Factors Contributing to Farmers' Attitude towards Practicing Aquaculture in Dinajpur District of Bangladesh

M.F. Hasan[1], M.F. Hossain[2], M.S. Rahman[3] and S. Sarmin[4]

Abstract

The purposes of this study were to determine and describe the attitude of the farmers towards practicing aquaculture, to explore the relationships and contribution of the selected characteristics of the farmers with their attitude towards practicing aquaculture. The study was conducted in six villages of Sadar, Chirirbondor and Biral upazila of Dinajpur district of northern part Bangladesh. Data were collected from randomly selected 110 farmers with a structured interview schedule during 05 May to 05 July, 2015. Twelve selected characteristics of the farmers were considered to explore the relationships with the attitude of the farmers towards practicing aquaculture. The findings revealed that majority of the farmers (70.9 percent) had favorable attitude while 17.3 percent had less favorable and 11.8 percent had highly favorable attitude towards practicing aquaculture. Among the twelve selected characteristics nine of them namely, age, educational qualification, farm size, pond size, annual family income, annual income from aquaculture sources, aquaculture knowledge, training demand for practicing aquaculture and information need in practicing aquaculture of the respondents had significant positive relationships with their attitude towards practicing aquaculture. Farmers' training demand for practicing aquaculture was found having the highest predictive power to their attitude formation towards practicing aquaculture followed by annual family income, aquaculture knowledge and information need in practicing aquaculture.

Keywords: Aquaculture, attitude, knowledge, extension services.

Introduction

Aquaculture is one of the fastest growing animal protein supplying sectors in Bangladesh with an average annual growth rate of over 6 percent during the last three years (DoF, 2014). Bangladesh was the fourth largest global fish producer after China, India and Vietnam and the total fish production of Bangladesh was 17.26 lac metric tons in 2012 (FAO, 2014). Aquaculture contributes the large share in this production and plays vital role in the national economy. The fish and fishery resources play a vital role in improving the socio-economic condition, combating malnutrition, earning foreign currency and creating employment opportunities for the people of the country. Fish production contributes 3.69 percent to the gross domestic products (GDP), 2.01 percent to the export earnings and supply about 60 percent of the animal protein to the nation (DoF, 2015). Aquaculture is very much important to fulfill nutritional requirement, improving food security and to generate livelihood opportunities of the people in Bangladesh, especially in rural areas. It provides reasonable cash income to the rural people, even though a part of the fish may be used for domestic consumption and thus contributes to the nutrition for family members also. As in Bangladesh a large number of people suffer from malnutrition,

[1]Professor, [2&4]MS fellow, [3]Associate Professor, Department of Agricultural Extension, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

it is necessary to increase the supply of animal protein for ensuring balance diet. Fish contains comparatively cheaper protein and it is within the purchasing power of the poor people. But, deficit of fish production is very common due to various factors in this sector. Increase of aquaculture production depends on a number of factors including farmers' attitude towards practicing aquaculture. Again, various characteristics of the farmers are likely to have an influence on the formation and development of their attitude towards certain technologies. Therefore, information related to farmers' attitude towards

aquaculture and the contributing factors responsible for formation of attitude is an important consideration for promotion of development in aquaculture sector. This information will help to formulate policy for the sectorial development. Considering the above issues, the present study was undertaken with the following objectives: i) to determine and describe the attitude of the aquaculture farmers towards practicing aquaculture and ii) to explore the relationships and contributions of some of the selected characteristics of the aquaculture farmers with their attitude towards practicing aquaculture.

Methodology

Locale, population and sampling design: The study was conducted in Dinajpur district of Northern region of Bangladesh. Dinajpur district was selected purposively as the aquaculture practice is very common and extensive compared to other districts of the region. For selection of the population and sample, multi-stage random sampling technique was used. In first stage, out of 13 upazilas of Dinajpur district, three upazilas were selected randomly namely, Dinajpur Sadar, Chirirbandar and Biral upazila. One union from each of these three upazilas were selected randomly in the second stage, and then two villages from each of the selected unions were selected randomly namely, Ranigonj, Purbopargao, Basudevpur, Lokkhipur, Noyamela and Noyapara as locale of the study. The total number of aquaculture farmers in these six villages was 372 which constituted the population of the study. An updated list of these population (sample frame) was prepared with the help of respective Upazila Fisheries Office. Then the sample size was determined by a mathematical formula given by Miller and Brewer (2003) as:

$$n = N/\{1 + N(\alpha^2)\}$$

Where N is the sample frame, n is the sample size and α is the margin of error (fixed at 8%).

The sample size, n becomes;

$$n = \frac{372}{\{1 + 372(0.08)^2\}} \cong 110$$

Then 110 farmers were selected proportionally from the operational villages and they constitute the sample for this study. A reserve list of 10 farmers was also made, in order to use in case of unavailability of the sampled farmers.

Data collection: A structured interview schedule was prepared for collection of data containing both open and closed form of questions which was pre-tested with 10 farmers selected from the study area. Data were collected from 05 May to 05 July, 2015.

Measurement of variables: Attitude towards aquaculture is the focus variable of

the study. Attitude towards aquaculture of a respondent referred to his feeling, belief and action tendency towards different components of aquaculture and its practices. Likert scale was used to determine the attitude. The attitude scale contained twelve statements consisting both positive and negative statements. A statement was considered positive only when it reflected the idea of favorableness towards the aquaculture and vice-versa. The respondents were asked to express his/her opinions in the form of strongly agree, agree, undecided, disagree, and strongly disagree. Scores of 5, 4, 3, 2, and 1 were assigned, respectively in case of strongly agree, agree, undecided, disagree, and strongly disagree for a positive statement and reverse scoring was followed for the negative statements. Hence attitude of a respondent towards aquaculture was determined by summing up the scores obtained by him/her for all statements in the scale. The possible attitude scores of the respondents could range from 12 to 60, where 12 indicates highly unfavorable attitude and 60 indicates highly favorable attitude. Twelve personal and socio-economic characteristics of the respondents namely: age, educational qualification, family size, farm size, pond size, annual family income, annual income from fisheries sources, organizational participation, extension media contact, knowledge on aquaculture, training demand for practicing aquaculture and information need for practicing aquaculture were

selected to understand the factors contributing farmers attitude towards aquaculture. Standard and conventional procedures were maintained to measure these explanatory variables.

Data processing and analysis: The collected data were coded, compiled, tabulated and analyzed for interpretation. The SPSS (version 22) computer program was used for analyzing the data. Different descriptive statistical measures such as frequency, number, percentage, mean, standard deviation and rank order was used for categorization and describing the variables. Karl Pearson's Product Moment Correlation coefficient (r) (Pearson, 1895) was used for testing the relationship between the concerned variables. Nevertheless, the correlation analysis only indicates direction of relationship of selected variables with farmers' attitude towards practicing aquaculture but cannot show their influences quantitatively so that attitude can be explained. So, regression analysis (both enter and stepwise method) was run to explore the effect of explanatory variables (selected characteristics) on farmers' attitude towards practicing aquaculture. Thus, the influential factors were identified that have effects on farmers' attitude towards practicing aquaculture. It helps to reveal highest coefficient of determination (R), that is, amount of change of dependent variable by the independent (selected) variables.

Results and Discussion

Farmers' attitude towards practicing aquaculture
Farmers' attitude towards practicing aquaculture is the main focus of this study. Twelve statements were selected to measure

the extent of farmers' attitude towards practicing aquaculture. The overall attitude towards practicing aquaculture of the farmers is presented in Table 1.

Table 1 Distribution of the aquaculture farmers according to their attitude towards practicing
         aquaculture (n=110)

Range		Categories	Respondents		Mean	SD
Possible	Observed		Number	Percent		
12-60	33-59	Less favorable (below 42)	19	17.3	47.05	5.51
		Favorable (42-53)	78	70.9		
		Highly favorable (above 53)	13	11.8		
		Total =	110	100.0		

The total score of attitude could range from 12 to 60. The observed scores ranged from 33 to 59 with a mean of 47.05 and standard deviation of 5.51. Based on their attitude scores the respondents were classified into three categories (considering mean and standard deviation as the basis of categorization). The highest proportion (70.9 percent) of the farmers had favorable, 17.3 percent had less favorable and 11.8 percent had highly favorable attitude towards aquaculture. It is found that the majority (88.2 percent) of the respondent showed less favorable to favorable attitude towards practicing aquaculture. The results might be due to the fact that, as aquaculture could be a profitable activity to the farmers of the study area, their highly favorable attitude is essential for succeeding in this sector. High income from this sector makes strong economic base of the aquaculture farmers. This phenomenon needs to be emphasized to encourage the aquaculture farmers which might help in forming highly favorable attitude towards practicing aquaculture.

Characteristics profile of the aquaculture farmers

There are various characteristics of the fish farmers that influence their attitude towards practicing aquaculture. In the present study, twelve characteristics of the aquaculture farmers have been selected to describe the characteristics profile of the aquaculture farmers. Categorical distribution of these characteristics is given in Table 2.

The mean age of the aquaculture farmers was found 37.23 years and majority (48.2 percent) of them are young aged. All of the respondents were educated from primary level to higher secondary level. The average family size of the respondents is high compared to national average of 4.06 (HIES, 2016). Majority of the respondents belong to small to medium farm sized category. The average pond size of the aquaculture farmers was found 0.45 hectare. Majority of the respondents fall under the category of medium income, and the average annual income from aquaculture is 91.58 thousand taka. The organizational participation of the aquaculture farmers is very dissatisfactory as majority of them have low participation in different organizations. Extension media contact of the respondents is quite satisfactory, this might be due to the fact that, sample farmers received extension services from upazila fisheries offices and different local extension personnel. Vast majority of the respondents have medium to high aquaculture knowledge. More than three-fourth of the aquaculture farmers had medium to high extent of training demand for practicing aquaculture. Similarly, majority of the respondents had medium to high extent of information need in practicing aquaculture. This scenario indicates the lack of adequate training facilities and information support regarding aquaculture in the study area.

Table 2 Characteristics profile of the respondents (n=110)

Characteristics (measurement unit)	Possible range (observed range)	Respondents			Mean	SD
		Category	No.	%		
Age (year)	Unknown (19-72)	Young (1-35)	53	48.2	37.23	11.66
		Middle aged (36-50)	46	41.8		
		Old (above 51)	11	10.0		
Educational qualification (year of schooling)	Unknown (2-17)	Primary (1-5)	19	17.3	10.45	3.98
		Secondary (6-10)	47	42.7		
		Higher secondary and above (above 11)	44	40.0		
Family size (number)	Unknown (1-15)	Small family (1- 4)	34	30.9	5.53	2.24
		Medium family (5-6)	56	50.9		
		Large family (above 6)	20	18.2		
Farm size (hectare)	Unknown (0.01-5.47)	Landless (below0 .02)	2	1.8	1.36	1.07
		Marginal (0.02-0.2)	5	4.5		
		Small (0.2-1)	48	43.6		
		Medium (1-3)	46	41.8		
		Large (above 3)	9	8.2		
Pond size (hectare)	Unknown (0.00-2.83)	All farmers	110	100.0	0.45	0.57
Annual family income ('000' Taka)	Unknown (7-700)	Low income (below 35)	9	8.2	222.33	187.36
		Medium income (35-410)	80	72.7		
		High income (above 410)	21	19.1		
Annual income from aquaculture ('000' Taka)	Unknown (0-500)	All farmers	110	100.0	91.58	121.23
Organizational participation (score)	Unknown (0.00-105)	Low participation (below 36)	105	95.5	6.84	18.66
		Medium participation (36-70)	1	0.9		
		High participation (above 70)	4	3.6		
Extension media contact (score)	0-36 (1-23)	Low (1-3)	18	16.4	8.65	5.25
		Medium (4-14)	80	72.7		
		High (above 14)	12	10.9		
Aquaculture knowledge (score)	0-25 (10-25)	Low (below 15)	15	13.6	18.95	4.05
		Medium (15-23)	83	75.5		
		High (Above 23)	12	10.9		
Training demand for practicing aquaculture (score)	0-81 (4-81)	Low demand (below 32)	26	23.6	51.14	19.51
		Medium demand (32-71)	74	67.3		
		High demand (above 71)	10	9.1		
Information need (score)	0-84 (5-84)	Low needs (below 35)	25	22.7	54.72	20.53
		Medium needs (35-75)	69	62.7		
		High needs (above 75)	16	14.5		

Relationships between the selected characteristics of the farmers and their attitude towards practicing aquaculture
Pearson's Product Moment Coefficient of Correlation (r) was computed in order to explore the relationships between the selected characteristics of the aquaculture farmers and their attitude towards practicing aquaculture and the results are presented in Table 3.

Table 3 Relationships between the selected characteristics of the farmers and their attitude towards practicing aquaculture (*df* 108)

Focus variable	Selected characteristics	Correlation coefficient (r)
	Age	0.252**
	Educational qualification	0.394**
	Family size	0.144
	Farm size	0.260**
Attitude towards	Pond size	0.238*
practicing	Annual family income	0.275**
aquaculture	Annual income from aquaculture sources	0.256**
	Organizational participation	-0.037
	Extension media contact	-0.158
	Aquaculture knowledge	0.414**
	Training demand for practicing aquaculture	0.435**
	Information need in practicing aquaculture	0.260**

'**' indicates correlation is significant at the 0.01 level (2-tailed) and
'*' indicates correlation is significant at the 0.05 level (2-tailed)

Among the twelve selected characteristics nine namely, age, educational qualification, farm size, pond size, annual family income, annual income from aquaculture sources, aquaculture knowledge, training demand for practicing aquaculture and information need in practicing aquaculture of the respondents had positive significant relationships with their attitude towards practicing aquaculture. Therefore, farmers with high age, high educational qualification, large farm and pond size, more annual family income, more income from aquaculture sources, more aquaculture knowledge, more training demand for practicing aquaculture and more information need in practicing aquaculture will have more favorable attitude. This might be due to the fact that, all these factors enlighten the farmers and build their capacity and insights which might help them to construct favorable attitude towards aquaculture.

Factors contributing to farmers' attitude towards practicing aquaculture
In order to find out the relative contribution of selected characteristics of the aquaculture farmers to their attitude towards practicing aquaculture, multiple regression analysis was applied. Out of twelve variables, nine

variables were included in regression analysis due to their significant values in correlation analysis. The different independent variables had their own units of measurement that did not permit a comparison of the unstandardized regression coefficient values. For this reason, standardized regression coefficient values were also computed to avoid the problems of different units of measurement and the results are presented in Table 4.
The values of multiple determination coefficients (R^2) for all the nine independent variables jointly explained 35.5% of variation in the attitude towards practicing aquaculture (Table 4). The observed t value for regression coefficient was significant in case of annual family income, aquaculture knowledge, training demand for aquaculture practices and information need in practicing aquaculture. For reaching an optimum model of prediction, analysis of selected independent variables with the attitude towards practicing aquaculture, only significantly contributed variables to the attitude were included in the stepwise multiple regression analysis (Table 5).

Table 4 Contributing variables to explain the attitude towards practicing aquaculture (n=110)

Variables entered	Unstandardized coefficient (B)	Standardized coefficient (Beta)	(% contribu-tion)	t value	F value
Age	0.048	0.101		1.060	
Educational qualification	0.178	0.128		1.192	
Farm size	0.001	0.049		0.457	
Pond size	-0.006	-0.163		-1.040	
Annual family income	0.007	0.233		2.208*	
Annual income from aquaculture sources	0.008	0.175	35.5	1.168	7.672***
Aquaculture knowledge	0.336	0.247		2.597*	
Training demand for practicing aquaculture	0.159	0.563		3.278**	
Information need in practicing aquaculture	-0.101	-0.374		-2.299*	

Constant = 32.533; R^2 = 0.408; Adjusted R^2 = 0.355; * = significant at 0.5% level of significance; ** = Significant at 1% level of significance; *** = Significant at 0.1% level of significance.

Table 5 Summary of stepwise multiple regression analysis showing contributing variables to attitude towards practicing aquaculture (n=110)

Mode	Variable entered	Unstand-ardized coeffi-cient (B)	Standar-dized coeffi-cient (Beta)	Adjust-ed R^2	R^2 Change (% contrib-ution)	t value	F value
1	Constant + Training demand for practicing aquaculture	0.197	0.698	0.181	18.1	4.701***	25.153***
2	Constant + Training demand for practicing aquaculture + Annual family income	0.009	0.304	0.291	11.0	3.912***	23.384***
3	Constant + Training demand for practicing aquaculture + Annual family income + Aquaculture knowledge	0.368	0.270	0.323	3.2	2.973**	18.327***
4	Constant + Training demand for practicing aquaculture + Annual family income + Aquaculture knowledge + Information need in practicing aquaculture	-0.114	-0.425	0.366	4.3	-2.855**	16.711***

** = Significant at 1% level of significance; *** = Significant at 0.1% level of significance.

As per multiple regressions analysis among the four variables, training demand for practicing aquaculture of the farmers contributed 18.1% in predicting their attitude towards practicing aquaculture, while annual family income, aquaculture knowledge and information need in practicing aquaculture contributed 11.0%, 3.2% and 4.3%, respectively. The results revealed that training demand for aquaculture practices, annual family income, and aquaculture knowledge of the farmers improve their attitude towards practicing aquaculture. This might be due to the fact that, these three factors broaden the horizon of outlook of an individual. Thus, increase farmers' favors towards practicing aquaculture. But information need in practicing aquaculture contributes negatively as the farmers with high information need might be in information crisis and thereby reduces their favors towards practicing aquaculture.

Conclusions

The majority of the farmers had less favorable to favorable attitude towards practicing aquaculture. These farmers need to be supported with their demand driven information for making successful aquaculture programs. Farmers under low categories of farm size, pond size and annual family income need to be considered intensively for bringing their positive attitude towards aquaculture. Different GOs and NGOs should undertake effective aquaculture programs in order to enhance farmers' knowledge on aquaculture. Comprehensive extension support including training and timely appropriate information support should be provided to the aquaculture farmers through district or upazila Fisheries Offices under the Department of Fisheries. Training demand, annual family income and aquaculture knowledge contributed positively to bring favorable attitude of the farmers towards practicing aquaculture, whereas information need in practicing aquaculture contributed negatively to the same. These factors need to be considered for further development of aquaculture programs in Bangladesh. Similar studies may be conducted in other areas of the country to generalize the findings. Research should be undertaken particularly to identify the further factors causing hindrance to bringing favorable attitude of the farmers towards practicing aquaculture and to explore the potentialities to overcome the hindrances to practice aquaculture.

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