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Fisheries extension in Bangladesh and local extension agent for fisheries: A micro level assessment of farmers' Attitude

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Abstract
The present study was aimed to review the fisheries extension services in Bangladesh as well to assess fish farmers' attitude towards extension services provided by the Local Extension Agent for Fisheries (from hereafter LEAF). Thus, both primary and secondary data were used to furnish this study. Primary data were obtained from 72 randomly selected fish farmers from Akua and Dapunia unions of Mymensingh *Sadar* Sub-district of Mymensingh district by using structured interview schedule. Findings of the study shows that the fisheries extension services is still weaker in the country compared to crop and livestock extension services. It is also evident that 61.1 percent of the fish farmers had moderately favorable attitude towards extension services provided by LEAF, while 26.39 percent had slightly favorable attitude. Conversely, 12.5 percent had highly favorable attitude towards extension services provided by LEAF. Correlation analysis indicates that the pond size and fish farming experience had significant and negative relationships. While extension media contact, training exposure on fish farming and innovativeness had significant positive relationships with their attitude towards extension services provided by LEAF. The study explored that there are still few strong problems like "LEAF has shallow knowledge on subject matter", "Poor motivational capacity" and "Cannot provide solutions of all problems". Finally, it could be concluded that if it is possible to employ more numbers of LEAF with an initiative to remove their deficiencies through intensive training they might contribute efficiently and play the key role in fisheries extension of Bangladesh.

Keywords: Extension service, Fisheries, LEAF, attitude, farmers and Bangladesh

1. Introduction
Bangladesh is a small riverine country in South Asia. The country is crisscrossed with hundreds of rivers. The climate of Bangladesh is unique for aquaculture and fisheries resources management [1]. Bangladesh is considered one of the most suitable regions for fisheries in the world, with the world's largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India [2]. Fisheries and aquatic resources are economically, ecologically, culturally and aesthetically important to the nation. In Bangladesh fisheries is one of the major sub-sectors of agriculture, which plays a dominant role in nutrition, employment, earning foreign currency and other areas of economy and is second only to agriculture in the overall economy of the country [3].

It is very rich in water resources and in fact the country is crisscrossed by various types of water bodies such as rivers, lake, hoar, boar, estuaries, which all together offers tremendous opportunities for fisheries development. A network of rivers of which the Padma, the Jamuna, the Brahmaputra and the Meghna are important prevails in Bangladesh. These rivers and their branches numbering about 290 with a total length about 24,140 km have covered the land [4]. All these water bodies have often immense scope and potentiality for augmenting fish production and contribute in livelihood support of the people living around these water bodies [1]. Bangladesh produced 3.26 million tons of fish during 2011-12 from inland and marine water bodies and aquaculture contributed more than 50 percent of the total production. Fisheries sector accounts for 4.4 percent of Bangladesh GDP, 22.8 percent of agriculture sector and 2.5 percent of total export earnings [5].

Total pond area in Bangladesh is estimated 0.3 million ha of which 90.77 percent is cultured, 7.82 percent is cultivable and 1.42 percent is derelict [5]. Fisheries sector plays an important role in the national economy. In the year of 2011-2012 the total fish production was 2.3 million MT. In which 1.3 million MT was contributed from ponds and ditches [6]. The overseas fish trade is an important source of foreign currency earnings for the country and provides benefits at both the macro and microeconomic levels. Fish is the third largest contributor to Bangladesh's export earnings and is growing annually by 5-8 percent [1].

Bangladeshi people mostly depend on fish to meet their protein demand. Till early 1970s, there was an abundance of fish in the natural water bodies like floodplain, rivers, rivulets, *beels*, lakes, ditches and canals to well-satisfy the demand of fish of the country. Presently, however, capture fish production has declined to about 50 percent, with a negative trend of 1.24 percent per annum [3]. Despite the constant depletion of the natural water bodies for years, Bangladesh, globally, still holds one of the most diverse inland fisheries and the recent and rapid development of aquaculture sector has boosted Bangladesh to 5th in world aquaculture production [7].

1.1 Fisheries extension services in Bangladesh

Agricultural extension is the application of scientific research and new knowledge to agricultural practices through farmers' education. The field of 'extension' now encompasses a wider range of communication and learning activities organized for rural people by educators from different disciplines, including agriculture, agricultural marketing, health, and business studies. Agricultural extension (also known as agricultural advisory services) plays a crucial role in promoting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth [8].

The Department of Fisheries (DoF) is responsible for providing, inter alia, fisheries extension services in Bangladesh. Since the inauguration of the DoF, it has been continuing its role as a front line public sector extension organization for fisheries development in the country. After the inception of Bangladesh in 1971 the Central Fisheries Department of the was merged with the DoF of Bangladesh in April 1975. Later on in 1984 Central Marine Fisheries Department was merged with the DoF as a Marine Fisheries wing [9].

DoF belongs to the Ministry of Fisheries and Livestock (MoFL) of the Government of the People's Republic of Bangladesh. It is headed by a Director General (DG), who is assisted by four Directors (one reserve) and 2 Principal Scientific Officers (PSO) (equivalent to Director). There are 1553 technical officers of different stairs and supporting staff in the DoF. They deliver their services to attain the mission and vision of the DoF.

DoF is working with the subsequent mandates:

- To disseminate superior aquaculture technologies through training and demonstration and to extend extension advisory services to the major stakeholders.
- To augment fisheries assets through enacting conservation and management events.
- To support the administrative ministry to originate policies, acts etc.
- To impose quality control events and issuance of health credentials for exportable fish and fish foodstuffs.
- To carry out fisheries resources appraisal and estimation of stock to build up fisheries database for apposite planning.
- To aid collection for institutional loan for fish and shrimp farmers, fishers and fish traders and entrepreneurs.
- To facilitate unconventional income generating actions for rural poor and unemployed people towards poverty easing.
- To devise and execute development projects /programs towards sustainable utilization of fisheries resources to ensure food security; and
- To disseminate better aquaculture technologies through e-Extension service.

There are administrative set-ups at division, district and *Upazila* (sub-district) levels headed by Deputy Director, District Fisheries Officer and Senior/*Upazila* Fisheries Officer respectively. Besides these, there are three fish inspection and quality control stations under DoF. Furthermore DoF also comprises of Marine Fisheries Station, Fisheries Training Academy, Fisheries Training and Extension Centers, and Fish Hatcheries.

The DoF provides extension services through the revenue (permanent) set up as well as development (temporary) set up. The revenue set up consists of four Divisional Deputy Directors (DDs), 64 District Fisheries Officers (DFOs) and 492 *Upazila* Fisheries Officers (UFOs), 492 Assistant Fisheries Officers (AFOs) and 492 Field Assistants (FAs). UFOs are the entry level officers in the fisheries cadre service; the requirement for the post is a B.Sc. Fisheries (Honours). However, those promoted may have lower qualifications. The entry qualifications for the posts are respectively Higher Secondary Certificate (HSC) and Secondary School Certificate (SSC) with science, although some AFOs and FAs have higher qualifications. Nevertheless, *upazila* (sub-district) level is the practical level and extension personnel working at this level are directly responsible to provide extension services to the fish farmers, fishers and other associated stakeholders. *Upazila* office of DoF is lead by *Upazila* Fisheries Officer (UFO) or Senior *Upazila* Fisheries Officer (SUFO) and supported by the following staff:

- Fisheries Extension Officer- 01(Not in every sub-district)
- Assistant Fisheries Officer - 01
- Field Assistant -01

Fisheries Extension: describes all organized communication efforts by which DoF tries to bring about changes in the knowledge, attitudes, skills and behaviour of a client population (fish farmers, fishers and other stakeholders) in order to reach one or more objectives that have been established within the framework of an overall fisheries development policy in Bangladesh.

In this regards DoF usages varieties of extension communication approaches like individual contact, group contact and mass contact (electronic and print media).

Among the individual contact methods usually the following methods are usually used by the extension personnel of DoF.

Service to office callers: The fisheries officers at *upazila* (sub-district), district, division and national levels offer technical advice to the individual office callers.

Farm visits: The extension staff, on a fish farmer's specific request, visit his/her farm for any specific investigations and advice.

Mail service: Fish farmers may receive advice using mail service from the extension personnel of DoF.
However, as the number of extension personnel is relatively fewer in contrast to number of clientele so the extension personnel of DoF are mostly used group contact methods. The frequently used group contact methods are mentioned below.

Training and workshops: Training and workshops are frequently organized at *upazila* (sub-district) and district levels for the farmers. Training sessions are also organized at the DoF fish seed farms and training centers.

Informal meetings: Informal meetings are a common practice in establishing feedback between the fish farmers and the extension workers. Thus, the extension agents of DoF frequently organize informal meetings with the fish farmers, fishers, input dealers and other stakeholders.

Demonstrations: Demonstrations of new or improved culture or hatchery techniques are provided either in a suitably located private or Government-owned pond. In either case the demonstrations are open to any interested persons. In the case of private ponds, extension workers provide the pond owner with repeated training and advice. The pond owner is expected to extend the new knowledge and techniques to fellow farmers who, in turn, are expected to disseminate the knowledge to more farmers. Whenever and wherever this method has been organized properly, the new information has trickled down to a large number of farmers in a short time.
In order to meet the huge demand for information need of the fish farmers and fishers extension personnel of DoF also use mass media to provide their clientele efficient, effective and timely fisheries information. In this regard they use newspaper, radio, television, posters, etc. to disseminate basic information and simple technologies. They also us different print materials like pamphlets, booklets, manuals, bulletins, hand-outs, and other forms are prepared and distributed to the fish farmers time to time based on situation.
Due to higher demand for animal protein for the growing population of the country aquaculture is getting as a high priority development area in Bangladesh. Because of continuous deterioration of open water fisheries due to natural and man-induced changes in the fish habitats and fish populations, the Government has endeavored to increase fish production through aquaculture. Thus, besides the routine extension efforts, the DoF offers extension services through development projects like Fourth Fisheries Project, National Agricultural Technology Program - Phase I Project (NATP-1&2) etc.
All these projects were aimed to overall fisheries sector development in the country through developing capacity of the extension personnel as well as infrastructure development and strengthening institutional capacity. However, DoF always suffer a lot to implement its routine extension services as well as project activities due to shortage of insufficient number of personnel. Table 1 shows that the distribution of human resources in seven administrative divisions headed by Deputy Directors and 64 districts headed by District Fisheries Officers (DFO) followed by Senior *Upazila* Fisheries Officer (SUFO) or *Upazila* Fisheries Officer (UFO), Assistant Fisheries Officer (AFO) and Field Assistant (FA), Hatchery Managers and others.

Table 1: Structure of senior officials of the DoF of Bangladesh.

Division	Deputy Director	DFO	Assistant Director	SUFO	UFO	Hatchery Manager
Barisal	1	6	2	7	31	5
Chittagong	1	11	2	2	48	5
Dhaka	1	17	1	43	69	20
Khulna	1	10	5	29	-	8
Rajshahi	1	8	3	19	45	6
Rangpur	1	8	1	12	46	3
Sylhet	1	4	2	12	26	5
Total	7	64	16	124	265	52

Source: Department of Fisheries [5]

The officials of this structure are primarily responsible for inland aquaculture and inland capture fisheries [5].
I addition to DoF, NGOs (both national and international) play a vital role in aquaculture development in Bangladesh. Their main involvement relates to organizing and training the landless and asset less people in aquaculture, creating opportunities for the trained people to earn their livelihood through fish farming in Government owned water bodies, and organizing institutional credit for the target population [10].
Realizing the necessity of extension workers and this shortage at field level National Agricultural Technology Programme (NATP 1) project first introduced field level extension staff in the DoF. The designation of the extension agent is Local Extension Agent for Fisheries (from here and later in LEAF) [11].
A LEAF is a local progressive fish farmer. The main duty of LEAF is to act as bridge between local fish farmers and the *Upazila* Fisheries Office. *Upazila* Fisheries office trains the LEAFs as a trainer. A LEAF trains the ordinary fish farmers about quality fish farming in his community. He also works for water quality testing by using instrument provided by *Upazila* Fisheries Office. For providing such kind of services among the local people the LEAFs are paid a little amount of honorarium.
Usually, there was no manpower of DoF at union level in Bangladesh before introduction of NATP project. Thus, a progressive fish farmer/local leader has been selected among the local fish farmers who are involved with fish and fish seed business. Then the LEAFs are trained-up on extension approach and adequate technical knowledge on fish farming. They were equipped with a bicycle and kit-box for extension and advisory services. The LEAFs are allowed to take charges of small amount of remuneration from local fish farmers' for their services. Furthermore, they will be awarded 600 BDT (Bangladeshi currency) as a subsidy from the project. There is a FIAC (Farmers' Information & Advise Centre) centre at union level and there is a room for the LEAF where they work from 9 am to 5 pm from Sunday to Thursday except government holidays. They provide extension services and advices to the fish farmers who ask for suggestions or consultations. In case of critical issues they communicate with UFO and provide appropriate suggestions to the fish farmers.

Various types of training are provided to all the fish farmers as well as project field staff and others are involved in the NATP (National Agricultural Technology Programme) project. The major aim of the project is to improve fish productivity by providing intensive extension services to the fish farmers at grassroots level supported by LEAF, supervised credit, demonstration programs and training. However, the main features of the extension services of DoF under NATP project is focused on using the LEAF as a change agent.

1.2 Research problem

The role of agricultural extension in the development of agriculture sector throughout the world is not in doubt **[12]**. It has remained one of the prime movers in the development of agriculture and invariably in the rural development. Agricultural extension is, fundamentally, speeding up the diffusion and adoption of improved agricultural practices. The objective is to reduce the gap between research findings and their practical application in the field. The agricultural extension officer plays an important role in projecting innovations and ideas, but so too do the farmer and others in the community who disseminate information [13]. To accelerate this diffusion of information, it is necessary to determine what sources of information are used by a specific farming community. In the recent time freshwater aquaculture is getting popularity in Bangladesh which is comprised mainly of pond aquaculture, particularly the poly-culture of a variety of species. Fish farmers have been working in close cooperation with both the public and private sectors in the country. The public sector provides technologies while the private sector is investing and adopting technologies. A combination of provision of training knowledge and credit from both sectors has enabled both men and women to start fish culture. Fisheries Extension may be defined as the dissemination of the educational advances of institution to persons unable to take advantage of such in a normal manner. Fisheries extension brings to the fishermen, fish farmers, and fish processors that form of educational assistance best suited to their needs [14]. With the rapid expansion of aquaculture and inland capture fisheries activities, the organizational framework of DoF deserves more qualified extension human resources, particularly at the grass-root level offices [10]. However, unfortunately the number of extension agent at *upazila* fisheries offices are very few and they need to be equipped to support the private sector and NGOs but the government response in this regard is not sufficient. For example, only 55 percent of approved 634 second-class officers (mostly posted at *upazila* officers, who are key extension persons) of DOF have been appointed to date. Apart from human resources, other logistic support is also needed at the field offices [15].

As the largest agricultural extension organization in the country the Department of Agricultural Extension (DAE) is the largest organization and employs 14,092 field-level extension agents,1 with each responsible for 900-1200 farm families [16]. On the contrary, the DoF and Directorate of Livestock Services (DLS) have few field-level extension agents—usually only two to three at the *upazila* level (which includes 60,000 to 70,000 farms) and none at the union or block level [17]. However, for improving livelihoods of the fish farmers it is important to provide them timely information regarding fisheries technologies and market issues. The interpersonal communication done by the extension agents dominates the transfer of knowledge and information system to the fish farming society. Thus, for dissemination of technological knowledge and information about fish farming LEAFs are introduced as extension agent for fisheries extension at grassroots level under NATP project. However, what about the farmers' attitude towards LEAF and their services are not yet assessed by any researchers. Thus, the present study was undertaken with the following specific objectives:

- To determine and describe the selected characteristics of the fish farmers;
- To determine the farmers' attitude towards extension services provided by the LEAF;
- To explore the relationship between the selected characteristics of the fish farmers and their attitude towards extension services provided by LEAF; and
- To explore the problems faced by the fish farmers' in receiving extension services provided by LEAF.

2. Methodology

The study was conducted in Mymensingh *Sadar upazila* (sub-district) under Mymensingh district. Two unions of Mymensingh *Sadar* namely Akua and dapunia were selected purposively for the study. As these two unions have huge aquaculture enterprises compared to other areas. Additionally LEAFs also provide extension services in these areas. The map of Mymensingh district and *sadar upazila* of Mymensingh district showing the study area presented in Figure 1.

2.1 Population and sample of the study

All the fish farmers of the selected two unions were the population of the study. Empirical data for the study were collected from fish the farmers in the study area who received extension services from LEAF in maintaining his/her aquaculture enterprise. An updated list of all fish farmers who received extension services provided by LEAF were collected from the office of *Upazila* Fisheries Officer (UFO). There were 235 fish farmers who were engaged in fish farming actively and received extension services provided by LEAF. From this list 31 percent of the fish farmers were selected randomly as the sample of the study. Therefore, a total of 72 farmers were selected as the sample of the study. A reserve list containing 10 fish farmers were also selected from the two unions.

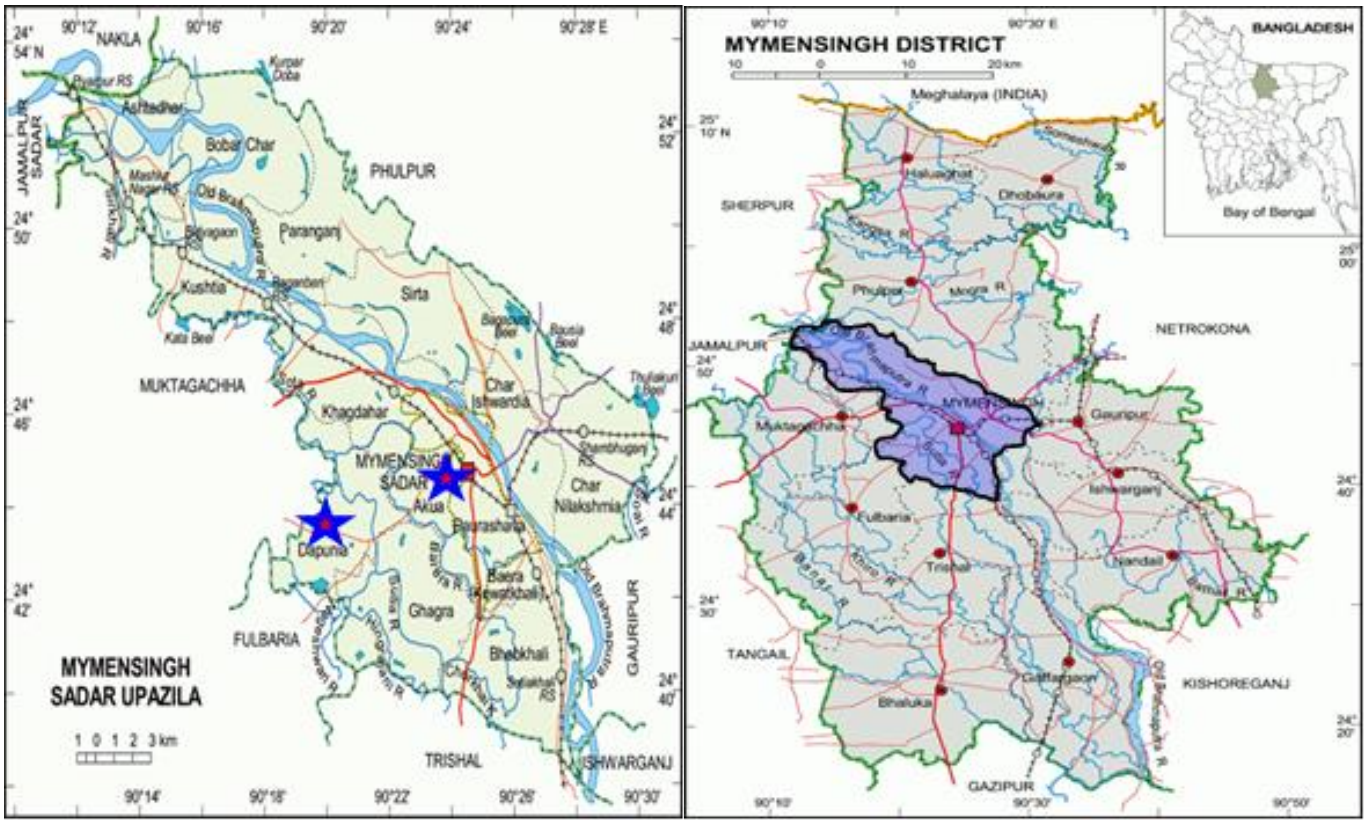

Fig 1: Map of Mymensingh district and Mymensingh *Sadar* sub-district showing the study area.

2.2 Research instrument of the study

A structured interview schedule was used as data gathering instrument. The interview schedule was carefully prepared considering the objectives of the study. The interview schedule contained both open and closed forms of questions. Considering the socio-economic characteristics of fish farmers, easy and direct questions were included in the schedule to obtain necessary information. The interview schedule was prepared in Bengali for clarity of understanding and it was pretested with ten fish farmers of the study area. On the basis of the results of pre-test, necessary corrections, alterations and modifications were made before finalizing the interview schedule. The interview schedule was then printed in its final form and was multiplied for collecting data from the respondents.

2.3 Data collection

Data were collected by the researchers from the selected fish farmers. The interviews were conducted with the respondents individually in their respective houses or farms. The researchers took all possible care to establish rapport with the respondents so that they would not feel any trouble while starting the interview. If the respondents felt any difficulty in understanding any question, the researcher took utmost care to explain and clarify the same properly. The researcher in collecting data faced no serious difficulty. Data were collected from 05 March to 27 March, 2015.

2.4 Measurement of variables

The selected characteristics of the fish farmers (i.e. age, educational qualification, household size, farm size, pond size, annual family income, training exposure on fish farming, fish farming experience, extension media contact, innovativeness and organizational participation) were treated as the independent variables of the study. The dependent variable of the study was farmers' attitude towards the extension services provided by LEAF. Measuring techniques of the independent variables of the study are shown in Table 3. Farmers' attitude towards extension service provided by LEAF was the dependent variable of the study. This variable was measured through a 5-point Likert type scale. Likert developed the principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of the extent to which they agree with them, and so tapping into the cognitive and affective components of attitudes [18]. The Likert Scale is a five (or seven) point scale which is used to allow the individual to express how much they agree or disagree with a particular statement [19]. Each of the five (or seven) responses would have a numerical value which would be used to measure the attitude under investigation [20]. However, there were sixteen statements (8 positive and 8 negative) on various aspects of extension services provided by LEAF were asked to the farmers. The positive and negative statements were arranged randomly in the schedule in order to achieve the real responses regarding attitude of the fish farmers towards LEAF and their services. There were five options to response against a statement, namely ‘strongly agree’, ‘agree’, ‘undecided’, ‘disagree’ and ‘strongly disagree’ with a corresponding score of 5, 4, 3, 2 and 1 respectively for the positive statements and the scoring was reverse for the negative statements. A respondent was asked to indicate his/her attitude regarding a statement by selecting the appropriate option. The attitude score of a respondent was computed by summing the scores for his responses to all the statements. Hence, scores of a respondent could range from 16 to 80; while 16 indicating highly unfavorable attitude and 80 highly favorable attitudes towards extension service provided by LEAF.

2.5 Statistical analysis

Collected data were coded, categorized and analyzed. For analysis of data SPSS 16v. Software was used. Both explanatory (i.e., mean, standard deviation, frequency, percentage and rank order) and inferential statistics (i.e., correlation analysis) were used wherever necessary. In correlation analysis, we estimate a sample correlation coefficient, more specifically the Pearson Product Moment correlation coefficient. The sample correlation coefficient, denoted r. Ranges between -1 and +1 and quantifies the direction and strength of the linear association between the two variables. The correlation between two variables can be positive (i.e., higher levels of one variable are associated with higher levels of the other) or negative (i.e., higher levels of one variable are associated with lower levels of the other). The sign of the correlation coefficient indicates the direction of the association. The magnitude of the correlation coefficient indicates the strength of the association [21].

The formula for the sample correlation coefficient is

Where, Cov (x,y) is the covariance of x and y defined as

$$\mathrm{Cov}(x,y) = \frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{n-1}$$

$$r = \frac{\mathrm{Cov}(x,y)}{\sqrt{s_x^2 * s_y^2}}$$

3. Results and Discussion

3.1 Selected characteristics of the fish farmers

Twelve selected characteristics (i.e., age, educational qualification, household size, farm size, pond size, annual family income, training exposure on fish farming, fish farming experience, extension media contact, innovativeness and organizational participation) were selected for the study. The composite findings of the selected characteristics of fish farmers are presented in Table 2 and have been discussed in subsequent sections. Data presented in Table 3 shows that the observed age of the respondent farmers ranged from 22 to 85 years. The mean age of the respondent farmers was 43.90 years with standard deviation of 6.33 years.

Table 2: Salient features of the selected characteristics of fish farmers.

Characteristics	Scoring System	Possible score	Observed score	Mean ± SD*
Age	Actual Years	Unknown	22-85	43.90 ± 6.33
Educational qualification	Years of schooling	Unknown	1-16	8.17 ± 2.44
Household size	Number	Unknown	3-10	6.51 ± 1.40
Farm size	Hectare	Unknown	0.28-3.06	1.11 ± 0.39
Pond size	Hectare	Unknown	0.12-2.02	0.69 ± 0.28
Fish farming experience	Number of years	Unknown	5-18	11.55 ± 4.00
Annual family income	'000' BDT*	Unknown	150-560	302.77 ± 138.76
Extension media contact	Scale score	0-33	13-25	21.97 ± 1.65
Training exposure on fish farming	Number of days	Unknown	0-3	4.74 ± 1.94
Innovativeness	Scale score	0-21	8-19	14.93 ± 2.39
Organizational participation	Scale score	0-12	1-9	1.61 ± 0.98

*BDT- Bangladeshi Taka (1 US$ = Approx. 80 BDT), *SD- Standard deviation.

The findings indicated that the highest proportion (83.3 percent) of the respondents in the study area was middle aged category, while 15.3 percent belonged to young and only 1.4 percent belonged to old aged category. It indicated that 98.6 percent of the respondents were young to middle-aged. Young and middle-aged farmers might have valuable opinions in receiving extension services from LEAF. The extension agent can make use of these views and opinions in designing their extension activities. Young people are generally receptive to new ideas and things. They would have a favorable attitude towards in receiving extension services if necessary steps are taken to disseminate new technologies/practices to them. Two studies also reported similar findings in their respective studies [22, 23].

The educational qualification score of the respondents ranged between 1 to 16 years of schooling and the average was 8.17 years of schooling with a standard deviation of 2.44. Figure 2 shows that on the basis of educational qualification scores obtained, the respondents were grouped into three (03) categories, such as primary education, secondary education and higher secondary education and above.

It is evident from Figure 2 that among the respondent fish farmers more than a quarter (26 percent) had primary education. While more than half (60 percent) had secondary level of education. On the other hand a significant portion (13.9 percent) of the fish farmers had higher secondary and above level education.

Findings indicated that majority of the respondents had secondary education and above. However, education has a vital role on farmers' attitude formation regarding new practice or extension services. On the contrary farmers having low level of education are more dependent on extension service provided by LEAF for technological information about fish farming. Two other studies also showed similar findings in their respective studies [24, 25].

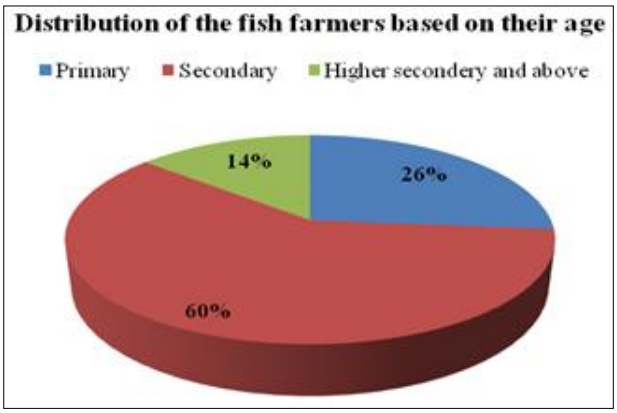

Fig 2: Distribution of the fish farmers' based on their educational qualification

Data furnished in Table 2 shows that the household size of the respondent fish farmers ranged between 3 to 10 members. The average household size of them was 6.51 members with a standard deviation of 1.40. It means that, the majority of the

fish farmers had medium size family (6.51 members) which is quite higher than that of the national average of 4.9[26]. Data presented in Table 3 indicates that the farm size of the respondent fish farmers varied from 0.28 to 3.06 ha. The average farm size was 1.11 ha with a standard deviation of 0.39 ha. the area under fish farming ranged from 0.12 to 2.02 ha. While, the average pond size of the respondent farmers was 0.69 ha with standard deviation of 0.28 ha. The fish farmers were classified based on their farm size and pond size into the following four (04) categories in accordance with the categorization of Department of Agricultural Extension[27]: 'marginal farm' (0.021-0.2 ha), 'small farm' (up to 1.0 ha), 'medium farm' (1.01 to 3.0 ha), and 'large farm' (above 3.0). The distribution of the fish farmers according to their farm size is shown in Table 3. Table 3 shows that about two-thirds (66.7 percent) of the respondents possessed medium farms, while a little less than one-third (31.9 percent) of them having small farms and only 1.4 percent having large farms.

Table 3: Distribution of the fish farmers based on their farm size and pod size.

Characteristics	Categories	Respondents (n=72)	
		Frequency	Percentage
Farm Size	Marginal (0.021-0.2 ha)	0	0
	Small (0.21-0.99 ha)	23	31.9
	Medium (1.0-3.0 ha)	48	66.7
	Large (>3.0 ha)	1	1.4
Pond Size	Marginal size pond (0.021-0.2 ha)	3	4.2
	Small size pond (0.21-1.0 ha)	59	81.9
	Medium size pond (1.01-3.0 ha)	10	13.9
	Large size pond (>3.0 ha)	0	0.0

However, there were no marginal farm holders among the respondent fish farmers. Thus, the overwhelming majority (98.6 percent) of the fish farmers were the owners of small to medium farms. Two other studies also reported similar findings in their respective studies [28, 29].

Data presented in Table 3 also revealed that the highest majority (81.9 percent) of the fish farmers had small size pond while 13.9 percent had medium size pond. However, unlike farm size a small portion (4.2 percent) of the respondents had marginal size pond. On the contrary, it is noted from Table 3 that in the study area there were none having the large size pond among the respondent fish farmers.

Data presented in Table 2 shows that the fish farming experience score of the respondents ranged from 5 to 18 years with a mean of 11.55 years and standard deviation of 4.00. So, it is evident from Table 3 that the respondents had medium level experience in fish farming.

It is reported from Table 2 that the annual family income of the fish farmers ranged from 150 to 560 thousand BDT. The mean was Tk. 302.77 thousand and standard deviation Tk. 138.76 thousand BDT.

Extension media contact play an important role in meeting the information need of the fish farmers to manage their fish farming effectively. The computed extension media contact scores of the respondents ranged from 13 to 25 against the possible range of 0 to 33 (Table 2). It is also exhibited in Table 2 that the mean extension media contact score of the respondent fish farmers were 21.97 with standard deviation of 1.65. Figure 3 demonstrates that on the basis of extension media contact scores, the respondent fish farmers were classified into three categories: 'low media contact' (up to 11), 'medium contact' (12 to 22) and 'high contact' (above 22).

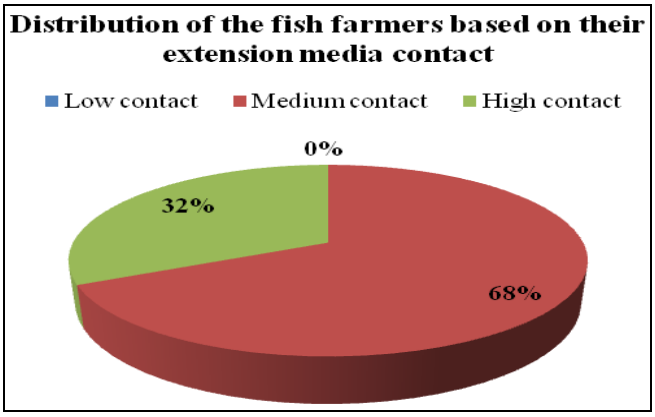

Fig 3: Distribution of the fish farmers based on their extension media contact.

Data presented in Figure 3 indicates that more than half (58 percent) of the respondents had medium extension media contact while rest 42 percent had high extension media contact. It is also reported that nobody had low extension media contact among the respondent fish farmers.

However, it was prominent from Table 3 that the training exposure on fish farming score of the respondents ranged from 0 to 8 days with the average score of 4.74 days and standard deviation of 1.94.

Figure 4 shows that based on the training score, the respondents were classified into four categories: 'no training' (0 day), 'short duration training' (1-3 days), 'medium duration training' (4-7 days) and 'long duration training' (above 7 days). Data presented in Table 4.1 show that about half of the respondents (52 percent) had medium duration training, 44 percent had short duration training and only 3 percent of the respondents had long duration training. However, one percent of the fish farmers had never received any training on fish farming yet. Farmers of that region took training from both GO and NGOs. Two studies also shown similar findings in

their respective studies [22, 30].

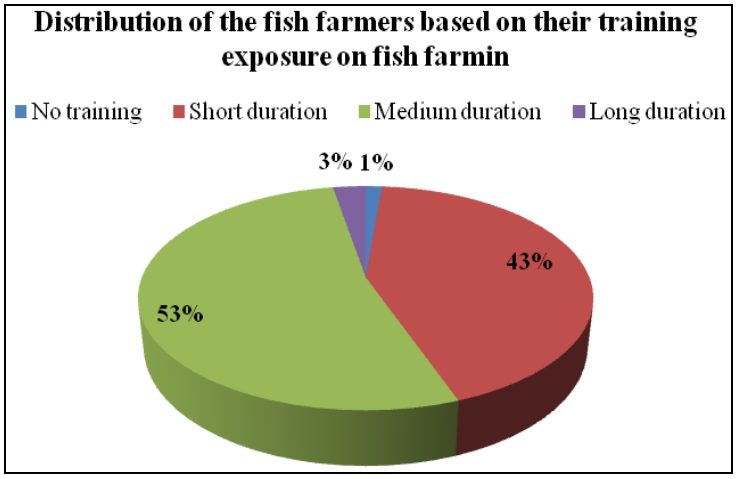

Fig 4: Distribution of the fish farmers based on their training exposure on fish farming.

It shows in Table 2 that the observed innovativeness score of the respondent fish farmers ranged from 8 to 19 in against a possible score of 0-21. Table 3 also demonstrates that the mean score of 14.93 and standard deviation of 2.39. On the other hand, the observed organizational participation score of the respondents ranged from 1-9 in against a possible score ranged between 0 to 12 with a mean score of 1.61 and standard deviation of 5.64.

3.2 Farmers' attitude towards extension service provided by LEAF

Farmers' attitude towards extension service provided by LEAF was the main focus of the study. Attitude scores of the fish farmers varied from 18 to 55 against the possible range of 16 to 80, with a mean of 37.79 and standard deviation 8.86. Based on the observed attitude scores, the respondents were classified into three categories as shown in Table 4.

Table 4: Distribution of the fish farmers according to their attitude towards extension service provided by LEAF.

Categories	Frequency	Percent	Mean ± SD
Slightly favorable attitude (up to 37)	19	26.39	37.79 ± 8.86
Moderately favorable attitude (38-59)	44	61.11	
Highly favorable attitude (>59)	9	12.5	
Total	72	100.0	

Table 4 shows that the highest majority (87.5 percent) of respondents had slightly favourbale to moderately favourbale attitude towards extension services provided by the LEAF. It also shows that more than half (61 percent) respondent fish farmers had moderately favourable attitude towards the extension services provided by the LEAF. However, the rest (12.5 percent) of the respondents had highly favourable attitude towards the extension services provided by the LEAF. This is may be due to the reason that the LEAF started to provide extension services in the recent years and they are only few in numbers so cannot cover all fish farmers of his territory. Moreover, they do not have sufficient technical background so the fish farmers has relatively unfavourable attitude towards services provided by the LEAF.

However, in addition to assess the overall attitude of the fish farmers towards extension services provided by the LEAF their responses against each of the statements were also recorded and presented in Table 5. To have an understanding about the statement-wise attitude of the fish farmers for each of the statement it was computed the mean values.

Table 5: Fish farmers' statement-wise attitude of towards extension service provided by LEAF.

S. No.	Statements	No. of respondents (n=72)					Average Score (1-5)
		SA	A	UD	D	SD	
1	LEAF serve as a link between DOF and fish farmers (+)	39(54)	24(33)	9(13)	0(0)	0(0)	3.42
2	Extension services of LEAF are not credible for fish farming (-)	0(0)	28(39)	36(50)	8(11)	0(0)	2.39
3	Information provided by LEAF are reliable, practical and useful for solving farmers' problem (+)	32(44)	35(49)	5(7)	0(0)	0(0)	3.38
4	Extension services provided by LEAF do not help in improving farmers' income (-)	9(13)	29(40)	34(47)	0(0)	0(0)	2.95
5	Only resource-rich farmers can get the benefit of extension services provided by LEAF (-)	0(0)	2(3)	9(13)	26(36)	35(48)	3.31
6	Extension services provided by LEAF assist the farmers in planning and decision making in his fish culture activities (+)	35(48)	27(38)	4(6)	6(8)	0(0)	3.26
7	LEAFs do not have sufficient technical quality to provide effective extension service (-)	32(44)	28(39)	5(7)	7(10)	0(0)	3.18
8	Existing infrastructure and facilities of extension services provided by LEAF are not enough to meet the information needs of the fish farmers (-)	32(44)	25(35)	10(14)	5(7)	0(0)	2.17

9	LEAFs cannot demonstrate improved fisheries technologies to farmers (-)	7(10)	34(47)	27(37)	4(6)	0(0)	2.16
10	LEAF are capable enough to disseminate aquaculture technologies (+)	25(35)	35(48)	8(11)	4(6)	0(0)	3.12
11	Extension services provided by LEAF seem to be the same from year to year (-)	0(0)	4(6)	8(11)	36(50)	24(33)	3.11
12	LEAF can communicate frequently as they are from the same community (+)	30(41)	31(43)	7(10)	4(6)	0(0)	3.21
13	LEAF can use different extension teaching methods very effectively (+)	29(40)	34(47)	4(6)	5(7)	0(0)	3.20
14	Extension services provided by LEAF ca not provide all possible solutions to the fish farmers' problems (-)	7(10)	20(28)	31(43)	6(8)	8(11)	2.83
15	Extension services provided by LEAF provide all possible solutions to the fish farmers' problems (+)	29(40)	19(26)	8(11)	5(7)	11(16)	2.69
16	LEAFs can motivate farmers to adopt new fisheries technology (+)	32(44)	13(18)	6(8)	7(10)	14(20)	2.58

Notes: SA: Strongly Agreed; A: Agreed; UD: Undecided; D: Disagreed; SD: Strongly Disagreed
Number in the parentheses indicate percentage

It is evident from the Table 5 that 'LEAF serve as a link between DOF and fish farmers has ranked first as the attitude score of fish farmers was the highest (3.42). The findings may be due to that for fisheries extension there is no other extension agents working at the field level and as the fish farmers are getting a little services from LEAF for their fish farming, so to them it has value. Thus, they are treating this services as "something is better than nothing". 'Information provided by LEAF are reliable, practical and useful for solving farmers' problem" ranked second (3.38). This may be due to that the information provided by the LEAF were seemed as useful to the fish farmers. However, results presented in Table 5 shows that "Extension services provided by LEAF assist the farmers in planning and decision making in his fish culture activities" ranked 3rd position (average score 3.26). This results may be due to that information provided by the LEAF helped many fish farmer in starting their fish enterprises that helps them in producing more fishes and ultimately contributed in improving their income. On the other hand among the all statements "Existing infrastructure and facilities of extension services provided by LEAF are not enough to meet the information needs of the fish farmers" and "LEAF cannot demonstrate improved fisheries technologies to farmers" ranked 15th and 16th position respectively due to their least corresponding average scores of 2.17 and 2.16 respectively.

3.3 Relationship between the selected characteristics of the fish farmers and their attitude towards extension services provided by LEAF

The purpose of this section is to explore the relationships between each of the selected characteristics of the respondent fish farmers and their attitude towards extension service provided by LEAF. The relationship between the selected characteristics of the farmers and their attitude towards extension service provided by LEAF is presented in Table 6.

Table 6: Correlation between fish farmers' characteristics with their attitude towards extension services provided by the LEAF (n=72).

Fish farmers' characteristics	Observed co-efficient of co-relation coefficient (r) with df = 70
Age	0.111
Educational level	-0.098
Household size	0.009
Farm size	0.149
Pond size	-0.528**
Fish farming experience	-0.246*
Annual family income	0.016
Extension media contact	0.494**
Training exposure on fish farming	0.267*
Innovativeness	0.658**
Organizational participation	-0.045

*Significant at 0.05 level of probability
**Significant at 0.01 level of probability

The null hypothesis of the study was "there is no relationship between the selected characteristics of the fish farmers and their attitude towards fish extension services provided by the LEAF. Pearson's Product Moment Correlation Co-efficient (r) was used to test the null hypotheses concerning relationships between any two variables. Findings of the study shows that out of eleven selected characteristics of the fish farmers (independent variables) five variables showed significant relationships with their attitude towards extension services provided by the LEAF. However, among the significant variables pond size and fish farming experience showed negative relationships and extension media contact, training exposure on fish farming and innovativeness showed positive relationship with their attitude towards extension services provided by the LEAF.

It is evident from Table 6 that the relationship between pond size of the fish farmers and their attitude towards extension services provided by LEAF showed significant and negative relationship. The reason behind this phenomenon may be that fish farmers with small pond size are not interested to communicate with extension workers for technological information. Moreover, fish farmers having smaller pond size are most likely to be for family subsistence thus they do not care about fish production and never search for modern fish

farming technological information. For this reason they have relative poor contact with LEAF and posses relatively negative attitude towards the services provided by the LEAF. On the other hand the fish farmers having larger pond size are more likely to boost up their fish production using the latest technological information receiving from LEAF/ UFO.

Unlike pond size, the relationship between fish farming experience of the fish farmers and their attitude towards extension services provided by LEAF showed significant and negative relationship between fish farming experience and attitude of the farmers towards extension services provided by the LEAF. The reason behind this phenomenon may be that fish farmers with low experienced and fish farmers need to consult with LEAF for maintaining their fish farm. Thus, they have better communication with LEAF and possess a positive attitude. This finding is supported by the findings of Ofuoku [31].

Table 6 demonstrates that extension media contact of the fish farmers had significant and positive relationship with their attitude towards extension services provided by the LEAF. It means that fish farmers having better extension contact are more likely to have positive attitude towards extension services provided by the LEAF. This is due to the reason that fish farmers have good communication with the LEAF and other extension agents for receiving necessary farm information, thus they have better perception and attitude towards extension services provided by the LEAF. This findings is supported by the findings of four other studies in their respective studies [22, 23, 32, 33].

It is also shown in Table 6 that training exposure of the fish farmers and their attitude towards extension services provided by LEAF have significant and positive relationship. It means that fish farmers having more exposure to training on fish farming are more likely to have better attitude towards extension services provided by the LEAF. This is due to the reason that fish farmers when received more training from DoF obviously the will have better communication with DoF personnel. Thus, they have better attitude towards LEAF and their services.

It is evident from Table 6 that the relationship between innovativeness of the fish farmers and their attitude towards extension services provided by LEAF shows significant and positive relationship. The reason behind this phenomenon may be that fish farmers with high level of innovativeness take decisions always maintain close relationship with LEAFs, other model fish farmers and UFO. Thus, they possess be positive attitude towards extension services provided by the LEAF.

3.4 Problems faced by the fish farmers in receiving extension services provided by LEAF

In spite of greater potentiality of fish farming in Bangladesh, the farmers are not free from problems associated with fish farming. Similarly, though LEAF have given a little momentum in the fisheries extension services at grassroots level of the country. But still fish farmers are facing number of problems in receiving extension services from the LEAFs. Thus, an attempt was made to explore the problems confronted by the fish farmers in receiving extension services from LEAF (Table 7).

A focus group discussion (FGD) was organized to explore the problems faced by them in receiving extension services from LEAF. Ten potential problems were identified with the participation of the fish farmers and then incorporated those in the interview schedule to know the extent of the specific problem. Data presented in Table 7 shows that about half of the respondent fish farmers perceived high level problem that "Shallow knowledge on subject matter" and "Limited motivational capacity". It is also evident from Table 7 that less a little less than half (49 percent) of the respondent fish farmers had perceived as high extent of problem that the LEAF has poor communication ability.

Table 7: Problems faced by the fish farmers in receiving extension services provided by LEAF (n=72).

Problems	Extent of problems				Problem Facing Index (PFI) Score
	High	Medium	Low	Not at all	
1. Shallow knowledge on subject matter	42(58)	17(24)	10(14)	3(4)	170
2. Limited motivational capacity	38(53)	19(26)	11(15)	4(6)	163
3. Poor communication ability	35(49)	16(22)	19(26)	2(3)	156
4. Cannot build rapport with farmers	37(51)	15(21)	12(17)	8(11)	153
5. Lack of confidence in solving farmers' problem	17(24)	13(18)	18(25)	24(33)	95
6. Cannot provide solutions to the all problems	37(51)	17(24)	9(12.5)	9(12.5)	154
7. Frequent contact with only resource-rich farmers	0(0)	11(15)	22(31)	39(54)	44
8. Poor command on using different teaching methods	7(10)	11(15)	19(26)	35(49)	62
9. Services provided by LEAF seems sometimes ineffective	34(47)	12(17)	24(33)	2(3)	150
10.Not capable enough in overall dissemination of aquaculture technologies	15(21)	19(26)	24(33)	14(20)	107

Note: Number in the parentheses indicate percentage

It is evident from the data presented in Table 7 that more than half (51 percent) of the fish farmers perceived as high extent of problems that LEAF cannot provide solutions of all of their problems and they have limitations in building rapport with the farmers, which is really very basic for attracting the attention of the clientele towards the extension services.

This is may be due to the reason that LEAF has limited experience of providing extension services to the people of the fish farming community. On the contrary, around half of the fish farmers perceived no problem that the LEAF has frequent communication only with resource-rich farmers and they have poor command on using different teaching methods. However, it is evident from Table 7 that more than half (56 percent) of the fish farmers faced low to medium level problem that LEAF are not capable enough in overall dissemination of aquaculture technologies.

4. Conclusion

Effective extension services is very essential in maintaining growth in the fish production of the country. It is well established from the findings of the study that the fisheries extension service is relatively weaker among the all public sector extension service providers in the country. However, the initiative of introducing LEAF in fisheries extension

services at the grassroots level through NATP project was a very timely decision for reforming and revitalizing fisheries extension services in the country. However, due to do not having sufficient technical knowledge and limited experiences of extension services fish farmers had slightly favourable to moderately favourable attitude towards extension services provided by the LEAF. It is also explored by the study that services of LEAF is helping a few of the fish farmers in solving their problems to maintain their fish farms. However, if it is possible to organize intensive training programme for the LEAF to remove their technical deficiencies it would be fantastic to harvest their potent extension services in building an efficient fisheries sector in the country which will ultimately contribute in improving nutritional security as well as poverty reduction of the country.

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