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Willingness to Participate in Pond Fish Farming by Rural Women in South Tripura

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ABSTRACT

This paper aimed at analysing different factors influencing the willingness of rural farming family women to participate in pond fish farming in south Tripura district. Probit regression analysis of dichotomous dependent variable (Yes/No) about the willingness to participate in pond fish farming by women were carried out using different influencing factors as explanatory variables. These independent variables were age, education, family size, number of fish ponds available, pond area under fish farming, annual household income, and social membership of rural women. The analysis showed that few social factors like age, education, family size and annual income influenced the decision regarding the willingness of women to participate in pond fish farming. In general, women with lesser education level and moderately aged having lesser family income were more likely to participate in pond fish farming. Further, the likelihood of rural women to participate in pond fish farming increases highest (84 %) for unit increase in social membership like self help groups, farmer's club etc. as per the analysis on marginal probability effect.

Key Words: Participation, Pond fish farming, Probit regression, Tripura, Women.

INTRODUCTION

The role of women in socio-economic and cultural-political relationships in the country has gained importance over time and are the backbone of development of rural and national economy. The involvement of women in the fisheries sector in India in earlier times was largely restricted to marine fisheries sector, especially retail sale of fish and simple indigenous methods of fish processing. The emergence of modern fish processing industries provided a new avenue of employment to innumerable women. With the meteoric growth of women's education in the country in recent decades, women have started entering all walks of life, including the various fisheries sectors, such as research, development, training, extension and industry, and have already made their presence felt. However, even though the integration of women in the fisheries mainstream is already on the move, there is still ample scope for further substantial growth.

Freshwater aquaculture sector is a fast growing segment in the fisheries sector. Pond fish farming, a segment of freshwater aquaculture is highly promising in many states where the resources are available. Tripura witnessed an impressive growth in fish production during last decade where fish culture is recognized as a vital activity for economic development (Debnath *et al,* 2015a). Fisheries have a unique status in Tripura as fish is an integral part of the social and cultural life of the people in this state (Debnath *et al,* 2015b). With available culture fisheries resources and with almost 95per cent being fish eaters in Tripura, there is a scope for substantial increase in yield and production of freshwater fish (Debnath *et al,* 2013).

A characteristic feature of rural Tripura (especially plain areas) is that most houses have a small backyard pond, or a ditch that can easily be converted into one. These backyard ponds are commonly used for bathing and washing. Generally

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ranging from 100 to 1000 m^2 in area, ideally suited for fish farming by the women of the family, who can periodically fertilize the ponds with the cow-dung obtained during cleaning their cattle sheds, and feed the fish by dumping into the ponds all the spoiled food, left over and kitchen refuse. Thus, much of the organic waste produced by a family can also be profitably recycled through these ponds by the women folk. It can be easily seen that the cost of inputs in the form of labour, manure and feed are minimal in such backyard pond fish culture. On the other hand, huge water resources exist in the form of mini-barrages in hilly *(or tilla)* areas of Tripura. Compared to agriculture, many of the aquaculture operations are simple and women can easily undertake several of them. This will not only improve the economy of the rural population but also provide nutritious food.

Paul *et al* (2015) reported that higher percentage of women participation in livestock and poultry sector were observed in Tripura. The participation of women was found different for different activities under crop enterprises. In both plain and hilly region of Tripura, it was noticed by Paul *et al* (2015) that activities like land preparation, irrigation, application of fertilizer and manures etc. were exclusively performed by the male members of the family, likewise intercultural operation and harvesting were female dominated activities. In livestock enterprise, majority of the activities were performed by the female in plain and in hilly. Debnath *et al* (2015b) reported that that social participation of the respondents of both the genders has positive as well as negative significant influence on the adoption of the fisheries practices and the set of parameters that influenced the adoption of technologies among women and men fishers were different.

Currently, there is no documented evidence of the factors and willingness to participate in pond fish farming by women in Tripura. It is against this backdrop that the present study attempts to fill the gap in knowledge. The study contributes significantly to the scanty literature on women participation in freshwater aquaculture and pond fish farming. This study aimed to investigate willingness to participate in pond fish farming by rural farming family women in south Tripura district.

MATERIALS AND METHODS

Study Area and Data

The present study was mainly based on primary data collected through interview schedule from the Rural Farming Family Women (RFFW) of under south Tripura district who had a scope for participation in pond fish farming. The study was confined to those villages of the district where KVK has taken up different frontline extension activities related to fish farming since 2015. These villages were selected intentionally as the RFFWs of these villages were exposed to fish farming technology through intervention of KVK, South Tripura and expected to respond perfectly. A stratified random sampling approach was followed for this study. Eight villages were randomly selected from those villages and then, five rural farming family women were interviewed by using a structured interview schedule which was pre-tested for its validity. Altogether, 38 RFFWs (two being rejected due to insufficient information provided by the respondents) from eight different villages were interviewed.

The farmer's response score as mentioned in earlier section for different extension services were taken as explanatory variable against the dichotomous response towards the practical adoption of climate smart integrated fish farming. It was done using probit model probability regression analysis.

The Probit Model

The probit regression model was employed to quantify the factors that determine the willingness of RFFWs to participate in pond fish farming due to the dichotomous nature of the dependent variable. The justification for the use of the probit model over the logit model is as a result of its ability to constrain the utility value ofthe decision to join variable to lie within 0 and 1, and its ability to resolve the

problem of heteroscedasticity (Asante *et al,* 2011). Willingness to of RFFWs to participate in pond fish farming was captured as a dummy variable with the value of 1 assigned to a farmer who is willing to participate and 0 for otherwise. Following from Greene (2003), the binary probit model was applied for this study using regression model.

Present study defines the probit model with the probability of rural farming women participation in pond fish farming as dependent variable, where 1 indicates the willingness of rural farming women to participate in pond fish farming and 0 otherwise. The dichotomous response of the respondent women used as dependent variable, whereas age, education, household size, numbers of ponds available, total pond area, household income and social membership in the form of SHG, Cooperatives, Farmers Club (FC), FPO etc. were used as explanatory variables.

Other Descriptive variables selection was guided by economic theory and results of previous researches. Following the researches of Edward *et al* (2014), Oladejo *et al* (2014), Nsikak-Abasi A. Etim and Edet J. Udoh (2018), we chose to include certain variables such as age, education, household size, pond numbers, pond area, household income, social membership of rural farming family women. Table 1 defined the description of the variables under study.

RESULTS AND DISCUSSION

The probit regression was carried out by using Gretl (Gnu Regression, Econometrics and Time series Library) software developed by Allin Cottrell, Reccardo Lucchetti and the gretl team in 2000 and the utility of which elaborated by James (2009). Age, education, family size, social membership and household income of the rural farming family women were found to significant. The number of ponds available or the total pond area under fish culture didn't show such significant influence on the willingness of RFFWs to participate in pond fish farming (based on p-value). Rather, it is other social factors like age, education, family size and income which influenced the decision of RFFWs to participate in pond fish farming. The variables also had the hypothesized signs. The co-efficient of age, household/ family size, number of ponds, total pond area under cultivation, social membership in SHG, FC, Co-operatives etc. were found positive. The variable education and household income were negative. In general, women with lesser education level and moderately aged and having lesser family income were more likely to participate in pond fish farming. The probit equation for the analysed data (Table 3) can be expressed as:

The coefficients of age, education, household size, pond numbers, pond area, household income, social membership of rural farming family women did not directly show the magnitude of utility of each explanatory variable towards willingness to participate in pond fish farming. The marginal probability effect of each explanatory variable is required to be calculated to find out the magnitude of effect on dependent variable. For this, marginal probability effect in terms slope at mean for each explanatory variable has been estimated using Gretl. As Gretl did not provide the p-values and slope at the same time, the analysis was repeated using Gretl for estimating the slope or the marginal probability effect of the independent variables.

The values (Table 3) showed the magnitudes of increment in likelihood that the RFFWs were willing to participate in pond fish farming due to one unit change in explanatory variables. For example, marginal probability effect for the explanatory variable Age is 0.04 implies that every unit increase in years of age of women was having 4 per cent probability to participate in pond fish farming. Results showed that the likelihood of RFFWs to participate in pond fish farming increases highest by 84 per cent for one unit increase in social participation as member of social organization like SHG, FC etc. Here, it is necessary to mention that the slopes or marginal probability effects have been calculated at mean of the explanatory variables. The likelihood of participating in pond fish farming by RFFWs due to change in explanatory variables may differ at both end of the graph.

Table 1. Definition of variables used in Probit model to study the willingness of rural farming family women to participate in pond fish farming in Tripura, 2018.

Variable	Description
Dependent Variable:	
Willingness to participate	1 if the rural farming family women is willing to participate in pond fish farming, 0 otherwise
Explanatory variables:	
Age	Age of the respondent in years
Education	Class passed (1 if passed class 1, 2 if passed class 2 and so on)
Household size	Number of family members
Pond numbers	Total number of fish ponds that the farming family possessed
Pond area	Total area (in acre) of fish ponds under fish farming cultivation
Household Income	Annual household income (in Rs.) of the respondent's family. 1 if the annual household Income is below Rs. 50,000/-, 2 if it is Rs. 50,001/- to Rs.100000/-, 3 if it is Rs.100001/- to Rs.150000/-, 4 if it is Rs.150001/- to Rs.200000/-, 5 if it is Rs.200001/- to Rs.250000/-, 6 if it is Rs. 250001/- to Rs. 300000/-, 7 if it is above Rs. 6,00000/-.
Social membership	1 if She is a member of any SHG, Cooperatives, Farmers Club (FC), FPO or other social group; 0 otherwise.

Table 2. Descriptive Statistics of the variables included in the model.

Variables	Units	N	Minimum	Maximum	Mean	Std. Deviation
Age	Years	38	18.00	55.00	32.87	9.709
Education	Class	38	2.00	12.00	5.87	2.762
Household Size	Nos.	38	3.00	14.00	6.37	2.530
Pond Numbers	Nos.	38	1.00	5.00	2.37	1.403
Pond Area	Acre	38	.50	3.20	1.55	0.903
Annual Income	Rs.	38	60,000	3,00,000	1,51,711	63152

CONCLUSION

The study analysed the various factors affecting the willingness of rural farming family women to participate in pond fish farming in south Tripura district. Study showed age, education, family size, social membership and household income of the rural farming family women were significant to decide about the participation in pond fish farming. Still, research scope exists to identify the type of fish farming activities viz. fish feeding, liming, manuring etc. in which women are willing to participate easily.

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WTP =	- 3.735	+ 0.09*Age	- 0.747*Edu	+ 0.685*HHS
	(3.682)	(0.052)	(0.351)	(0.326)
	+ 0.217*PNo	+ 1.460*PAr	- 1.090*HHI	+ 2.848*SM
	(1.007)	(1.572)	(0.644)	(1.301)
N = 38, Adjusted R-square = 0.423, (Standard errors in parenthesis)				

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Table 3. Probit analysis with dichotomous depended variable (Standard errors based on Hessian).

Sr. No.	Variable	Coefficient	Std. Error	z	p-value	slope
	Constant	−3.735	3.683	−1.014	0.311	
	Age	0.092	0.052	1.765	0.0776*	0.0368
	Education	−0.747	0.351	−2.130	0.0332**	−0.298
	Household size	0.685	0.326	2.101	0.036**	0.273
	Pond numbers	0.217	1.008	0.215	0.829	0.086
	Pond area	1.460	1.572	0.929	0.353	0.582
	Household Income	−1.090	0.645	−1.692	0.090*	−0.434
	Social membership	2.849	1.301	2.189	0.028**	0.843
Mean dependent var		0.526	S.D. dependent var		0.506	
McFadden R-squared		0.727	Adjusted R-squared		0.423	
Log-likelihood		−7.161	Akaike criterion		30.322	
Schwarz criterion		43.423	Hannan-Quinn		34.983	
Number of cases 'correctly predicted' = 35 (92.1%)						
Likelihood ratio test: Chi-square(3) = 38.2513 [0.0000]						
Test for normality of residual - Null hypothesis: error is normally distributed						
Test statistic: Chi-square(2) = 10.6159 with p-value = 0.004952						