area the pond owners were classified into three categories as small pond, medium pond and large pond. The distribution of the fish farmers according to their pond size is shown in Table 4.6.

Table 4.6 Distribution of the fish farmers according to their pond size

Categories according to pond size (Decimal)	Fish Farmers		Mean	SD
	Number	Percent		
Small pond	21	20.79	96.38	42
Medium pond	45	44.55		
Large pond	35	34.65		
Total	101	100		

Data presented in Table 4.6 reveal that 44.55 percent of the fish farmers had medium ponds while 34.65 percent of them had large ponds and 20.79 percent had small ponds. Thus, overwhelming majority (79.20 percent) of the pond owners had medium to large size pond.

4.1.6 Annual family income

Annual family income of the farmers ranged from Taka 50 thousand to 700 thousand, the mean being 379.27 thousand and standard deviation 188.68 thousand. On the basis of their annual income scores, the farmers were divided into three categories: "low income" (up to 120), "medium income" (121-360) and "high income" (above 360). The distribution of the farmers according to their annual family income is shown in Table 4.7.

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

Categories according to annual family income ('000' taka)	Fish farmers		Mean	SD
	Number	Percent		
Low Income ((up to 120)	21	20.79	379.27	188.68
Medium income (121-360)	63	62.37		
High income (above 360)	17	16.83		
Total	101	100		

The majority (62.37 percent) of the fish farmers had medium income compared to 20.79 percent of them having low income and 16.83 percent high income. Thus, the vast majority (83.16 percent) of the farmers had low to medium income

4.1.7 Annual income from pond fish farming

Annual family income of the pond farmers ranged from Taka 20 thousand to 300 thousand with an average and standard deviation of 162.57 and 81.25 respectively. Based on the annual income from fish farming the respondents were classified into three categories as shown in Table 4.8.

Table 4.8 Distribution of the fish farmers according to their annual income from pond fish farming

Categories according to annual income from pond fish farming ('000' taka)	Fish farmers		Mean	SD
	Number	Percent		
Low Income ((up to 80)	19	18.81	162.57	81.25
Medium income (81-200)	71	70.29		
High income (above 200)	11	10.89		
Total	101	100		

Data presented in Table 4.8 reveal that 70.29 percent of fish farmers had medium income, 10.89 had high income and 18.81 percent had low income from their farming. Thus, overwhelming majority (89.11 percent) of the fish farmers had low to medium income from their pond fish farming.

4.1.8 Training exposure

The training score of the fish farmers ranged from 0 to 13 with a mean of 7.47 and standard deviation of 4.35. Based on their observed range, training scores, the farmers were classified into four categories: no training, low training, medium training and high training. The distribution of the farmers according to their training is presented in Table 4.9.

Table 4.9 Distribution of the fish farmers according to their training exposure

Categories according to training exposure (no. of days)	Fish farmers		Mean	SD
	Number	Percent		
No training (0 day)	61	60.39	7.47	4.35
Low training (1-4 days)	28	27.72		
Medium training (4-9 days)	10	9.9		
High training (above 9 days)	2	1.98		
Total	101	100		

About 60.39 percent of the fish farmers had no training while the 27.72 percent of them received 1-4 days training. Only 1.98 percent of the fish farmers had high training.

4.1.9 Extension media contact

The observed extension contact scores of the fish farmers ranged from 2 to 14 against the possible range from 0 to 15, the mean and standard deviation were 7.61 and 4.17 respectively. According to this score, the farmers were classified into three categories: "low extension contact" (up to 5), "medium extension contact" (6-10) and "high extension contact" (above 10). The distribution of the farmers according to their extension contact is shown in Table 4.10.

Table 4.10 Distribution of the fish farmers according to their extension media contact.

Categories according to extension contact (scores)	Fish farmers		Mean	SD
	Number	Percent		
low extension contact (up to 5)	55	54.46	7.61	4.17
Medium extension contact (6-10)	25	24.75		
High extension contact (above 10)	21	20.79		
Total	101	100		

A proportion of 54.46 percent of the farmers had low extension contact compared to 24.75 percent of them having medium extension contact. Almost 20.79 percent of the farmers had high contact. Thus, overwhelming majority (79.21 percent) of the farmers had low to medium extension contact.

4.2 Problems faced by the farmers in pond fish farming

Problems faced by the fish farmers score ranged from 6 to 18 against the possible score of 0-21 with a mean of 10.26 and standard deviation of 4.12. Based on the problems scores, the farmers were classified into three categories: "low problem" (up to 10), "medium problem" (11-15) and "high problem" (above 15). The distribution of the fish farmers according to their problem faced is presented in Table 4.11.

Table 4.11 Distribution of the fish farmers according to their problems faced

Categories according to problems (scores)	Fish farmers		Mean	SD
	Number	Percent		
Low (up to 10)	33	32.67	10.26	4.12
Medium (11-15)	45	44.55		
High (above 15)	23	22.77		
Total	101	100		

About 44.55 percent of the farmers had medium problems compared to 32.67 percent of them having low problem and 22.77 percent having high problems. Thus, the vast majority (78.22 percent) of the farmers had low to medium problems.

4.3 Relationship between the selected characteristics of the fish farmers and their problems faced

The purpose of this section is to explore the relationship of each of the nine (9) selected characteristics of the fish farmers with their problem faced. The independent variables were age, education, family size, land area, pond size, annual family income, annual income from pond fish farming, training exposure, extension media contact. Problems faced by the fish farmers was one of the dependent variable. Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between each of the selected characteristics of the fish farmers with their problems faced. Five percent level of probability was used as the basis for rejection of a null hypothesis. The computed values of 'r' were compared with relevant tabulated values for 99 degrees of freedom at the designated level of probability in order to determine whether the relationships between the concerned variables were significant or not. The results of correlation of coefficient (r) between the independent and dependent variable have been shown in Table 4.12.

Table 4.12 Co-efficient of correlation showing relationship between each of the selected characteristics of the fish farmers with their problems faced (n=101)

Dependent variable	Independent variable	Correlation co-efficient values "r"	Tabulated value of "r" with 99 df	
	Age	0.004^{NS}	**At 0.05 level**	**At 0.01 level**
	Education	-0.183^{*}		
	Family size	0.128^{NS}		
Problems Faced by the fish farmers	Land area	-0.349^{**}		
	Pond size	-0.288^{**}		
	Annual family income	-0.123^{NS}	0.175	0.228
	Annual income from pond fish farming	-0.337^{**}		
	Training exposure	0.435^{**}		
	Extension media Contact	-0.399^{**}		

NS = Not significant
*Significant at 0.05 level of probability
** Significant at 0.01 level of probability

4.3.1 Relationship between education and problems faced by the fish farmers

Relationship between education of the fish farmers and their problems faced was determined by testing the null hypothesis: "There is no relationship between education of the farmers and their problems faced in fish culture". The computed value of the co-efficient of correlation (r) between the concerned two variables were (-0.183) as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration

• The computed value of 'r' (-0.183) was greater than the tabulated value of 'r' (0.175) with 99 degrees of freedom at 0.05 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.05 level of probability and showed a negative trend.

The findings demonstrate that education level of the farmers had significant negative relationship with their problems faced. This meant that the farmers having more education were likely to have less problems faced. It is quite logical that educated person can minimize any problems they faced.

4.3.2 Relationship between land area and problems faced by the fish farmers

Relationship between land area of the fish farmers and their problems faced was determined by testing the null hypothesis: "There is no relationship between land area of the farmers and their problems faced". The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.349 as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of `r.' (-0.349) was greater than the tabulated value 'r'(0.228) with 99 degrees of freedom at 0.01 levels of probability.

• The concerned null hypothesis was rejected.

• A significant negative relationship was found to exist between the two concerned variables.

The findings demonstrate that land area of the fish farmers had significant negative relationship with their problems faced. This meant that the farmers having more land area were likely to have less problems faced.

4.3.3 Relationship between Pond size and problems faced by the fish farmers

Relationship between pond size of the fish farmers and their problems faced was determined by testing the null hypothesis: "There is no relationship between Pond size of the fish farmers and their problems faced". The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.288 as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (-0.288) was greater than the tabulated value `r' (0.228) with 99 degrees of freedom at 0.01 levels of probability.

• The concerned null hypothesis was rejected.

• A significant negative relationship was found to exist between the two concerned variables.

The findings demonstrate that pond size of the fish farmers had significant negative relationship with their problems faced. This meant that the farmers having more pond area were likely to have less problems faced.

4.3.4 Relationship between annual income from pond fish farming and problems faced by fish farmers

Relationship between annual income of the farmers from pond fish farming and their problems faced was determined by testing the null hypothesis: "There is no relationship between income of the farmers from pond fish farming and their problems faced in fish culture". The computed value of the co-efficient of correlation (r) between the concerned variables was found to be -0.337 as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r.' (-0.337) was greater than the tabulated value 'r'(0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

The findings demonstrate that income of the farmers from pond fish farming had high significant negative relationship with their problems faced.

4.3.5 Relationship between training exposure and problems faced by the fish farmers

Relationship between training exposure of the farmers and their problems faced was determined by testing the null hypothesis: "There is no relationship between training exposure of the farmers and their problems faced. The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.435 as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of `r' (-0.435) was larger than the tabulated value 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

The findings reveal that training exposure of the farmers had highly significant negative relationship with their problems faced. This meant that the farmers having more training exposure face fewer problems. Training makes a man perfect to do his job properly. Well trained person has the ability to cope with the problematic situation. This might be the reason for the above findings.

4.3.6 Relationship between extension media contact and problems faced by the fish farmers

Relationship between extension media contact of the farmers and their problems faced was determined by testing the null hypothesis: "There is no relationship between extension media contact of the farmers and their problems faced in fish culture". The calculated value of the co-efficient of correlation between the concerned variables was found to be -0.399 as shown in Table 4.12. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of `r.' (-0.399) was greater than the tabulated value 'r' (0.228) with 99 degrees of freedom at 0.01 levels of probability.

• The null hypothesis was rejected.

The findings demonstrate that extension media contact of the farmers had highly significant negative relationship with their problems faced. This meant that the farmers having more extension media contact face fewer problems

4.4 Comparative severity of the problems faced by the fish farmers

The purpose of this section was to have an understanding on comparative problems faced by the fish farmers. To compare among the problems, a rank order was made based on Problem Faced Index (PFI). Problems faced index (PFI) of the fish farmers of the 7 problem items in fish farming ranged from 59 to 171 against a possible range of 0 to 303.

On the basis of PFI, it was observed that "Low price of fish in pick period" ranked first followed by "Fish feed price hike", "Poor communication system", "Lack of proper marketing facilities", "Insufficient credit", "Natural calamities", "Shortage of pond water in dry season"

Table 4.13 Rank order of problems faced by the fish farmers

Sl. No	Problems	Farmers N=101				Problem Facing Index	Rank order
		Very High	High	Low	Not at all		
1	Low price of fish in pick period	8	15	43	35	171	1
2	Fish feed price hike	32	22	12	35	170	2
3	Poor communication system	18	12	24	47	152	3
4	Lack of proper marketing facilities	14	11	25	51	151	4
5	Insufficient credit	14	12	35	40	143	5
6	Natural calamities	13	18	35	35	108	6
7	Shortage of pond water in dry season	15	17	45	24	59	7

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Selected characteristics of the fish farmers

Age

The highest proportion (41.58 percent) of the fish farmers were middle aged compared to 29.70 percent of them being young aged and only 28.71 percent old aged

Education

The highest proportion (44.55 percent) of the fish farmers had education up to above secondary level compared to 23.76 percent of them having secondary level education.

Family Size

The small size family constitute the highest proportion (60.40 percent) followed by the medium size family (24.75 percent). Only 14.85 percent farmers had large family size

Land area

Almost three–fourth (74.26 percent) of the fish farmer's possessed small land compared to 17.82 percent of them having medium land and only 2.97 percent had marginal land area

Pond size

Almost 44.55 percent of the fish farmers had medium ponds while 34.65 percent of them had large ponds and 20.79 percent had small ponds.

Annual family income

The majority (62.37 percent) of the fish farmers had medium income compared to 20.79 percent of them having low income and 16.83 percent high income.

Annual income from pond fish farming

About 70.29 percent of fish farmers had medium income, 10.89 had high income and 18.81 percent had low income from their farming.

Training exposure

About 60.39 percent of the fish farmers had no training while the 27.72 percent of them received 1-4 days training. Only 1.98 percent of the fish farmers had high training.

Extension media contact

A proportion of 54.46 percent of the farmers had low extension contact compared to 24.75 percent of them having medium extension contact. Almost 20.79 percent of the farmers had high contact.

5.1.2 Problems faced by the farmers in pond fish farming

About 44.55 percent of the farmers had medium problems compared to 32.67 percent of them having low problem and 22.77 percent having high problem

5.1.3 Relationship between selected characteristics and problems faced by the fish farmers

Farmer's education, land area, Pond size, Annual income from pond fish farming, extension media contact, Training exposure had significant negative relationship with the problems faced by the fish farmers. Farmer's Age, Family size and annual family income had no significant relationship with the problems faced by the fish farmers.

5.1.4 Comparative severity of the problems faced by the fish farmers

The purpose of this section was to have an understanding on comparative problems faced by the fish farmers. To compare among the problems, a rank order was made based on Problem Faced Index (PFI). Problems faced index (PFI) of the fish farmers of the 7 problem items in fish farming ranged from 59 to 171 against a possible range of 0 to 303.

On the basis of PFI, it was observed that "Low price of fish in pick period" ranked first followed by "Fish feed price hike", "Poor communication system", "Lack of proper marketing facilities", "Insufficient credit", "Natural calamities", "Shortage of pond water in dry season"

5.2 Conclusions

On the basis of findings, discussion the following conclusions have been drawn:

i. Farmer's education, had significant negative relationship with the problems faced by the fish farmers.

ii. Annual income from pond fish farming had significant negative relationship with the problems faced by the fish farmers.

iii. Training exposure had significant negative relationship with the problems faced by the fish farmers. It can be concluded that participation in different training increased knowledge and skill of the fish farmers which aware them to adopt different problems.

iv. The vast majority (78.22 percent) of the farmers had low to medium problems. It is concluded that most of the farmers faced problems in pond fish farming which needs to minimize for sustainable pond fish farming.

5.3 Recommendations

The following recommendations are made from the results of the study based on the observations and conclusions:

5.3.1 Recommendation for policy implication

i. The vast majority (78.22 percent) of the farmers had low to medium problems. It is recommended that an effective step should be taken by the Department of Fisheries (DoF) and Non-Government Organizations (NGOs) for strengthening the farmers fish farming capacity for reducing the problems faced by them.

ii. There remains a negative significant relationship between education of the fish farmers and their problem faced in pond fish farming. Thus, it may be recommended that suitable steps might be taken to increase the education level of the farmers by establishing adult learning centers to reduce fish farming problems.

iii. Massive and relevant training programs should be conducted for fish farmers to upgrade their knowledge, practice, skills and ability. The concerned authorities should be involved in the conduction of training programmes for the fish farmers.

iv. To increase the annual family income of the farmers, they need to invest money to use quality fry, feed etc. in times. So, it may be recommended that GOs, NGOs and Concern authority should supply credit so that they can overcome the problems.

5.3.2 Recommendations for further study

Based on the scope and limitations of the current study and observation made by the researcher, the following recommendations will be made for future study.

i. The present study was conducted in Debidwar upazila under Cumilla district. It is recommended that similar studies should be conducted in other parts of Bangladesh.
ii. Relationships of nine characteristics of the fish farmers with their problems faced have been investigated in this study. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers with their problems faced.
iii. It is difficult to explore all the problems faced by the fish farmers. Measurement of problems of the fish farmers is not free from questions. More reliable measurement of the concerned variable is necessary for further study.

In the present study farmer's age, family size, annual family income had no significant relationship with their problem faced. In this connection, further verification is necessary.

REFERENCES

Abbas, S., M. Ashraf and I. Ahmed. (2014). Effect of fertilization and supplementary feeding on growth performance of *Labeo rohita, Catla catla and Cyprinus carpio*. *Journal Animal Plant Science*, *24*(1), 142-8.

Abdullah, M. M. and M. B. H. Chowdhury. (2016). Problems' and prospects of fish farming in some selected area of Bangladesh and its implications on increased fish production. *Asian Journal of Agricultural Extension, Economics & Sociology*, 1-6.

Ahmed, S. (2002). Problem Confrontation of the Contact Growers of BADC in Jute Seed Production. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Akanda, M. G. R. (1993). Problem Confrontation of the Farmers in respect of Cultivating Mukta (BRII) Rice. MS. Thesis, Department of Agricultural Extension and Teachers' Training, BAU, Mymensingh.

Ali, M.A. (1999). Opinion of unemployed rural youth in self-employment by undertaking: selected income generating activities. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Anisuzzaman, M. (2008). Problem Confrontation of the Farmers in Tuberose Cultivation of Jhikargacha Upazila Under Jessore District. M.S. (Ag. Ext.) Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka.

Aziz, M.A. (2006). Constraints Faced by the Farmers in Potato Cultivation in Jhikargacha Upazilla Under Jessore District. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka.

Bartley, D. M. and G. Marmulla. (2015). Inland capture fisheries: status and data issues. *Fisheries Management and Ecology*, *22*(1), 71-77.

Bashar, M.A. (2006). Problem Confrontation of the Farmers in Mushroom Cultivation. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka.

Das, S. K. and B. B. Jana. (1996). Pond fertilization through inorganic sources: an overview.*Indian Journal of Fisheries*, *43*(2), 137-155.

DeSilva, S.S. and M.R. Hasan. (2006). Feeds and fertilizers: the key to long-term sustainability of Asian aquaculture. *FAO Fisheries Technical Paper*, 497, 19.

Delgado, C. L. (2003). *Fish to 2020: Supply and demand in changing global markets* (Vol. 62) World Fish.

DoF (Department of Fisheries). (2018). Fish Fortnight Compendium, Department of Fisheries, Government of People's Republic of Bangladesh. 155.

DoF (Department of Fisheries). (2016). Fish Fortnight Compendium, Department of Fisheries, Government of People's Republic of Bangladesh. 135.

DoF (Department of Fisheries). (2012). Sharonika, Madsha Saptha. (2012). Department of Fisheries, Ministry of Fisheries and Livestock, Government of Peoples Republic of Bangladesh, 135.

Edwards, P. and H. Demaine. (1997). Rural aquaculture: overview and framework for country reviews. RAP Publication (FAO) vol.36.RAP, Bankok, Thiland, pp.62.

Ezeanya, N. C. and C. C. Egwuonw. (2015). Standard Water Quality Requirements and Management Strategies for Fish Farming (A Case Study of Otamiri River). *International Journal of Research in Engineering and Technology*, *4*(3), 1-5.

FAO. (1997). FAO Fisheries Circular, vol. 886. 163 pp.

Faruk, M.A.R., M.J. Alam and M.B. Kabir. (2004b). Status of fish disease and health management practices in rural freshwater aquaculture of Bangladesh. Pakistan Journal of Biological Science, 7 (12), pp.2092-2098.

FAO (2016). Fisheries Aquaculture Department. (2010) The state of world fisheries and aquaculture. *Food and Agriculture Organization of the United Nations, Rome*.

FAO (2011). Fisheries Aquaculture Department. (2013). Global Aquaculture Production Statistics for the year.

FRSS. (2015). Fisheries Statistical Yearbook of Bangladesh. Fisheries Resources Survey System (FRSS). Department of Fisheries in Bangladesh. Volume, 28:46.

Ghose, B. (2014). Fisheries and aquaculture in Bangladesh: Challenges and opportunities. Annals of Aquaculture and Research 1 (1), pp.1-5.

Hossain, M.A.R. (2015). An overview of fisheries sector of Bangladesh. Research in Agriculture Livestock and Fisheries, 1 (1), pp.109-126.

Hossain, M.A.R., M.Z. Ali. and A.K.M. Amin. (2002). Participatory rural appraisal with small indigenous species of fish retailers in two fish markets. *Progressive Agriculture*, 13(1&2): 133-138.

Hossain, S.M.A. (1985). A Study of the Landless Labourers in Bhahabail Union of Mymensingh District. M.Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Haque, M.A.S. (2006). Problem Faced by the Farmers in Using Integrated Plant Nutrient Management. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka.

Iqbal, Z. and M.N. Khan. (2001). Disease prevalence in culturable fish species in Punjab. Pakistan Journal of Fisheries ,1, pp.103-112.

Islam, M.M., E.Y. Mohammed and L. Ali. (2016). Economic incentives for sustainable hilsa fishing in Bangladesh: an analysis of the legal and institutional framework. Marine policy, 68, pp.8-22.

Islam, M.N. (2001). An overview of aquaculture development in Bangladesh. Aquaculture Asia, 6 (2), pp.8-9

Islam, M.N. (1987). Artificial Insemination Problem Confrontation of the Farmers in the Two Selected Unions of Madhupur Upazila under Tangail District. M.Sc. (A. Ext. Ed.) Thesis, Department of Agricultural Extension & Teachers" Training, Bangladesh Agricultural University, Mymensingh.

Karim, M.L. (1996). Relationship of Selected Characteristics of Kakrol Growers with. Their Problem Confrontation. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Kerlinger, F. N. (1973). Foundations of Behavioral Research, Educational and Psychological Inquiry. Rinehart and Winston Inc. Halt, New York, U.S.A.

Khan, M.A.S. (2004). Farmers' Participation in Farm and Community Level Activities in Sailokupa Upazila under Jhenaidah District. M.S. (Ag. Ext. Ed.) Thesis, Dept. of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Kurnia, S., R. M. Mahbubur and B. Alzougool. (2015). E-commerce technology adoption: A Malaysian grocery SME retail sector study. *Journal of Business Research*, *68*(9), 1906-1918.

Kubečka, J., K. Soukalová and R. Welcomme. (2016). Ecology and ecological quality of fish in lakes and reservoirs. Fisheries Research, vol. 173, pp.1–3.

Mansur, M.A.A. (1989). Farmers Problem Confrontation in Feeds and Feeding Cattel in Sonapur Union of Raipur Upazial Under Lakshmipur District. M.Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Teachers‟ Training, Bangladesh Agricultural University, Mymensingh.

Miah, M. S., M. S. Uddin and M. S. Shah (1993). Effects of artificial feed in carps polyculture system. *Bangladesh Journal. Agriculture. Science*, *20*, 359-364.

Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. Info. Sys. Res.12(3): 240-259.

Nahid, M. M. H. (2005). Problem Confrontation of the Sugarcane Growers in Sugarcane Production. MS. Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Rahman, M.H. (2006). Contraints Faced by the Banana Growers of Sonargaon Upazilla Under Narayanganj District. M.S. (Ag. Ext.) Thesis, Department of Agricultural Extension and Information System, Sher-eBangla Agricultural University, Dhaka.

Rahman, M.F. (19950. Problem Confronted by the Pineapple Growers in a Selected Area of Madhupur thana under Tangail District, M. Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Bangladesh

Rashid, S. M. M. (2014). Empowering Farmers through e-Agriculture. MS (Ag. Ext.), Department of Agricultural Extension and Information System, Shere-Bangla Agricultural University, Dhaka-1207.

Roy, P.C. (2007). Constraints faced by the farmers in maize cultivation. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensing.

Rashid, M.Z. (2003). Participation of School Dropout Rural Youth in Selected Agricultural Activities in Two Villages of Mymensingh District. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Saha, N. K. (1997). Participation of Rural Youth in Selected Agricultural Activities in the Villages of Muktagacha Upazila under Mymensingh District. M.S. Thesis, Department of Agricultural Extension Education, BAU, Mymensingh.

Salam, M.A. (2003). Constraint Faced by the Farmers in Adopting Environmentally Friendly Farming Practices. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Salvanes, K. G. and R. Tveterås. (1998). Firm exit, vintage effect and the business cycle in Norway.

Shamsuzzaman, M. M. and M. M. Islam. (2017). Fisheries resources of Bangladesh: Present status and future direction. *Aquaculture and Fisheries*.

Subasinghe, R.P. and S.E. McGladdery. (2001). Aquaculture development, health and wealth:The nematode Raphidascaris acus. Journal of Parasitology, 82, pp.668-669.

Thilsted, S.H., R., Phillips and E.H. Allison. (2016). Sustaining healthy diets: The role of capture fisheries and aquaculture for improving nutrition in the post-2015 era. Food Policy, 61, pp.126-131.

Townsend, J. C. (1953). Introduction to experimental methods. International Student Edition. New York: McGraw Hill Book Company, Inc.

Yamane, T. (1967). Statistics: An introductory analysis, 2nd Ed., New York: Harper and Row.

Zafri, A. and K. Ahmed. (1981). Studies on the vitamin A content of fresh water fishes: content and distribution of vitamin A in mola (*Amblypharyagodon mola*) and dhela (Rohte cotio). *Bangladesh Journal Biology Science*, *10*, 47-53.

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

PROBLEMS FACED BY THE FISH FARMERS OF DEBIDWAR UPAZILA UNDER CUMILLA DISTRICT

Name of the respondent: ----------

Sl. No. ---------

Date : ----------

Village	:	Upazila	:
Union	:	District	:
Mobile No	:		

(Please answer the following questions)

1. Age

What is your present Age?..... Years.

2. Education

a) Cannot read and write…….
b) Can sign only: ----------
c) I read up to class: ----------
d) I passed ---------- class

3. Family members …….

4. Land area

Please indicate your area of lands according to use

Sl. No.	Land type	Land area	
		Local unit (Dec)	Hectare
1	Homestead area (A)		
2	Own land under own cultivation (B)		
3	Land taken from others on borga system(C)		
4	Land given to others on borga system (D)		
5	Land taken from others on lease (E)		
Total=A + B +1/2 (C+ D) + E			

5. Pond size

Local unit	Decimal

6.Annual Family Income

SL. No.	Sources of income	Monthly income (Tk)	Annual income (Tk)
1	Agriculture		
2	Pond Fish Culture		
	Selling fish		
	Selling fish fry		
3	Business		
4	Service		
5	Others		
Total Income			

7.Annual income from pond fish farming

SL. No	Source of income	Monthly income (TK)	Annual income (TK)
1			
2			
3			
Total			

8. Training exposure

Do you have participated any training?

Yes ……. No. ……

If yes, mention the following information

SL. No	Name of training course	Duration of training (days)	Training provider
1			
2			
3			
4			
5			
Total			

9. Extension Contact for fish culture information

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

SL. No.		Extent of Participation			
		Regularly (3)	**Occasionally (2)**	**Rarely (1)**	**Never (0)**
1	Model fish farmer				
2	Input dealer				
3	NGO worker				
4	Field worker of fisheries department				
5	Upazilla fisheries officer				

10. Problems Faced by the fish farmers

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

SL. No.	**Problem**	**Extent of Problems**			
		Severe (3)	**Moderate** (2)	**Low** (1)	**Not at all (0)**
1	Lack of proper marketing facilities				
2	Poor communication system				
3	Low price of pond fish in pick period				
4	Natural calamities				
5	Shortage of pond water in dry season				
6	Insufficient credit				
7	Fish Feed Price Hike				

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

_____

Signature of interviewer

Date: .....