FARMERS' AWARENESS ON SAFE FEED FOR CULTIVATION OF CARP FISH

MD SHER ALAM

REGISTRATION NO. 19-10374

DEPARTMENT OF AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA -1207

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BY

MD SHER ALAM

REGISTRATION NO. 19-10374

Contact:01773788441

Email:shershuvohstu@gmail.com

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Approved by:

Prof. Dr. Md Rafiquel Islam	**Prof. Dr. Muhammad Humayun Kabir**
Supervisor	**Co-Supervisor**
Department of Agricultural Extension and Information System	Department of Agricultural Extension and Information System

Prof. Dr. Muhammad Zamshed Alam
Chairman
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University, Dhaka

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 "FARMERS' AWARENESS ON SAFE FEED FOR CULTIVATION OF CARP FISH" submitted to the **Department of Agricultural Extension and Information System,** Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfilment of the requirements for the degree of **MASTERS OF SCIENCE (M.S.) in AGRICULTURAL EXTENSION AND INFORMATION SYSTEM,** embodies the result of a piece of bonafide research work carried out by **MD SHER ALAM, Registration No. 19-10374** 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, received during the course of this investigation has been duly acknowledged.

Dhaka, Bangladesh

(Prof. Dr. Md. Rafiquel Islam)
Professor
Department of Agricultural Extension and Information System
SAU, Dhaka

Dedicated to
My
Beloved Parents

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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
SPSS	Statistical Package for Social Science
UFO	Upazila Fisheries Officer

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BY

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ABSTRACT

The purpose of this study was to determine the extent of awareness towards safe fish feed by the carp fish farmers and to explore the relationships between the selected characteristics of the fish farmers and their awareness. Data were collected from 101 fish farmers of 2 unions of Kishorganj Upazila under Nilphamari district. An interview schedule followed by a pretested structured questionnaire 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 44.5 percent of the farmers had moderate awareness compared to 34.7 percent of them having highly aware and 20.8 percent having less awareness. Thus, the vast majority (78.2 percent) of the farmers' have moderate to highly awareness. Farmer's education, experience in fish farming, time spending in farm, annual income from pond fish farming, extension media contact and training exposure had significant positive relationship with the awareness by the fish farmers. Farmer's Age and Family size had no significant relationship with the awareness by the fish farmers. It was recommended that step should be taken by the concern authority for strengthening the farmers' capacity for increasing the awareness towards safe feed for carp cultivation by the fish farmers.

CHAPTER I

INTRODUCTION

1.1 General Background

Bangladesh is a land of rivers and is blessed with an rich biodiversity of fish and fisheries resources. Fisheries play a vital role in nutrition, employment, income generation and foreign exchange earnings. Fisheries sector provides about 60% of the animal protein intake and more than 11% of the total population of the country is directly or indirectly involved in this sector for their livelihoods (DoF 2016). However, due to the degradation of ecological balance, fish production from open water natural resources has been declined. Thus, aquaculture has expanded, diversified, intensified and technologically advanced in Bangladesh. With the increased intensification and commercialization of aquaculture practice, quality of fish seeds and fish health somewhat decreased and became one of the most important issues to aquaculturists (Amin et al. 2005 Bondad-Reantaso et al. 2005, Hossain et al. 2020). Day by day culture fisheries production increased for safe fish feed awareness. Now fish production in Bangladesh 46 lakh metric ton (2022 Economic Review).

Historically fish farming has been a part time activity of the peasant farmers' who developed it as an efficient mean of utilizing farm resources to the maximum extent. Indian major carps, some exotic carps and catfishes are the main cultured species for the closed water system and production of these species completely depends on timely and adequate supply of quality seed. Until very recent times, carp culture in pond remained the main stay of aquaculture globally including Bangladesh. However, a number of other fish have been added to the species combinations with the expectation of increasing productivity in polyculture pond (Uddin at al. 2016 Samad et al. 2013). Brood fish is considered as the heart of the hatchery and management of brood stock is the key of quality seed production. Success of induced breeding depends on availability of sufficient number of brood fish. Therefore, brood stock should be managed scientifically so that mature broods could be obtained during the whole breeding season. Most of the government hatcheries have their own brood stock and around 25 percent recruitments take place in every year. On the other hand, few private hatcheries have their own brood stock and maintain them more or less

scientifically but there are many private hatcheries that do not have the required number of broods. During the breeding season, they instantly buy broods from others and produce fry from them to fulfill their target (Sarder et al. 2007). Feed quality is another important issue to maintain a good brood stock to get quality seeds.

Carp fisheries are the prime source of fish production in Bangladesh. Carp species are the most important fish species in Bangladesh, where more than 80 percent of aquaculture production is from inland ponds. The most farmed carp species are Rohu, Catla and Silver carp, which account for 25, 21 and 19 percent of the total production of fish from ponds, respectively 2016. There are at least 265 freshwater fish species in the country (Rahman, 2005) but only 4 native and 12 exotic carp species are cultured in Bangladesh (DoF, 2017). Some non-carp species are also brought under culture lately in the country. The total amount of cultured fishes in the country is produced in ponds and ditches (86%) and other water bodies (14%) (FRSS, 2009). Among the fishes produced in ponds and ditches, 88.18% are carp species and 11.82% are non-carp species (FRSS, 2009). Average fish production (2839 kg/ha) in aquaculture ponds and ditches of Bangladesh is still much lower than many other carp producing countries like China (4474 kg/ha) (FRSS, 2009; Dey et al., 2005). Though the aquaculture production rate has been increased much in recent time in Bangladesh, but still not satisfactory in comparison to most other Asian countries due to existence of some constraints and problems in culture system. Considering feed quality as a problem, the present study focused on the awareness of quality of feed used in the fish farms.

1.2 Statement of the Problem

The massive growth in commercial aquaculture reported in the preceding section has been made possible, in large part, by concurrent growth in the production and use of aquafeeds, with commercial pelleted feeds replacing ‘farm made’ and ‘raw’ unformulated feeds. Production of commercial aquafeeds increased by 32 percent per year from 2008 to 2012, reaching about 1.07 million t in 2012. Sinking feeds, accounting for 81 percent of total manufactured output, dominate over extruded floating feed (19 percent). Growth in the production of floating aquafeed has been

most rapid, averaging 89 percent per year over the last four years (2016-2020). Based on demand forecasting, total aquafeed production is projected to increase to 1.57 million ton by 2015. By then, floating feed is expected to constitute 31 percent of all formulated aquafeeds. In addition to commercial pelleted feeds, more than 0.3-0.4 million ton of farm made pelleted feeds are also produced in farming areas. The number of farms made pellet mills is difficult to estimate, but there are at least 1000. Simple pellet mills can be easily manufactured in local workshops for around $2500. It is used to crush ingredients such as dried fish and maize that are then mixed manually with other feed ingredients and mechanically forced through a die to produce long 'strings' that are later air-dried and broken into small pieces before feeding. Operators of these machines often face difficulties with inadequate pellet binding and drying, and lack of knowledge and awareness needed to formulate feeds that provide sufficient nutritional value. There are around 100 mills producing commercial aquafeeds in Bangladesh, among which 8-10 large operators account for 60-70 percent of market share. Almost all mills also produce poultry feeds. Fifteen companies have installed extruders in their factories and two companies import floating feed from India and Thailand. There are around 20 commercial feed mills around the country that manufacture feed on a rental basis. These mills are used by large farmers to produce feed to meet their requirements and by feed traders who brand and sell feed in the local area at relatively low cost.

The main raw materials used for aquafeed production and their inclusion rates are rice bran (20-50 percent), maize (5- 20 percent), soybean meal (10-20 percent), mustard oil cake (10-25 percent), fishmeal (5-15 percent) and meat and bone meal (10-20 percent). Three types of rice bran are used: de-oiled rice bran (DORB), grade A rice bran (85-90 percent bran), and grade B rice bran (40-50 percent husk and 60-50 percent bran). The protein content of DORB (15-17 percent) is greater than that of grade A rice bran (10-13 percent). Rice bran is produced mainly locally. Maize originates from local (75-80 percent) and imported (20-25 percent) sources. Soybean is mainly imported from South America, although around 150,000 ton was grown in Bangladesh in 2012. Soybeans are used primarily for the extraction of oil for human use, and the meal or cake byproduct is used in feeds. In this context, the present study has been undertaken to get answer of the following questions-

1. What extent farmers are aware about feed quality for carp fish culture?

2. What are the socio-economic characteristics of the farmers?
3. Have any relationship between farmers' socio-economic characteristics and their awareness towards feed safety?

1.3 Specific Objectives

- ✓ To asses farmers awareness towards safe feed for carp fish cultivation,
- ✓ To describe socio economic characteristics of carp fish cultivators and
- ✓ To explore relationship between farmers characteristics and awareness towards safe feed for carp fish.

1.4 Justification of The Study

The use of aquaculture feeds in Bangladesh has grown substantially in the past few years, and now over 1 million tons of commercial pelleted feed are being formulated for use by aquaculture farmers. An estimated further 0.4 million tons of locally-formulated and processed diets are also being prepared by small village-based feed-making enterprises. Rapid growth in use of formulated feeds has helped many aquaculture farmers intensify production, but at the same time has raised a number of issues including feed quality, feed management efficiency and environmental sustainability. So, the researcher become focus on fish feed awareness towards safe feed in carp fish.

1.5 Assumption of The Study

The researcher had following assumption in mind while undertaking the 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.

1.6 Limation of the study

The study was undertaken with a view to having an understanding of the awareness towards safe fish feed in carp fishes among farmers. However, from the research point of view, it was necessary to impose certain limitations as follows:

1. The study was confined with only Kishorganj upazilla under Nilphamari district
2. Farmers' have many varied characteristics but only some 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.

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 lakh Taka.

Experience in fish farming

Experience referred to a farmer's dexterousness' how much he know about fish farming or culture of carp fishes in his pond or another water source.

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 programs.

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.

Time Spend in Fish Farm

Time spends in fish farm referred to as daily how much time spend in fish farm by a farmer. Generally, it is expressed as hr/day.

Awareness

Awareness referred to the degree of consciousness obtained by concerned people in accomplishment of particular activities. In this study awareness meant extent of consciousness 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 Farmers Awareness on Fish Feed

Ahmed et al. (2014) conducted a study 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.

Biswajit 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) observed 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) stated 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 in 2020, 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 The Relationship Between Selected Characteristics of The Fish Farmers and Safe Fish Feed Awareness

2.2.1 Age and Safe Fish Feed Awareness

Mamun-Ur-Rashid(2013) found that age had significant association with their safe fish feed awareness in aquaculture fish farms among farmers'. Akanda (1993) found that there was relationship between age of farmers' and their awareness faced in using quality rice seed. Huque (2006) found that age of the farmer's had noteworthy association with their awareness in utilizing coordinated plant supplement administration. Karim (1996) conducted a study and found that age had significant relationship with feed awareness. Mansur (1989) found that age of the farmers had no significant relationship with the feeds and feeding problem confrontation.

2.2.2 Level of Education and Safe Fish Feed Awareness

Anisuzzaman (2008) found that education had positive associations with their awareness in tuberose cultivation. Aziz (2006) found that education of the farmers had very high significant positive relationship with their awareness in potato cultivation in Jhikargacha upazilla under Jessore district. Bashar (2006) found that education of the farmers had huge positive association with their awareness in mashroom cultivation. Haque (2006) found that education of the farmers had highly significant positive relationship with their awareness in using integrated plant nutrient management. Karim (1996) in his study found that education of the farmers had significant positive relationship with their feed awareness faced. Rahman (1995) in his study on awareness in the

pineapple growers found a significant negative relationship between education of the farmers' and their safe fish feed awareness.

2.2.3 Family Size and Safe Fish Feed Awareness

Anisuzzaman (2008) found that family size had no huge association with their awareness 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 farmer's had no significant relationship with their safe fish feed awareness in mushroom cultivation. Haque (2006) found that family size of the farmers had no significant relationship with their awareness in using integrated plant nutrient management. Rahman (1995) found that there was no significant relationship between family size of the pineapple growers and theirawareness. He also found negative tendency between the concerned variables.

2.2.4 Annual Family Income and Safe Fish Feed Awareness

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

2.2.5 Experience in Fish Farming

Haque (2006) found that experience of the farmers had high noteworthy positive association with their awareness in utilizing coordinated plant supplement administration. Akanda (2005) reported that there was significant positive relationship between experience and technological gap in cultivating transplanted modern aman rice. Bashar (2006) found that experience of the farmers had noteworthy positive association with their awareness showdown in mushroom cultivation. Rahman (2006) found that experiences of the farmers had significant relationship with their awareness in Banana cultivation of Sonargaon Upazila under Narayangonj district.

2.2.6 Training Exposure and Safe Fish Feed Awareness

Anisuzzaman (2008) found that yearly training exposure had significance association with their awareness in tuberose cultivation. Haque (2006) found that training exposure of the farmers had significant positive relationship with their awareness in using integrated plant nutrient management. Bashar (2006) found that training exposure had high significant positive relationship with awareness in mushroom cultivation. Hossain (1985) found an important association among training exposure and awareness of the land less laborers. Islam (1987) reported that the relationship between training exposure and awareness was positively significant. Karim (1996) found that the training exposure of the farmers had significant positive relationship with their awareness.

2.2.7 Extension Contact and Safe Fish Feed Awareness

Haque (2006) found that extension media contact of the farmers had high noteworthy positive association with their awareness 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 positive association with their awareness showdown in mushroom cultivation. Rahman (2006) found that extension media contact of the farmers had significant relationship with their awareness 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, awareness by the fish farmers. Awareness of the fish farmers' may be influenced and affected through interacting forces in his surroundings. Awareness by the fish farmer's 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, annual family income, experience in fish farm, training exposure, aquaculture extension media contact ana time spend in fish farm. These characteristics are the independent variables of this study, while awareness 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.

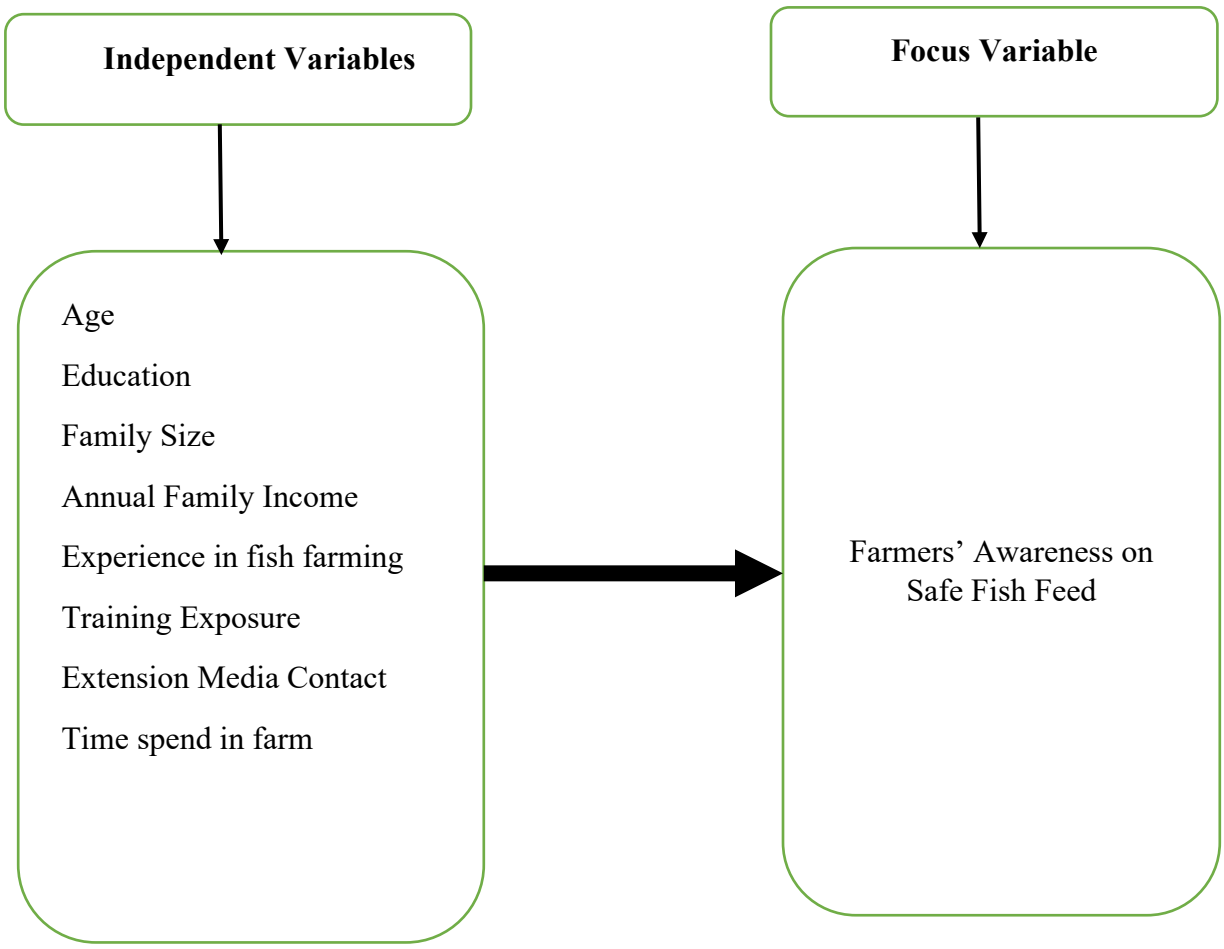

Figure 2.1 Conceptual Framework of The Study

CHAPTER III

MATERIALS AND METHOD

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 Local of The Study

Nilphamari (*Nilphamari Jela* also *Nilphamari Zila*) is a district in Northern Bangladesh. It is a part of the Rangpur Division. It is about 400 kilometers to the northwest of the capital Dhaka. It has an area of 1,580.85 square kilometres (610.37 sq mi). Nilphamari is bounded by Rangpur and Lalmonirhat in east, Rangpur and Dinajpur in south, Dinajpur and Panchagarh in west, Cooch Behar of India in north. There are many rivers in Nilphamari including the Tista, Buritista, Isamoti, Jamuneshwari, Dhum, Kumlai, Charalkata, Sorbomongola, Salki, Chikli, Chara and Deonai. There are four Municipal Corporation in Nilphamari district. Area of these Municipalities are Nilphamari 42.70 SqKm(27.50 SqKm Present, 15.20 SqKm Ongoing), Saidpur-34.42 SqKm, Jaldhaka-28.22 SqKm and Domar-9.421 SqKm. There are 60(sixty) Unions, 370 Moujas and 378 Village in Nilphamari district. Nilphamari district also show in figure 3.1 a map of kishoreganj upazilla also show in figure 3.2 Because specially I conducted my research on those above Kishoreganj upazilla under Nilphamari Distriict. Recently those above areas are rich in fisheries resources and so I conducted my research in this area.

3.1 A Map of Nilphamari District

Figure: 3.1 A map of Nilphamari District

3.2 A Map of Kishorganj Upazilla

Figure: 3.2 A map of Kishorganj Upazilla

3.2 Population and Sampling of The Study

The fish farmers of Garagram and Magura union of Kishorganj Upazila under Nilphamari District were the population of the study. However, representative sample from the population were taken for collection of data following random sampling technique. A purposive 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 Garagram and 269 were from Magura 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 tunions as the sample by random sampling method. Thus, the total sample size stood at 101. Moreover, a reserved list of 10 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 upazilla	**Selected union**	**Population**	**Sample size**	**Reserve list**
Kishorganj	Garagram	235	47	5
	Magura	269	54	5
Total		504	101	10

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 review 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 8 independent variables and one dependent variable. The independent variables were: age, education, family size, annual family income, experience in fish farming, training exposure, aquaculture extension media contact and spend time in fish farm. The dependent variable of this study was the safe fish feed awareness by the fish farmers' of Kishorganj Upazila under Nilphamari District'. The methods and procedures in measuring the variables of this study are presented below:

3.4.1 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

3.4.2 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

3.4.3 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)

3.4.4 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.

3.4.5 Experience in fish farming

Experience means maturity of any content of work. In fish farming experience measured by farmers' dexterousness about farming. Experience measured by years the more experience in fish farming the more awareness gain by farmers. A unit of 1 is used for 1 year experience .

3.4.6 Training exposure

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

3.4.7 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 7 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 4, 3, 2, 1 and 0 respectively. Thus, extension contact in fish farming score of a respondent could range from 0 to 28 where 0 indicated no extension contact and 18 indicated highly extension contact in fish farming.

3.4.8 Time spend in fish farm

A farmer daily how much work for frming purpose is known as time spend in fish farming. Mostly farmer spend 1 to 8 hrs in his farm. A unit of score 1 is used for spending 1 hr in his fish farm.

3.5 Measurement of Dependent variable

Farmers' awareness towards safe feed was the focus variables of the study. Awareness in fish farming was measured on the basis of extent of awareness by the fish farmers on 11 selected items. Each farmer was asked to indicate his nature of awareness in fish farming with four alternative responses like High, moderate, low and not at all aware basis and score was assigned as 3, 2, 1 and

0 respectively. Thus, fish feed awareness in fish farming score of a respondent could range from 0 to 33 where 0 indicated not aware and 33 indicated highest fish feed awareness.

3.6 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.

3.6.1 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 8 selected characteristics (age, education, family size, annual family income, experience in fish farming, training exposure, extension media contact and spending time at fish farm.) of the farmers has significant contributing factor with awareness faced by the fish farmers'.

3.6.2 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 8 selected characteristics (age, education, family size, annual family income, experience in fish farming, training exposure, extension media contact, spend time at fish farm.) of the farmers has no significant contributing factor with awareness faced by the fish farmers.

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 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.

3.7.2 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.

3.7.3 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. The 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.

3.8 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. Pearson product moment analysis was done to explore the relationship between the selected characteristics of the farmers with the focus 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 three 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 awareness by the fish farmers'. Relationship between the selected characteristics of the fish farmers' and their safe fish feed awareness has been discussed in the third sub-section.

4.1 Selected Characteristics of fish farmers

Eight characteristics of the farmers were selected to find out their contribution with awareness by the fish farmers'. The selected characteristics included their age, education, family size, annual family income, experience in fish farm, training exposure, aquaculture extension media contact, time spend in fish farm. 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)

	N	Minimum	Maximum	Mean	Std. Deviation
Age	101	25	63	44.73	8.907
Education	101	0	16	7.36	4.955
Family Size	101	3	11	6.83	1.619
Income	101	210000	1500000	637178.2178	253750.2865
Experience	101	3	17	8.2871	3.00778
Training	101	0	15	4.87	4.861
Mediacontact	101	3	16	9.9901	2.81601
Timespend	101	2	8	5.3267	1.25785
Awareness	101	12	24	17.5446	2.55548

4.1.1 Age

The age of the farmers has been varied from 25 to 63 years with a mean and standard deviation of 44.73 and 8.907 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 40	34	33.7		
Middle aged	41-50	34	33.6	44.73	8.907
Old aged	51-70	33	32.7		
Total		101	100		

The highest proportion (33.7 percent) of the fish farmers were young aged compared to 33.6 percent of them being middle aged and only 32.7 percent old aged. Data also indicates that the

young and middle-aged category constitute almost 67.3 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 7.36 and 4.955. 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)**	**Fish Farmers'**		**Mean**	**SD**
		Number	**Percent**		
Can't read and write	0	8	7.9		
Can't sign only	0.5	11	12.9		
Primary education	1-5	20	19.8	7.36	4.955
Secondary education	6-10	36	36.6		
Above secondary	>10	23	22.8		
Total		101	100		

Table 4.3 shows that farmers in the secondary education category have the highest proportion (36.6 percent), followed by above secondary education (23.76 percent) and primary education category (19.8 percent). On the other hand, can sign only (12.9 percent) and 7.9 percent of respondents can't read and write.

4.1.3 Family size

Mean and standard deviation of fish farmers' family size score was 6.83 and 1.619. 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)	Fish farmers'		Mean	SD
		Number	Percent		
Small family	(members up to4)	20	21.5		
Medium family	(5 to 8 members)	62	61.7	6.83	1.619
Large family	(above 8 members)	19	18.8		
Total		101	100		

Table 4.4 indicates that the medium size family constitute the highest proportion (61.70 percent) followed by the small size family (21.5 percent). Only 18.8 percent farmers had large family size. Thus, about (83.2 percent) of the farmers had small to medium family.

4.1.4 Annual family income

Annual family income of the farmers' ranged from Taka 210000 to 1500000, the mean being 637178.2178 and standard deviation 253750.2865. On the basis of their annual income scores, the farmers were divided into three categories: "low income" (1 lakh-3 lakh), "medium income" (4 lakh-6 lakh) and "high income" (7 lakh-15 lakh). The distribution of the farmers according to their annual family income is shown in Table 4.5.

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

Categories according to their annual family income(lakh tk)	Fish farmer'		Mean	SD
	Number	Percent		
Low Income(1-3)	14	13.9		
Medium Income(4-6)	52	51.4	637178.2178	253750.2865.
High Income(7-15)	35	34.7		
Total	101	100		

The majority (51.4 percent) of the fish farmers had medium income compared to 13.9 percent of them having low income and 34.7 percent high income. Thus, the vast majority (86.1 percent) of the farmers had medium to high income.

4.1.5 Experience in carp fish farming

Mean and standard deviation of fish farmers' experience in fish farming score was 8.2871 and 3.007. According to experience in fish farming, the respondent farmers were classified into three categories as shown in Table 4.6.

4.6 Distribution of fish farmers' according to their experience

Category	Basis of categorization(experience)	Fish farmers'		Mean	SD
		Number	Percent		
Low experience	0-7	45	47.5		
Medium experience	8-11	33	32.7	8.2871	3.007
High experience	12-15	23	19.8		
Total		101	100		

There are three sub category in experience generally (0-7) years based on low experience,(8-11 years) based on medium experience and (12-15) years has high experience. Majority of the farmers' 47.5 percent have low experience, 32.7 have medium experience and 19.8 percent have high experience.

4.1.6 Training obtain by fish farmers'

Mean and standard deviation of fish farmers' training in fish farming score was 4.87 and 4.861. According to training exposure in fish farming, the respondent farmers were classified into three categories as shown in Table 4.7.

4.7 Training exposure to fish farmers'

Category	Basis of categorization(training)	Fish farmers'		Mean	SD
		Number	Percent		
No trained	0 days	44	43.6		
Medium trained	1-7 days	29	28.7	4.87	4.861
Highly trained	8-15 days	28	27.7		
Total		101	100		

There are 3 sub category on training exposure to fish farmers majority of the farmers' have no training obtained 43.6 percent, medium training based farmers' has 28.7 percent and 27.7 percent have highly trained.

4.1.7 Extension media contact of fish farmers'

The observed extension contact scores of the fish farmers' ranged from 3 to 20 against the possible range from 0 to 28, the mean and standard deviation were 9.99 and 2.81 respectively. According to this score, the farmers were classified into three categories: "low extension contact" (3 to 7), "medium extension contact" (8-10) and "high extension contact" (11- 20). The distribution of the farmers according to their extension contact is shown in Table 4.8.

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

Categories according to extension contact (scores)	**Fish farmers'**		**Mean**	**SD**
	Numbers	**Percent**		
Low extension contact (3 to 7)	19	18.8		
Medium extension contact (8-10)	39	38.6	9.99	2.81
High extension contact (11-20)	43	42.6		
Total	101	100		

A proportion of 42.6 percent of the farmers had high extension contact compared to 38.6 percent of them having medium extension contact. Almost 18.8 percent of the farmers had low contact. Thus, overwhelming majority (81.2 percent) of the farmers had medium to high extension contact.

4.1.8 Time spend in fish farm by farmers

Mean and standard deviation of fish farmers' training in fish farming score was 5.32 and 1.25. According to time spend in fish farming, the respondent farmers were classified into three categories as shown in Table 4.9.

4.9 Distribution of the fish farmers' according to their time spending

Category	**Categories according to time spend (scores)**	**Fish farmers'**		**Mean**	**SD**
		Number	**Percent**		
Short time spend	1-4	31	30.7		
Medium time spend	5-6	50	49.5	5.32	1.25
High time spend	7-10	20	19.8		
Total		101	100		

A proportion of 49.5 percent of the farmers had medium time spend compared to 30.7 percent of them having shortly time spend. Almost 19.8 percent of the farmers had high time spend. Thus, overwhelming majority (80.2 percent) of the farmers had short to medium extension contact.

4.1.9 Awareness by the farmers' on feed in carp fish farming

Awareness obtained by the fish farmers' score ranged from 7 to 26 against the possible score of 0-33 with a mean of 17.54 and standard deviation of 2.56. Based on the awareness scores, the farmers were classified into three categories: "less aware" (up to 15), "moderate aware" (16-19) and "highly aware" (20-26). The distribution of the fish farmers' according to their awareness is presented in Table 4.10.

4.10 Distribution of fish farmers' according to their obtaining awareness

Category	Categories according to awareness (scores)	Fish farmers'		Mean	SD
		Number	Percent		
Less aware	7-15	21	20.8		
Moderate aware	16-19	45	44.5	17.54	2.54
Highly aware	20-26	35	34.7		
Total		101	100		

About 44.5 percent of the farmers had moderate awareness compared to 34.7 percent of them having highly aware and 20.8 percent having less awareness. Thus, the vast majority (78.2 percent) of the farmers had moderate to highly awareness.

4.2 Relationship between the selected characteristics of the fish farmers' and their awareness obtain.

The purpose of this section is to explore the relationship of each of the (8) selected characteristics of the fish farmers with their awareness. The characteristics were age, education, family size, annual family income, experience in fish farming, training exposure, extension media contact and time spend in farm. Awareness by the fish farmers was 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 awareness. 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 4.11.

Table 4.11 Co-efficient of correlation showing relationship between each of the selected characteristics of the fish farmers with their awareness (n=101)

Dependent variable	Independent variable	Correlation co-efficient values "r"	Tabulated value of "r" with 99 df	
Awareness by the fish Farmers'	Age	.167	**At 0.05 level**	**At 0.01 level**
	Education	.264**	0.175	0.228
	Family size	-0.055		
	Annual family income	.354**		
	Experience	.497**		
	Training	.488**		
	Media contact	.555**		
	Time spend	.411**		

*Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.2.1 Relationship between education and safe fish feed awareness by the fish farmers'

Relationship between education of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between education of the farmers and their awareness in safe fish feed". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.264**) as shown in Table 4.11. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.264**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that education level of the farmers had significant positive relationship with their awareness. This meant that the farmers having more education were likely to have more awareness.

4.2.2 Relationship between annual income and safe fish feed awareness by the fish farmers'

Relationship between income of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between income of the farmers and their awareness in safe fish feed". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.354**) as shown in Table 4.11. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.354**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that income of the farmers had significant positive relationship with their awareness. This meant that the farmers having more awareness were likely to have more income.

4.2.3 Relationship between experience in fish farming and safe fish feed awareness by the fish farmers'

Relationship between experience in carp fish farming of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between experience of the farmers' and their awareness in safe fish feed". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.497**) as shown in Table 4.11. The

following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.497**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that experience of the farmers had significant positive relationship with their awareness. This meant that the farmers' having more experiences were likely to have more awareness.

4.2.4 Relationship between training and safe fish feed awareness by the fish farmers'

Relationship between training of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between training of the farmers' and their awareness in safe fish feed". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.488**) as shown in Table 4.11. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.488**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that training of the farmers had significant positive relationship with their awareness. This meant that the farmers' having more training were likely to have more awareness.

4.2.5 Relationship between extention media contact and safe fish feed awareness by the fish farmers'

Relationship between media contact of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between media contact of the farmers' and their awareness in fish culture". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.555**) as shown in Table 4.11. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.555**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that extension media contact of the farmers had significant positive relationship with their awareness. This meant that the farmers' having more extension media contact were likely to have more awareness.

4.2.6 Relationship between time spend and safe fish feed awareness by the fish farmers'

Relationship between spending time of the fish farmers' and their awareness was determined by testing the null hypothesis: "There is significance relationship between spending time of the farmers and their awareness in safe fish feed". The computed value of the co-efficient of correlation (r) between the concerned two variables were (.411**) as shown in Table 4.11. The following observations were made regarding the relationship between the two variables under consideration.

• The computed value of 'r' (.411**) was greater than the tabulated value of 'r' (0.228) with 99 degrees of freedom at 0.01 level of probability.

• The null hypothesis was rejected.

• The co-efficient of correlation between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

The findings demonstrate that spending time of the farmers had significant positive relationship with their awareness. This meant that the farmers' having more spend time were likely to have more awareness.

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 (33.7 percent) of the fish farmers were young aged compared to 33.6 percent of them being middle aged and only 32.7 percent old aged.

Education

Farmers' in the secondary education category have the highest proportion (36.6 percent), followed by above secondary education (23.76 percent) and primary education category (19.8 percent). On the other hand, can sign only (12.9 percent) and 7.9 percent of respondents can't read and write.

Family Size

The medium size family constitute the highest proportion (61.70 percent) followed by the small size family (21.5 percent). Only 18.8 percent farmers had large family size. Thus, about (83.2 percent) of the farmers had small to medium family.

Annual family income

The majority (51.4 percent) of the fish farmers had medium income compared to 13.9 percent of them having low income and 34.7 percent high income.

Experience in fish farming

Majority of the farmers' 47.5 percent have low experience, 32.7 have medium experience and 19.8 percent have high experience.

Training Exposure

Majority of the farmers' have no training obtained 43.6 percent, medium training based farmer has 28.7 percent and 27.7 percent have highly trained.

Extension media contact

A proportion of 42.6 percent of the farmers had high extension contact compared to 38.6 percent of them having medium extension contact. Almost 18.8 percent of the farmers had low contact. Thus, overwhelming majority (81.2 percent) of the farmers had medium to high extension contact.

Time spend

A proportion of 49.5 percent of the farmers had medium time spend compared to 30.7 percent of them having shortly time spend. Almost 19.8 percent of the farmers had high time spend. Thus, overwhelming majority (80.2 percent) of the farmers had short to medium extension contact.

5.1.2 Farmers' Safe fish feed Awareness towards safe feed

About 44.5 percent of the farmers had moderate awareness compared to 34.7 percent of them having highly aware and 20.8 percent having less awareness. Thus, the vast majority (78.2 percent) of the farmers had moderate to highly awareness.

5.1.3 Relationship between selected characteristics and awareness by the fish farmers'

Farmer's education, Annual income from pond fish farming and off farming, experience, extension media contact, Training exposure and time spend in farm had significant positive relationship with the awareness by the fish farmers. Farmer's Age, Family size had no significant relationship with the awareness by the fish farmers.

5.2 Conclusions

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

- An overwhelming majority (65.3 percent) of the farmers had low to moderate awareness towards safe feed for carp fish culture. Therefore, still there is a scope to increase farmers awareness level towards safe feed culture through taking various steps.

- Farmer's education, annual income from pond fish farming and off farming, experience, extension media contact, training exposure and time spend in fish farm had significant positive relationship with the awareness by the fish farmers. The higher these factors the higher the farmers' awareness towards safe feed in carp cultivation. Therefore, these factors may help in policy formation towards increasing farmers' safe feed awareness.

5.3 Recommendation

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

5.3.1 Recommendation for policy implication

- Massive and relevant training programs should be conducted for fish farmers to upgrade their knowledge towards safe feed. Department of Fisheries (DoF) and Non-Government Organizations (NGOs) should be involved in the conduction of training programs for the fish farmers.

- The government and non-government extension agent should aware the farmers' more with less annual income and less time spending in fish farm towards feed safety.

- The DoF and other relevant media should broadcast more program and reach to the farmers about the harmful impact of fish feed on human health.

- Farmers' having long experience in fish cultivation were more aware then the farmers' having less experience. It is therefore, recommend that the extension agent should contact more with the farmers' having less experience or newly involved in fishing to aware about safe feed.

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.

- The present study was conducted in Kishorganj upazila under Nilphamari district. It is recommended that similar studies should be conducted in other parts of Bangladesh.

- Relationships of eight characteristics of the fish farmers with their awareness have been investigated in this study. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers with their awareness.

- ❖ It is difficult to explore all the indicator that responsible for increase awareness by the fish farmers. Measurement of awareness 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, had no significant relationship with their awareness. In this connection, further verification is necessary.

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THE INTERVIEW SCHEDULE

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University Dhaka-1207

An Interview Schedule for the Study Entitled

Farmers' Awareness on Safe Feed For Cultivation of Carp Fish

Serial No:……

Name of the respondent:…….

Village:…… Union: .....

Upazila:……..District:……..

Mobile No:……..

(Please answer the following questions put tick wherever necessary)

1. **Age:** How old are you? ……years

2. **Education:** Please mention your educational status.

   (a) Can't read or write---

   (b) Can sign only----------

   (c) Read up to class -------

   (d) Others (specify).....…

3. **Family size: Please mention the members of your family members (including yourself)**

   A. Male…..…..numbers

   B. Female……..numbers

   C. Total A+B=.....…….

4.Annual income: Please mention your fisheries income of last year

Income from fisheries

SL No.	Source of Income	Total price (Tk)
Fisheries Source		
1	Fish culture	
2	Hatchery	
3	Nursery	

Total (1+2+3)

Off farm annual family income

Sl No	Source of Income	Amount
1	Livestock	
2	Day labour	
3	Other business	

Total(1+2+3)

5.Experience in fish culture: How many years have you been involved in carp fish culture?

..... …..year(s).

6.Professional Training Exposure: Have you received any training related to carp fish culture?

Yes / No

If yes, please mention the name the following ones:

SL. No.	Name of the training course	Name of the organization	Days
01			
02			
03			

7.Agricultural Extension Contact: Please indicate the nature of your contact with the following information media.

SL. No	Media of Sources	Nature of visit				
		Regularly	**Often**	**Occasionally**	**Rarely**	**Not at all**
1.	Progressive farmers/Neighbors	More than 8 times/ month	5-6 times / month	3-4 times / month	1-2 times / month	
2.	Input dealers	More than 4 times/ month	3 times / month	2 times / month	1 time /month	
3.	NGO workers	More than 5 times /month	4-5 times /month	2-3 times/ month	1 time /month	
4.	Upazila fisheries officer	More than 6 times/year	5-6times/ year	3-4 times/ year	1-2 time/ year	
5.	Staff officer	More than 5 times /month	4-5 times/ year	2-3 times/ year	1 time/ year	
6.	Listening feed awareness programme in Radio	More than 5 times /month	4-5 times/ month	2-3 times/ month	1 time/ month	
7.	Watching fish feed awareness programmed in TV	More than 5 times / month	4-5 times/ month	2-3 times/ month	1 time/ month	

8. Time spend in fish farms …….hr/day

9.Awareness on Safe Feed: Awareness on safe feed perceived by you in carp fish.

Sl. No.	Item	Extent of awareness			
		High Awareness (3)	Moderate Awareness (2)	Low Awareness (1)	Not at all (0)
1.	Safe feed increase productivity				
2.	Unhygienic feed decreases the taste of fish				
3.	Unhygienic feed decreases the quality of fish				
4.	Growth patterns of fish vary depends on feed quality				
5.	Waste feed polluted the waterbody				
6.	Unhygienic feed decreases productivity				
7.	Use of safe feed increases the marketing demand				
8.	Safe feed increases nutritional safety				
9.	One should not rely fully on the retailer about quality of feed				
10.	Consumer may motivate to stop receive unhygienic feed using fish				
11.	Unhygenic feed not only harmful for human health but also environment				

Thanks for your kind cooperation .

Dated:……. (Signature of interviewer)