Analysis of Socio-Economic and Personal Characteristics of the Adopters and Non-Adopters of Climate Change Resilient Technologies in West Bengal, India

ABSTRACT

The study relates to the socio–economic condition of the respondents who are adopting climate resilient technologies and also not adopting those technologies.The socio-economic characteristics pertaining to demography, means of production, investment, income and expenditure pattern of people living in a particular location strongly influence their responses to technological changes and participation in development schemes. Socio-economic study of villages is mainly for understanding the present condition of villages regarding the lifestyle, education status, and overall development of rural areas. It influences the accessibility to the resources, livelihood pattern, food and nutritional security etc. The present study was conducted in Cooch Behar and Malda districts of West Bengal to know the socio-economic status of the farmers in adopted and non-adopted villages of climate resilient technologies. A total of 120 respondents were randomly selected for the study from the total of 120 respondents 60respondents were selected from climate resilient technologies adopted villages and another 60 respondents were selected from non-adopted villages. It has been found that majority of the respondents from adopted and non- adopted villages were belonging to Below Poverty Line category and climate resilient technologies adopted village respondents were having better Socio- Economic status than the non-Adopted villages.

Key words: Socio economic, Adopters, Non-adopters, Climate, Resilient, Technology, Respondents.

1. Introduction:

Indian agriculture has been the backbone of the economy for several thousand years and it still remains to be with 20per cent contribution to Gross Domestic Product (GDP) (Balkrishna *et al.,* 2021) and 50% employment of country's work force**.** Climate change is a global reality (Apurba and Haque, 2016). About two-thirds of the country's cultivable land depends exclusively on rainfall, which is often erratic and poorly distributed (Anil *et al.,* 2015). Climate change and global warming impacts all sectors of human life (Tajpara *et al.,* 2018). Climate change has caused diverse and significant impacts around the world (Lai *et al.,* 2021).Climate change is the most threatening phenomena and addressing it is the biggest challenge for civilized society now-a-days. Agriculture is inherently sensitive to climate conditions (Devi *et al.,* 2020) and is the most vulnerable sector to the risks and impacts of climate change. India is one of the most vulnerable countries in the world when it comes to climate change (Rohit *et al.,* 2017). The threat of climate change to agriculture is due to scanty and erratic rainfall pattern, shifting of seasons, more occurrences of climate extremities or increasing average daily temperature (Anonymous, 2011). Such phenomena will impact agriculture considerably through their direct and indirect effects on crops, livestock, and incidences of pest-disease-weeds, increasing deterioration of soil health and thereby threatening the food security like never before. Changes in rainfall due to global climate change may affect the surface moisture availability, which is important for germination and crop establishment in the rainfed areas (Medhi *et al.,* 2018). Warmer environment coupled with erratic rainfall distribution, results in higher rate of evaporation and depletion of soil moisture. In recent years Agriculture research had provided immense opportunities to increase agricultural production, this mainly depends on our ability to involve a large numbers of farmers and to impact them with the knowledge and skills necessary for the large scale use of new agricultural technology and inputs in an intensive

manner (Dobariya *et al.*, 2017). With the changed climatic conditions, there is every need to adapt or to go for mitigation measures to tune with climate change (Anseera and Alex, 2019). Resilience of a system to adverse external and internal factors is critical for the survival and success of the system in a sustainable manner (Jasna *et al.*, 2017). In order to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration National Innovations on Climate Resilient Agriculture (NICRA) was launched (Anonymous, 2021). According to Ganesh and Rahman (2018) with NICRA technologies impact 90 per cent migration was reduced and farmers' income increased up to 66.66 per cent.

Dissemination of climate knowledge and climate resilient technologies by local institutions will enhance resiliency of farm household (Naveen *et al.,* 2020). Socio-economic characters of an individual determines the psychological make-up of a person which in turn influence the decision making pattern towards any action. The term socio deals with the behavior, family structure, social structure, and social interactions of the people. Hence, characterization of socio-economic features may pave a way for the better understanding of the different livelihood activities carried out as a means of living (Benjongtoshi and Patra, 2021). Vijayasarathy and Ashok (2015) revealed that education level increases the probability of adopting climate resilient technologies, while household-size and farm-size negatively influence the adoption of technologies. Farmers' priorities may differ from technology to technology based on their age, gender, landholding size, income level, farming system and location (Arun *et al.,* 2017). Understanding the socio-economic status of the farmers helps in accelerating the process of effective transfer of technology as because it largely affects the adoption process. Extension programmes were proven as the best boon for improving the agricultural knowledge and socio-economic level of farming community in India (Gofard *et al.,* 2018). The highly correlating socio-economic variable have to be considered first before

offering any technology for adoption and technology should be developed in such a manner so that it creates a symphony with the existing socio-economic status of the intended people.Hence, the main objective of this study was to investigate the socio-economic and personal characteristics of the adopters and non-adopters of climate change resilemt technologies

2. Materials and Methods:

The study was conducted in Cooch Behar and Malda districts of West Bengal in the year 2019. This study covered the socio economic characteristics of the farmers who adopted and not-adopted the climate resilient technologies in the above mentioned two districts. Two KVKs were selected from the two districts which are implementing National Innovations on Climate Resilient Agriculture project (NICRA). Two villages were selected purposively from each KVK zone. One adopted village of KVK and another is Non-adopted village which is adjacent to the adopted village. A total number of 120 respondents were taken for the research work. From each village 30 respondents were selected randomly. The statistical methods such Percentage, Mean, Standard deviation, t-test, $\chi 2$-test were used as per the characteristics of data for analysis.

3. **Results and Discussion:**

3.1. Socio-economic and personal characteristics of the respondent

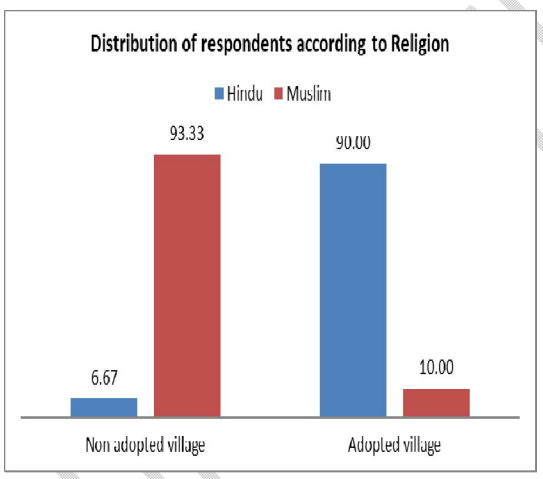
Figure-1 to 5 and Table-1 depicts the socio-economic and personal characters of the respondents.

From (Fig 1) it is shown that in the non-adopted village Muslim population was more (93.33 percent) than the Hindu population. In adopted village, Hindu respondents were more (90 percent) than the Muslim respondents.

In respect of distribution of the respondents according to their economic class (Fig 2), in both the non-adopted and adopted villages most of the respondents are under Below poverty level (BPL) class that is 96.67 and 81.67 per cent, respectively.

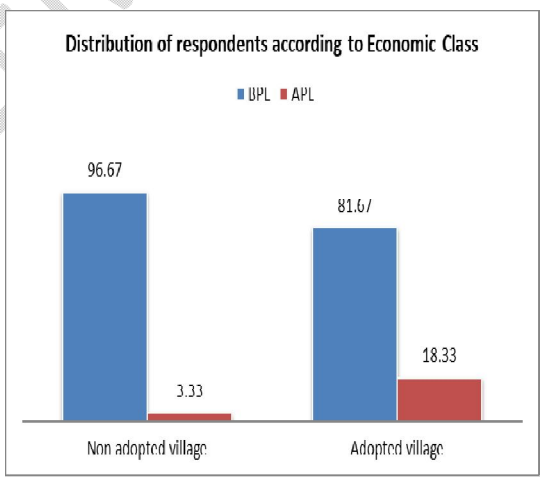
Distribution of respondents according to their organizational participation (Fig 3) indicates that most of the respondents having no membership i.e. 70% and 53.33% in adopted and non-adopted village. But in case of member in any organization 46.67% of respondents are from non-adopted village and only 30% are from adopted village.

While, Caste distribution (Fig 4) shows that Other Backward Class (OBC) was more (93.33 percent) in non-adopted village than in the adopted village. 55 percent of farmers in the adopted village and 5 percent in the non-adopted village belong to Scheduled Caste (SC) community. The statistical value indicates there is a significant difference between the two villages.



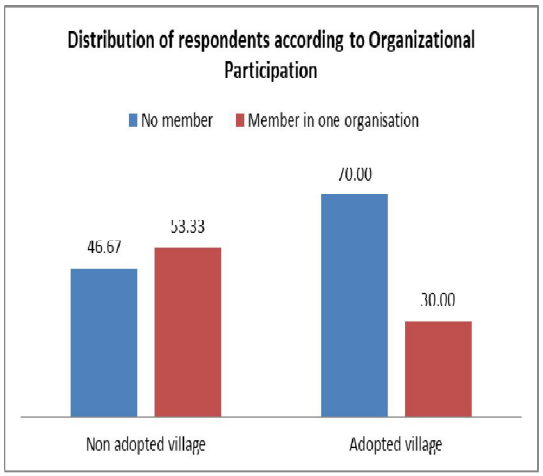
Chi-Square value=83.42**

Fig. 1: Distribution of respondents according to religion.



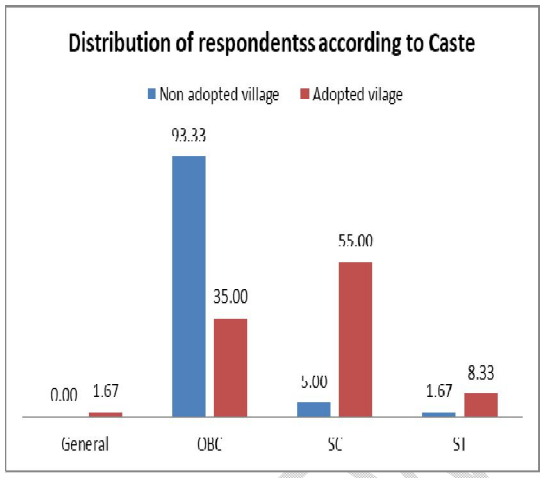
Chi-Square value=6.98**

Fig. 2: Distribution of respondents according to economic class.



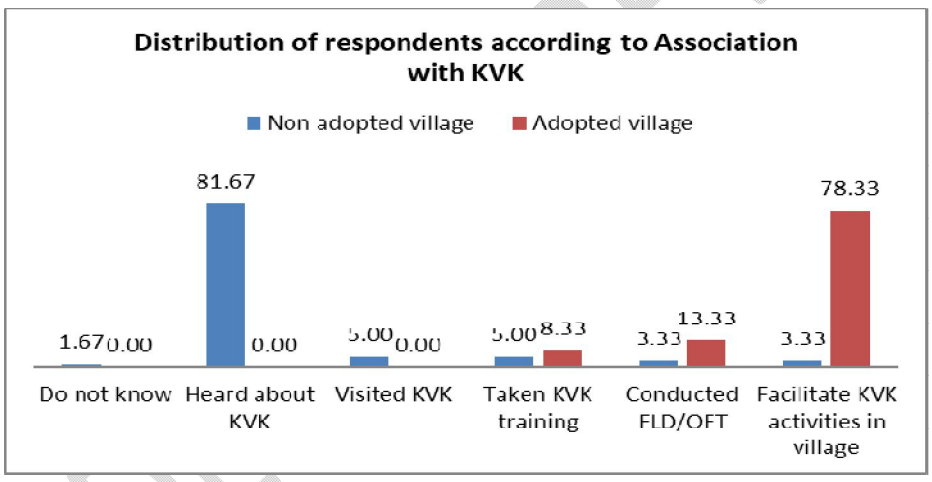
Chi-Square value=6.72**

Fig. 3: Distribution of repondents according to organizational participation



Chi-Square value=44.57**

Fig. 4: Distribution of respondents according to caste



Chi-Square value=98.427**

Fig. 5: Distribution of respondents according to association with KVK

Distribution of respondents according to their association with KVK was also assessed. From (Fig 5) it is observed that most of the respondents (81.67%) from non-adopted villages only heard about KVKs, but in case of adopted village many respondents (78.33%) facilitate KVK activities in village.

The $\chi 2$-value indicates there is no homogenous relationship between the adopted and non-adopted village.

Table 1 indicates mean comparison between the adopted and non-adopted village respondents according to socio-economic and personal characters. The table 1 shows that the mean value of adopted village in case of age, education, family size, total land, outside contact, total income, mass media participation, exposure to extension media, household power access status and awareness score is more than the non-adopted village that is 45.85, 6.93, 4.14, 7.92, 3.23, 173950.00, 2.28, 8.40, 7.75 and 48.01, respectively. But in case of household physical access status the mean value of non-adopted village is more than the adopted village that is 7.03. It indicates that the impact of KVK is more in the adopted village than the non-adopted village. The t- value is significant in every socioeconomic character. It implies there is significant difference between the adopted and non-adopted village.

Table 1: Personal and socio-economic characteristics of the respondents

Socio-economic characters	Adopted Village			Non-Adopted Village			t-test value
	Mean	Standard Deviation	CV	Mean	Standard Deviation	CV	
Age	45.85	9.52	20.76	41.60	13.36	32.14	2.005*
Education	6.93	4.74	68.39	4.48	4.45	99.45	2.914**
Family size	4.14	1.34	32.36	5.70	2.14	37.57	3.932**
Total land (Bigha=0.33ac)	7.92	3.77	47.60	3.28	2.83	86.40	7.620**
Outside contact	3.23	0.81	25.06	1.70	0.88	52.28	9.876**
Total Income	173950.00	70844.88	40.73	140583.33	47269.97	33.62	3.035**
Mass media participation	2.28	1.27	55.92	0.95	1.08	113.71	6.175**
Exposure to extension media	8.40	2.08	24.82	3.76	1.35	36.04	14.427**
Household physical access status	6.60	0.80	12.22	7.03	1.16	16.55	2.370**

Household power access status	7.75	1.45	18.80	6.05	1.06	17.54	7.298**
Awareness score	48.01	2.54	5.29	28.53	6.98	24.48	20.303**

*Significant at 5% ** Significant at 1%

Table 2 represents respondent's coefficient of correlation (r) values between socio-economic and personal character variables and adoption score of the climate resilient technologies. The result shows that the variables education of household head, total land holding, outside contact score, total yearly income of the family, extent of participation, exposure to interpersonal media, household power access status and level of awareness on climate resilient technology are positively and significantly associated with adoption score. It indicates that a change in these variables will change the adoption level in the same direction. All the variables have a positive effect on the adoption level of the respondents. But only one socio-economic character household physical status is negatively significant with adoption score. House hold physical status means the housing condition and sanitation. Household physical condition is an indicator of higher income which may come not only from agriculture but also from other diversified sources, viz. families with good household physical status is less dependent on agriculture, which may lead to such findings.

Table 2: Coefficient of correlation (r) values between socio-economic and personal character variables and adoption score of the respondents.

S.NO	**Socio-economic and personal characters**	**r-value**
1	Age of the household head	0.135
2	Education of household head	0.271**
3	Family size (Numbers of family members)	-0.177
4	Total land holding	0.528**

5	Outside contact score	0.467**
6	Total yearly income of the family	0.236**
7	Extent of mass media participation	0.352**
8	Exposure to inter-personal media	0.680**
9	House hold physical status	-0.254**
10	Household power access status	0.394**
11	Level of awareness on climate-resilient technology	0.792**

*Significant at 5% **Significant at 1%

4. CONCLUSION

It is inferred from the above research that the mean value of socio-economic status was more in adopted village than the non-adopted village. But in case of household physical access status the mean value of non adopted village was more than the adopted village. Both the respondents in adopted and non adopted villages mostly were under Below Poverty level (BPL). Most of the respondents from non-adopted village heard about KVK's. While in adopted village most of the respondents were facilitating KVK activities.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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