Original Article

Pradhan Mantri Fasal Bima Yojana And Its Socio-Economic Determinants: A Study Based On Growers' Perception After Kharif 2021 In India

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Abstract

Growers' perception and willingness in farm insurance in the context of Indian farming always has an immense importance. Main focus of the present study is to explore and highlight the growers' perception and attitude towards Pradhan Mantri Fasal Bima Yojana (PMFBY), one of the popular and user-friendly farm insurance schemes in Indian as well as to assess the impact of a few select socio-economic determinants on cultivators' willingness to avail PMFBY. Primary data have been collected for this purpose from a sample of total 510 Indian growers or cultivators. A multistage random sampling has been employed to select two districts from each of the select five states and from each district two blocks are selected at random. Total 20 blocks have been selected and 25 respondents are selected randomly from the villages of each block. This primary survey has been conducted since November 2021 to January 2022 by manual circulation of a pre-tested structured questionnaire. Data are presented and analysed with the help of descriptive statistics and a binary probit regression for the sake of this study. It is found from the study that socio-economic parameters like farmers' education, size of farm land, monthly household income of the growers, their awareness regarding PMFBY and access to PMFBY have positive impact as well as growers' age, gender farming experience, access to irrigation and access to formal credit for farming have negative impact on growers' attitude towards risk mitigation through PMFBY.

Keywords: Growers' perception, Pradhan Mantri Fasal Bima Yojana (PMFBY), Socio-economic determinants, Binary probit regression.

1. INTRODUCTION

India is highly dependent on farming and agro-activities as the nation considers farming as the primary sector of the national economy. Again, farming is always associated with several risks and every year Indian growers have to experience abnormal crop loss due to diverse pest infestation; natural disasters like super cyclone, hailstorms, heavy rain falls, floods, erratic or no rainfall, droughts etc. (Kumar et al. 2011; Soni and Trivedi 2013; Bharati et al. 2014; Kumbalep and Devaraju 2018; Mukherjee 2021). Socio-economic factors also often create serious problems in front of these Indian cultivators. Lack of education among farmers creates lack of awareness and interest to adopt formal sources of credit for farming and participate in formal financial inclusion programmes (Mukherjee and Mukhopadhyay 2016). These problems become acute to the small and marginal cultivators in India as after a serious crop loss due to vagaries of Indian climate or any other market-driven factor, small and marginal farmers fall in the trap of unexpected burden of debt. Yet the Indian poor and illiterate growers prefer informal sources of credit for their farming which fail to indemnify these indebted cultivators. When the situation reaches at extreme, this debt crisis invites the occurrence of frequent suicides of farmers in the rural India (Mishra 2008; Raju and Chand 2008; Mukhopadhyay and Mukherjee 2020).

'Crop insurance' is the most prominent and globally accepted institutional mechanism to indemnify the growers and cultivators against possible crop failure due to natural calamities and other specified reasons (Arnold 2008; Selvaraj 2010; Afroz, Akhtar and Farhana 2017; Sindhu and Ariff 2017). Like in the developed countries, namely USA or Canada (Bharati et al. 2014), performance of crop insurance in the Asia-Pacific region is not successful (Afroz, Akhtar and Farhana 2017). Though it is very complex actuarial proposition and of course a costly affair to the Indian farmers, Government of India continues its process to develop more user-friendly and understandable crop insurance schemes since 1970 (Mukherjee and Chattopadhaya 2020). Agriculture Insurance Company of India Limited (AICI) has been formed as the only public sector undertaking (PSU) to accomplish these farm insurance missions on behalf of Indian Government (Mukherjee and Chattopadhaya 2020). Being the flagship policy of AICI, The National Agricultural Insurance Scheme

(NAIS) is evident to operate since 1999-2000 replacing the former CCIS scheme (Mukherjee and Mukhopadhyay 2016). NAIS has been modified later and still in operation in the name of Modified National Agricultural Insurance Scheme (MNAIS). Following the same trend of NAIS, AICI has introduced also Weather Based Crop Insurance Scheme (WBCIS) and Pradhan Mantri Fasal Bima Yojana (PMFBY) operating since kharif season of 2016 (Official report by AIC of India Ltd. 2016). Where WBCIS has been designed by correlating weather index with yield losses, PMFBY is a simpler yield index-based actuarial programme with an assurance of higher premium subsidy by the Indian Government. Since the launch in 2016, PMFBY has become popular among all the available crop insurance schemes with an aim to extend financial support to both loanee and non-loanee farmers (Mukherjee and Chattopadhaya 2020) and indemnify the production lose caused by natural catastrophe, pests and diseases.

Study of farmers' perception and attitude towards risk mitigation becomes very important and crucial particularly while taking decision regarding how to face the adverse or uncertain situations in crop production (Akcaoz and Ozkan 2005; Akhtar et al. 2018). Earlier studies have established the fact that Indian growers from different states are having different perceptions about farm insurance and its benefits (Soni and Trivedi 2013; Bharati et al. 2014; Kumbalep and Devaraju 2018). It is also evident that countable initiatives are undertaken by the central and state governments in India to stand by all Indian small and marginal farmers financially. Even, new banking schemes are launched to financially include the poor Indian villagers like Pradhan Mantri Jan Dhan Yojana (since 2014) with a goal to open at least a zero balance bank account for each rural household; or offering Kisan Credit Cards (since 1998) to Indian farmers through nationalized, private and rural banks of India to provide term loans and agricultural credits etc. (Mukherjee and Mukhopadhyay 2016). These new financial and banking schemes are the parts of the national financial inclusion programme to include those excluded cultivators or villagers who depend mainly on informal sources of credit. Thus, financial and economic issues like growers' risk perception; willingness to participate in common financial inclusion programme; taking farm loans and other rural credits from formal sources; showing the positive attitude towards availing farm insurance are becoming the matters of importance and emerging subjects of socio-economic studies. Due to inadequate documentation and information regarding these serious issues over the nation, grass-root level studies are required very much to develop an effective risk management system for the farmers at national level (Lucas and Pabuayon 2011; Akhtar et al. 2018). Earlier researches show that majority of the farmers in India have non-participatory attitude towards national crop insurance programme. Low level of awareness regarding compulsory and voluntary benefits of PMFBY and lack of insurance culture among small and marginal cultivators (Mukherjee and Mukhopadhyay 2016) are found despite significant initiatives taken by AICI.

This study, therefore, attempts to investigate Indian growers' perception regarding PMFBY and their willingness to participate in crop insurance programme at the post-Kharif cultivation in 2021.

2. DATA AND METHODS

Firsthand survey data are decided to be collected from top five performing states selected on the basis of total sum insured (Rs. in lakh) from the performance report of the national crop insurance policy, PMFBY published by AICI for the Kharif crop season (rainy season of cropping) in the year 2021. (Source: www.aicofindia.com). These selected states are Chhattisgarh, Madhya Pradesh, Rajasthan, Odisha, and Uttar Pradesh. Finally a sample of total 510 Indian growers is selected for the study employing multistage random sampling by selecting two districts from each of the select five states. Then, from each district two blocks are selected at random. Total 20 blocks have been selected and 25 respondents are selected randomly from the villages of each block. This primary survey has been conducted since November 2021 to January 2022 by manual circulation of a pre-tested structured questionnaire. This sample size (510) is found adequate to satisfy Cochran's formula (Cochran, 1977) of minimum sample size determination where the population is infinite. Here, Cochran's formula can be expressed as:

$n = (z^2\, pq) / e^2$

$n =$

$n = 384.16 \approx 384$

Where, n = sample size; z = selected critical value of desired confidence level = 1.96 at 95% confidence level; p = variability of the population, used as 0.5 (maximum 50% for any population); q = (1-p); and e = desired level of precision = 0.05 (the more sample size the less margin of error).

Therefore, minimum respondents required are 384. A multistage random sampling technique is employed for selecting two districts from each of the select five states and from each district two blocks are selected at random. In the final stage, data collection is done from 510 cultivators by manual circulation of a pre-tested structured questionnaire prepared for the purpose. Here, total 20 blocks have been selected from the select five states and minimum 25 respondents are selected from each block at random basis. In this way, a sample of total 522 farmers has been collected among which 12 questionnaires are rejected due to incomplete responses. Therefore, the sample size here in this study is 510, significantly greater than the minimum required sample size of 384.

A dichotomous probit regression is employed here to conduct the analytical study. As the dependent or outcome variable is grower's farm insurance decision and of dichotomous nature, a probit model of regression is preferred to be employed (Kumar et al. 2011; Akhtar et al. 2018) for the sake of this type of study. The response variable (Y), i.e., farmers'

willingness to participate (WIP) in PMFBY is assigned '0' (no, not willing) and '1' (yes, willing to participate) in this probit model. In another side, explanatory variables used in this model are expressed as X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10} and X_{11} which can be expressed as:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \varepsilon$$

These variables are to be regressed on the outcome variable Y (farmers' willingness to participate in PMFBY) with an intercept α and corresponding coefficients β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8, β_9, β_{10} and β_{11} respectively. Here, ε indicates the error terms. Explanatory variables of continuous nature used in the analysis are X1(age of the farmers in years). X2 (education in years), X3 (farming experience years), X4 (farm land holding in hectare) and X5 (monthly family income in rupees). Again, categorical predictor variables are X6 (gender of the farmers assigning male 1 and female 2), X7 (access to PMFBY assigning 1 for not accessible; 2 for not sure; 3 for accessible in to some extent; 4 for accessible but not in village and 5 for well accessible in villages), X8(awareness regarding PMFBY assigning 1 for not aware and 2 for aware), X9 (participation in rural non-farm sector or RNF (Mukherjee, 2021) assigning 1 for non-participation and 2 for participation in RNF), X10 (no access to irrigation 1; otherwise 2) and X11 (access to formal credit for farming assigning 1 for no access of credit; 2 for very limited access; 3 for less accessible than informal credit; 4 for accessible but far from farm land and 5 for well access to formal credit).

3. RESULTS AND DISCUSSION

3.1. Socio-economic characteristics of the farmers

Relevant socio-economic characteristics of the respondents are assessed to know the Indian cultivators' perception and attitude towards PMFBY. Table 3.1 highlights the details of the select demographic and socio-economic parameters used in this study. These parameters are of two types, i.e., continuous and categorical. Continuous variables are age of the farmers (in years), education (in years), farming experience (in years), farm land holding (in hectare) and monthly family income (in Indian rupees). On the other hand, categorical variables are gender of the farmers (male and female, no third gender found), farmers' feedback regarding access to PMFBY, awareness regarding PMFBY scheme, participation in rural non-farm sector, access to irrigation and access to formal credit for farming. Results show that majority of the farmers belong to 18-35 age group and mean age of the farmers is 31and almost 6 years of average formal education. Majority (25%) of the respondent farmers are found illiterate or zero years of formal education. These growers have almost an average of 14 years of farming experience. Majority of the growers (8%) are found having 12 years of experience where young farmers of zero experience are also found in very significant amount (7%). Majority of the respondents are found as small and marginal growers having less than 2 hectares of land holding. The average farm land holding is found 1.83 hectares. The average monthly family income of the farm households is found Rs. 28,021. It is observed that out of 510 respondents, 323 (63%) cultivators are male and 187 (37%) are female; 307(60%) farmers are not aware about PMFBY till now; majority (51%) have to depend and participate in rural non-farm sector (RNF) to substitute their earnings (Mukherjee, 2021); majority (51%) have no access to irrigation till now. Feedback of 510 respondent growers show that PMFBY is not accessible to majority of the farmers (37%) and 25% are not sure whether PMFBY is accessible to them. 22% and 10% cultivators say that it is accessible but not in their village and well accessible respectively whereas 6% cultivators consider accessibility of PMFBY is not enough as per requirement. Regarding access to formal credit, majority (26%) of the growers say about its very limited access, 24% growers straightway deny about any access to formal credit. These farmers literally remain excluded from the financial assistance of the Government of India. 19%, 17% and 14% cultivators respectively have given feedback as formal credit is less accessible than informal credit, accessible but far from farm land and well accessed by the farmers at their premises.

Table 3.1 Descriptive statistics of predictors (Socio-economic characteristics):

Variable (s)	Type(s)	Mean	Standard deviation
Continuous variables			
Age (years)	Continuous	30.84	12.066
Education (years)	Continuous	5.78	4.895
Farming experience (years)	Continuous	13.66	10.079
Farm land holding (hectare)	Continuous	1.83	1.344
Monthly family income (Rs.)	Continuous	28,021	14,523.27
Categorical variables	**(a) Nominal**		
Gender	(male and female)	1.37	0.482
Awareness regarding PMFBY	(not aware and aware)	1.40	0.494
Participation in rural non-farm sector	(non-participation and participation in RNF)	1.51	0.50
Access to irrigation	no access and access to irrigation	1.49	0.50
Categorical variables	**(b) Ordinal (1-5 scale)**		
Access to PMFBY	not accessible, not sure, accessible in to some extent, accessible but not in village and well accessible in villages	2.42	1.419
Access to formal credit for farming	no access of credit, very limited access, less accessible than informal credit, accessible but far from farm land and well access to formal credit	2.70	1.376

(Authors' calculation from primary survey data)

3.2. Factors influencing Indian growers to avail PMFBY

Probit regression is employed to explore the impact of select demographic and socio-economic factors on growers' willingness to participate (WIP) in PMFBY in the select states of India. The goodness of fit of the probit model is measured and Table 3.2 in this study shows that the model is good to fit. Explanatory variables which are added in the probit model to be regressed on the dependent response variable are well fit to run.

Table 3.2 Chi-square test: model's goodness-of-fit:

		Chi-square	Df	Sig.
Probit Model	Pearson goodness-of-fit test	8.058E+14	498	0.090

Table 3.3 highlights the findings of probit regression which indicate that apart from participation in rural non-farm sector (not significant at 95% confidence level as 0.155> 0.05), other continuous variables like age, education, farming experience, farm land holding and monthly family income of the farmers as well as the categorical variables like gender, awareness regarding PMFBY, access to irrigation, access to PMFBY and access to formal credit for farming are significant at 5% level (less than 0.05). These ten demographic and socio-economic factors have significant impact on cultivators' perception and crop insurance decision. Positive estimates, i.e., 0.75, 0.323, 0.077, 0.603 and 1.446 respectively express that with the increase of education, size of farm land holding, monthly family income (Rs.) to pay insurance premiums, awareness regarding PMFBY and access to PMFBY, Indian farmers become more likely to avail PMFBY. Again, negative estimates, i.e., -0.020, -0.036, -0.185, -0.260 and -0.146 respectively express that with decrease in age, farming experience, gender, access to irrigation and access to formal credit for farming, Indian cultivators become more likely to avail PMFBY. The fact implies that comparatively older cultivators, growers with huge farm experience, female growers, those who have access to irrigation in their farm land and those who have access to formal credit for farming are less likely to avail PMFBY. Participation in rural non-farm (RNF) sector has played a very significant role in the livelihood of Indian cultivators during COVID-19 pandemic (Mukherjee, 2021) but this study finds no significant impact of this factor on farmers' crop insurance perception and decision.

Table 3.3 Probit regression coefficients of fitted model:

Parameter(s)	Estimate	Std. Error	Z value	Significance at 5% level
Intercept	-8.590	.427	-20.104	.000
Age (years)	-.020	.007	2.806	.005
Education (years)	.075	.013	5.969	.000
Farming experience (years)	-.036	.009	-4.145	.000
Farm land holding (hectare)	.323	.064	5.040	.000
Monthly family income (Rs.)	.077	.021	-10.114	.000
Gender	-.185	.061	-3.062	.002
Awareness regarding PMFBY	.603	.094	6.438	.000
Participation in rural non-farm sector	-.159	.111	-1.423	.155
Access to irrigation	-.260	.070	-3.709	.000
Access to PMFBY	1.446	.058	24.988	.000
Access to formal credit for farming	-.146	.031	-4.743	.000

(Total no. of observation = 510), (Authors' calculation from primary survey data)

Findings of this analysis support that of some earlier studies by Dadzie and Acquah (2012); Iqbal et al. 2016 and Akhtar et al. 2018 where negative estimation of age coefficient signifies that older cultivators are less likely to avail crop insurance. It is found that risk aversion attitude and crop insurance culture are more evident (Mukherjee and Chattopadhaya 2020) among young and educated cultivators. Higher the education, higher the risk aversion and likeliness to take decision in favour of crop insurance (Akhtar et al. 2018). The present study has found no significant impact of engagement in rural non-farm sectors and earnings from off-farm sources. Here, the result fails to follow the earlier studies by Akhtar et al. 2018 in Pakistan and Mukherjee 2021 in India where lower off-farm income has been found as an indicator of risk aversion in agriculture. This study also finds an opposite result of earlier studies while assessing impact of farmers' income on crop insurance decision. Lamb, 2003; Iqbal et al. 2016; Akhtar et al. 2018 explore the fact that the farmers with lower income are prone towards risk aversion and adoption of insurance. This study, in contrast, reveals farmers' perception regarding crop insurance premium as a costly affair and that's why growers with higher income only have the capacity to avail farm insurance. This finding is related to the finding of the study conducted by Akter, Brouwer, Choudhury and Aziz 2008 in the context of Bangladesh. The present study finds out positive influence of awareness regarding PMFBY and access to PMFBY on Indian growers' decision to adopt PMFBY which are related to the results of the study by Akhtar et al. 2018 conducted in Pakistan highlighting that access to farm insurance and related information should encourage the cultivators to participate in crop insurance programme. The study by Akhtar et al. 2018 also reveals

that maize growers' experience in Pakistan impacts positively on cultivators' risk mitigation strategy where as our present study finds out a negative association between farming experience and insurance decision. Experienced growers are less likely to avail PMFBY as new growers with no or less crop experience have positive mind-set towards risk mitigation and insurance adoption. This finding is related to that of the study conducted by Ayinde, 2008. Size of farm land holding by Indian farmers has significant positive association with cultivators' willingness to participate in crop insurance programme. The finding is in relation with the earlier studies conducted by Lucas and Pabuayon 2011 and Ullah et al. 2015 who have also found a positive impact of farming land size on growers' risk mitigation attitude. Determinants like access to irrigation and access to formal credit for farming have significant negative impact on Indian growers' insurance decision found our present study. This is related to the findings documented by Karthick and Mani 2013 in the context of farming in Tamil Nadu, India.

4. SUMMARY AND CONCLUSION

The present study has been initiated to investigate Indian growers' perception regarding crop insurance, especially PMFBY and farmers' willingness to participate in crop insurance programme at the post-Kharif crop season in 2021. The study has been conducted in select five states of India with a view to explore the impact of select few socio-economic determinants on cultivators' risk aversion attitude and crop insurance decision. Cross sectional data have been collected for this purpose from total 510 farmers. Majority of the growers belong to 18-35 age groups having average formal education of not more than 6 years. Young growers with no or less crop experience have positive attitude towards risk mitigation through PMFBY. Cultivators are found small and marginal in nature having less than 2 hectares of farm land. Farmers holding larger farm land are more willing to adopt crop insurance. Crop insurance premium is perceived as a costly matter and thus, growers having more household income are likely to participate in PMFBY. Majority of the growers are male and they have positive risk mitigation attitude than the female farmers. It is witnessed that 60% growers are not aware of PMFBY and they have not attended any awareness programme on PMFBY. Even, PMFBY is found not accessible to majority of the cultivators. These growers have no access to irrigation in their fields till now. It is also found that there is lack of formal sources of credit for farming among poor small growers. Both access to irrigation and access to formal credit have significant negative impact on Indian cultivators' insurance decision in this study. It implies that farmers neither having irrigation support infrastructure nor endorsed by the financial support of Indian Government are more likely to adopt farm insurance of PMFBY. This present study recommends for developing sustainable farm insurance programme with subsidized premium rate with more awareness programmes to reach the farmers who are excluded till now from the benefits of PMFBY along with formal financial assistance.

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