PARTICIPATION OF SMALLHOLDER FARMERS IN RURAL NON-FARM SECTOR: A STUDY IN SELECTED VILLAGES OF WEST BENGAL

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ABSTRACT

To alleviate rural poverty and foster rural prosperity, growth in the rural non-farm (RNF) sector is essential. Owing to the rising cost of cultivation, declining productivity, and climate change, farming has become unviable for small and marginal farmers, comprising 85% of the nation's farming population. In this context, as a strategy for sustainable rural livelihoods, the involvement of smallholder farmers in the RNF activities has increased significantly in the nation over the last two decades. In terms of a binary logistic regression model, this paper investigates how various demographic and socio-economic variables impact the participation of farmers in RNF activities by collecting data from 324 small-holder farming households in some selected villages of West Bengal. The paper further seeks to recognize different pull and push factors responsible for participation in RNF activities. The paper recommends the government's role in developing appropriate infrastructure facilities for agro-processing units, promoting micro, small and medium industries in rural areas, and organizing professional training programme to develop skills for rural non-farm workers.

Keywords: *Demographic, Nonfarm, Pull and Push Factor, Smallholder Farmer, Socio-economic.*

JEL: *C51, C83, J21, Q01, Q12.*

Introduction

The growth in the rural non-farm (RNF) sector is essential to alleviate rural poverty and to foster rural prosperity. Farming has become unviable for small and marginal farmers, comprising 85% of the farming population of the nation, due to the increasing cost of agriculture, declining productivity, and climate change. In this background, small-holder farmers' role in RNF activities has increased dramatically in the country over the last two decades as a strategy for sustainable rural livelihoods. According to the Rural India Development Report 2014, nearly 43% of rural households are now engaged in non-farm activities.

Rural Non-farm (RNF) activities are all wage or self-employing activities that are not farming but rural (Lanjouw,1999). This could include agribusiness, commerce, retail, tourism, rural industrialization, construction, mining, utilities, and financial services (Nagler and Naude, 2014).The RNF sector is capable of absorbing surplus labour in agriculture, stabilizing agricultural income due to crop failure, reducing rural-urban migration, providing a way out of poverty for rural poor, and promoting inclusive growth of the rural economy. (Haggblade, Hazell, and Reardon, 2010).Moreover, the government's 'lock-down' announcement to curb the coronavirus outbreak prompted a nationwide reverse migration of workers from cities to villages. Since agriculture is already overcrowded and has been suffering from the problem of disguised unemployment, the development of infrastructure for micro, small and medium-sized rural enterprises and the enhancement of rural employment schemes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is crucial for addressing migrant woes and creating employment opportunities for the rural people in the RNF sector.

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In this context, the study is motivated by following important research questions,

- What are the key drivers of the significant growth of non-farm income activities in rural India over the last two decades?
- Does RNF diversification driven by demand-pull factors or distress push factors?
- What strategies, government support mechanisms, and infrastructural developments are required to promote RNF employment?

There is a broad range of literature that explains the various potential determinants of RNF employment not only in the context of the Indian economy but also in the case of transitional economies of Asia, Europe, Latin America, and Africa. Few of them worth mentioning. The Reddy and Nagaraj (2014) study shows that farming household's literacy rate, decrease in farm productivity, rural upliftment government programmes are the major determinants of participation in rural non-farm income. The study of Mech (2015) shows that gender of household head, landholding size, and the problem of urban congestion are the crucial factors influencing rural non-farm income participation in Assam. According to the study of Coppard (2001), rural infrastructure, the pace of urbanization, and govt. rural development schemes are an important determinant of rural non-farm income. The Chakrabarti and Kundu (2009) research attempted to demonstrate the relationship between crop diversification and land conversion with people's involvement in RNF in India. In the context of transitional rural economies of the world, the study of UNCTAD (2015) has found that education and skill of the household head, landholding size, and social networking plays a crucial role in the participation of rural non-farm income. The study of Oadh and Nwibo (2017) has shown that education and gender of household head, household size, access to credit, and farm size are crucial determinants of participation in rural non-farm income in Southeast Nigeria. The study of Davis and Pearce (2000) has shown that farm size, social & financial capital, the skill of workers affects non-farm income participation in transition economies of Central & Eastern Europe. The study of Wandschneider (2003) has identified that education and skill, social capital, finance capital, gender dynamics, caste, ethnicity and religion, land ownership as crucial factors influencing participation in rural non-farm income. The study of Janvey, Sadoulet, and Zhu (2005) has shown how rural non-farm income plays a vital role in reducing poverty and income inequality in China.

But no study has been conducted yet at the village level to examine the impact of different factors responsible for the participation of farming households in RNF activities in the North 24 Parganas district of West Bengal, which is not only agriculturally rich but also where 97.83% of operational landholdings are small and marginal (District Census Handbook of West Bengal 2011), having the land size less than 2 hectares.

The objectives of the study are to:

- Understand the nature and types of RNF activity in the area of study,
- Investigate how different demographic and socio-economic factors affect the participation of farming households in RNF activities,
- Identify the importance of different pull and push factors responsible for their involvement in RNF activities,
- Suggest policies to promote the growth of RNF employment.

The plan of the paper is as follows – Section I introduces the paper by highlighting the motivation behind the study, a brief review of the literature, identification of the research gap, and objectives of the study. Section II portrays the sources of data and the research methodology used in the study. Section III makes an empirical analysis of data, while Section IV concludes.

Data and Methodology

A survey was conducted in the Amdanga block of North 24 Parganas district of West Bengal between October 2019 and January 2020 in four selected villages: Arkhali, Baraberia, Bodai, and Dariapur. A multistage random sampling design was used to collect data by interviewing 324 small farmer households in these villages.

The Amdanga block was picked from 22 blocks of the district of North 24 Parganas because the cropping intensity of this block is highest in the Census Data for 2011. In this block, 19.42% of the population is cultivator, while 35.59% is agricultural worker. Amongst the 79 villages of the block, the four villages were selected since they are the home of the maximum number of cultivating households in this block. Data on small-farm households in those villages were obtained from an exhaustive list of farmers available to the State Agriculture Offices. Small-holder farmers were randomly selected using a lottery method. The size of the sample size was calculated using the Yamane method (1967).

A binary logistic regression model is used to estimate the maximum likelihood of participation in RNF activity by the smallholder farmers due to the influence of different explanatory variables considered in the study in terms of the equation :

$$Y_i = \log(p/1\text{-}p) = \beta + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + u_i$$

Where Y_i = Participation of the ith farmer in RNF activity, is the response variable.

$Y_i = 1$ if the farmer participates in RNF activity & $Y_i = 0$ otherwise.

β = constant term & u_i = error term , where $u_i \sim N(0, \sigma^2)$

p = Probability of the occurring of the event (i.e., the farmer participating in RNF activity)

$(p/1-p)$ is called the odds ratio, where $p = (e^{\beta + \beta_i X_{ji}})/(1 + e^{\beta + \beta_i X_{ji}})$

$\beta_1, \beta_2, \ldots\ldots, \beta_5$ are the co-efficient of the five explanatory variables considered in the study.
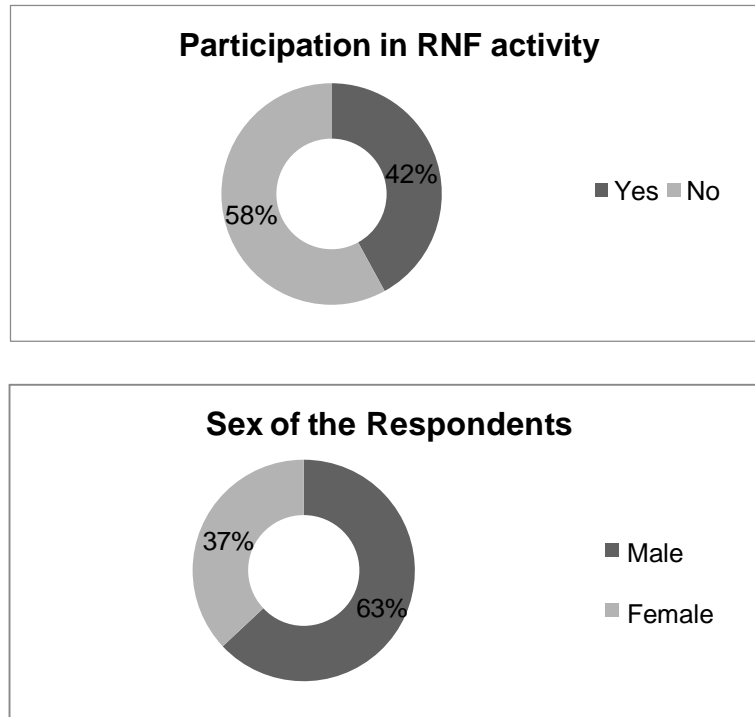
The explanatory variables considered in the study are shown in Table 1.

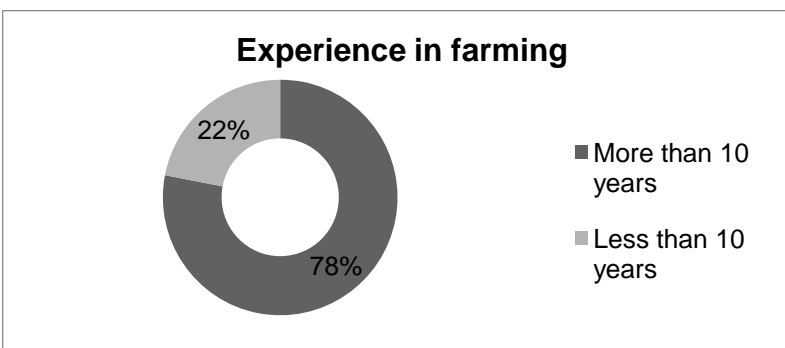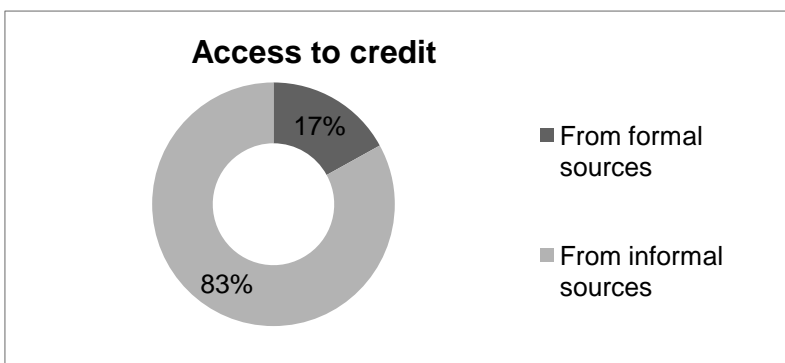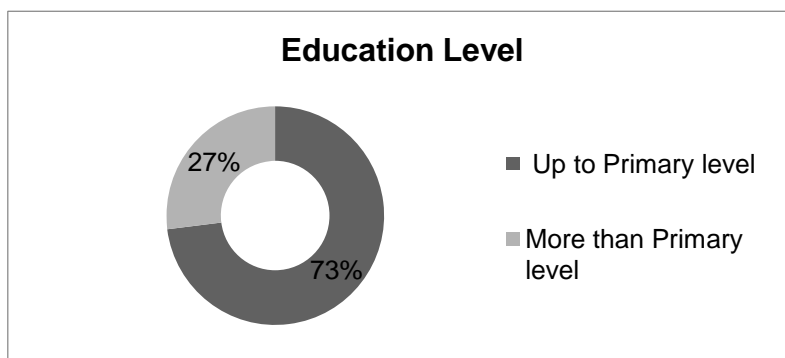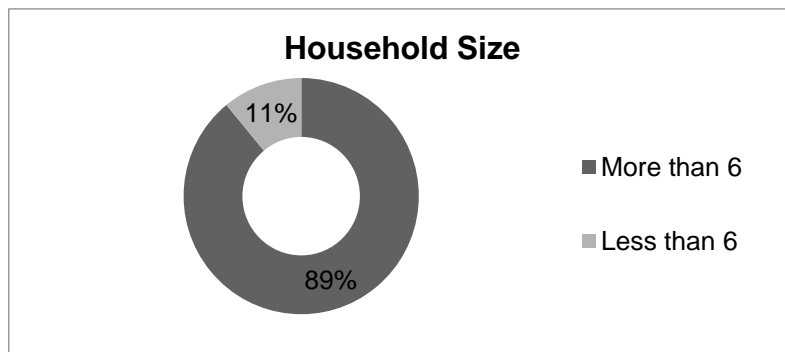**Table 1: Explanatory Variables Considered in the Study**

Name of the variable	Type	Notation	Measurement
Education level of household head	Continuous	X_1	Years of schooling
Sex of household head	Nominal	X_2	1 = if male , 0 = otherwise
Experience in farming	Continuous	X_3	Years in farming practices
Access to credit	Categorical	X_4	1 = if have access to credit from institutional sources, 0 = otherwise
Household size	Discrete	X_5	Number of persons in the family

Source: Author's Plan of study

The Multicollinearity problem among the explanatory variables chosen for the study is checked in terms of the Variance Inflation Factor (VIF). The 'goodness of fit' of the model is tested in terms of the Likelihood Ratio (LR) test and the Hosmer-Lemeshow (H-L) test. Lastly, the paper also aims to identify various pull and push factors responsible for involvement in RNF activities by the respondents in the study area. The demographic profile of the respondents is shown in Figure 1.

Figure 1: Demographic Profile of the Respondents

Household Size

- More than 6
- Less than 6

11%

89%

Education Level

- Up to Primary level
- More than Primary level

27%

73%

Access to credit

- From formal sources
- From informal sources

17%

83%

Experience in farming

- More than 10 years
- Less than 10 years

22%

78%

Source: Author's Survey data

As figure 1 shows, about 42% of the respondents in the study area are involved in RNF activities. About 63% of the respondents are male, and 73% of them have read only up to primary level. For nearly 89% of the respondents, the household size is more than six persons. The figure also reveals substantial financial exclusion in the study area, as only 17% of the respondents access their credit needs from formal or institutional sources. About 78% of the small-holder farmers in the study areahave farming experience for more than ten years. Figure 2 shows the different RNF activities in which the small-holder farming households are involved. As the figure shows, majority of the respondents (18%) are engaged as wage labour in MGNREGS, followed by weavers (15%), agribusiness (14%), hawkers (12%), rickshaw pullers and carpenter (10%), cottage industries (9%), running small shops (8%) etc.

Figure 2 : Types of RNF activities in the area of study

Legend: Agribusiness, Cottage industries, Livestock, Carpenter, Weavers, Wage labour, Running small shops, Rickshaw pullers, Hawkers, Others
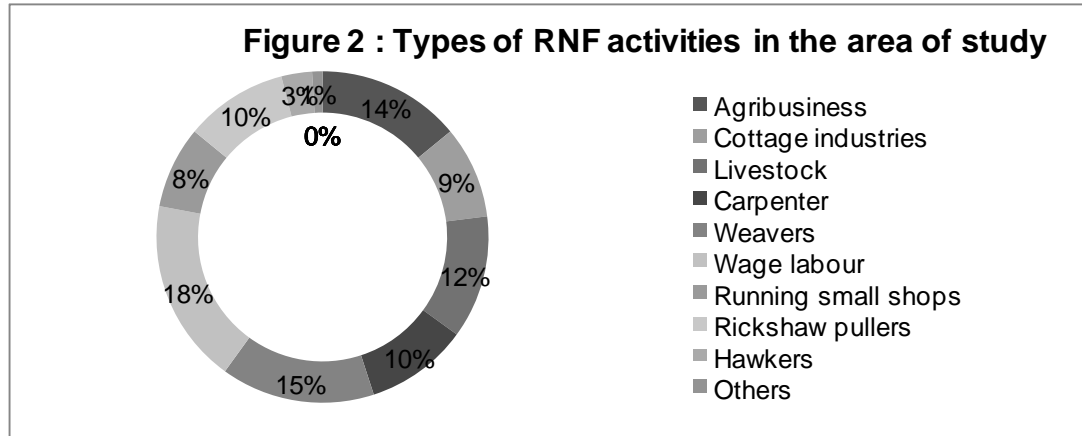
Source: Author's Survey data

Empirical Estimation

The mean VIF value of the independent variables considered in the study is 1.47 (<2), which confirms that there exists no problem of Multicollinearity among those explanatory variables in the study. Table 2 shows the Goodness of fit of the model in terms of the likelihood ratio test and the Hosmer & Lemeshow test. The likelihood ratio test is a chi-square test that checks whether the model chosen with the explanatory variables is significantly better than the model with no explanatory variables in explaining the response variable. In this model, the chi-square value is significant at a 1% level, and thus we can conclude that the chosen model fits good. The Nagelkerke R squared value is 0.794, which is quite satisfactory.

Table 2: Goodness of Fit Test

Likelihood Ratio Test
Estimation terminated at iteration number 5 as parameter estimates changed by less than 0.001
Number of Observations = 324
Likelihood Ratio chi-square = 56.767   prob> chi-square = 0.000
Nagelkarke R Square = 0.794
Hosmer-Lemeshow Test
Hosmer-Lemeshow chi-square = 1.496   prob>chi-square = 0.827

Source: Author's calculation

In the Hosmer-Lemeshow (H-L) test, prob>chi-square = 0.827> 0.05. So the model fits good.

Table 3 shows the Confusion matrix. This table shows that in this model, Specificity = 94.3 ; Sensitivity = 88.5; and overall Accuracy = 92.1.

Table 3: Classification Table (Confusion Matrix)

Observed		Predicted		
		Participation in RNF activity		Percentage Correct
		No	Yes	
Participation in RNF activity	No	192	12	94.3 = Specificity
	Yes	14	106	88.5 =Sensitivity
Overall Percentage		92.1 = Accuracy		
Cut off is 0.5 by default				

Source: Author's Calculation

The values of the estimated coefficients of the explanatory variables of the binary logistic regression model and the marginal effects are summarized in Tables 4. The result shows that, except for sex of the household head, all other explanatory variables are statistically significant in explaining the participation of small-holder farmer in RNF activities.

Table 4: Results of the Logistic Regression Model

Variables in the equation				Marginal Effects after Logit	
Variables		Wald	Exp ( )	dy / dx	Z value
Education level of household head	2.96***	8.109	12.93	0.21***	3.65
Sex of household head	1.341	1.71	3.82	0.07	1.45
Experience in farming	-1.591*	3.487	0.21	-0.15*	-2.02
Access to credit	2.068**	6.307	7.91	0.13**	2.43
Household size	2.371***	14.513	10.71	0.27***	3.76

Source: Author's calculation based on survey data

The findings of the binary logistic regression model indicate that, relative to females, the males are more likely to be involved in RNF activities. The result is not statistically significant. The marginal effect shows that if the sex of the person changes from female to male, the probability of participation in RNF activity rises by 7% (when the rest of the explanatory variables are at their mean values). The result is also not statistically significant.

Secondly, the rise in respondents' level of education raises the likelihood of participation in RNF activity. The odds of participation in RNF activity by more educated people is 12.93 times more than the odds of participation in RNF activity by less educated persons. The result is significant at the 1% level. The marginal effect shows that if the person is more educated, then the probability of participation in RNF activity increases by 21% (when the rest of the explanatory variables are at their mean values), and this result is also significant at the 1% level.

Thirdly, as the result indicates, more experienced people in farming are less likely to participate in RNF activities. The odds of participation in RNF activities by aged people is 0.21 times than that by young people. The result is significant at the 10% level. The marginal effect shows that for aged people, the probability of participation in RNF activities falls by about 15% (when the rest of the explanatory variables are at their mean values). The result is also significant at a 10% level.

Forthly, the likelihood of participation in RNF activities rises with the increase in access to formal credit sources. As the study shows, the odds of participation in RNF activities by the small-holder farmers having access to formal sources of creditis 7.91 times than those small-holder farmers having no access to formal sources of credit. This result is significant at 5% level. The marginal effect shows that for a small-holder farmer having access to formal sources of credit, the probability of participation in RNF activity rises by about 13% (when the rest of the explanatory variables are at their mean values). But the result is significant at 5% level.

Lastly, as the study shows, the odds of participation in RNF activities by the respondents who have family size more than six persons is 10.71 times more than others. The result is significant at the 1% level. The marginal effect shows that for the small-holder farmers having a family size of more than six persons, the probability of participation in RNF activities on average rises by about 27% (when the rest of the explanatory variables are at their mean values) than others. The result is also significant at a 1% level.

According to the respondents, their participation in RNF activities is mainly driven by push factors rather than pull factors. According to the respondents' opinion, the causes of their involvement and participation in RNF activities are summarized in Table 5.

Table 5: Factors Responsible for the Involvement of Respondents in RNF Activity

S. No.	The Cause for Involvement in RNF by Respondents	Factor
I	To stabilize the fluctuation in farm income due to crop failure (i.e., coping with the risk associated with farming, mainly due to climate change)	Push
II	To counter the problems associated with the declining fertility of the land, the rising cost of cultivation, etc., for which, farming has now become a losing proposition	Push
III	Higher return on labour/investment in RNF activity	Pull

Source: Author's Calculation

Conclusion

The paper proposes the role of the government in the (a) building of adequate infrastructure facilities for agro-processing units in rural areas, (b) dissemination of technical training for the formation of skills conducive to rural non-farm jobs, (c) support measures for enterprises, such as business incubators, consulting services for micro, small, and medium-scale rural industries to promote the initiative of 'Atmanirbhar Bharat' of the government of India, (d) enhancing the access to formal sources of rural credit for the rural households, and (e) increasing the man-day of work in MGNREGS. Policymakers are responsible for developing policies that will help the nation's rural economy prosper and evolve to generate new job opportunities in the post-covid period in the RNF sector.

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