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Study on Knowledge Level of Farmers towards Climate Change on Crop Production at Udaipur District, Rajasthan, India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Climate change is one of the most serious ecological problems, and it has a wide-scale effect on agricultural productivity all over the globe. In general, farmers know little about climate change, and their understanding of its impacts on agriculture is poor. Additionally, farmers play the most important role in supporting the economy. This research was conducted to understand farmers' knowledge about climate change. Check the level of knowledge they have. The present study, 'knowledge level of farmers towards climate change on crop production' was conducted in 2023. A total of 120 participants were selected from eight different villages' two tehsils, Vallabhnagar and Mavli. The research revealed that farmers' knowledge about climate change was ascertained at medium level and the independent variables namely age, caste, education, family type, house, sources of knowledge and economic motivation were positively and significantly correlated with knowledge level of the farmers about climate change.

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1. INTRODUCTION

Climate change is one of the biggest problems facing the world today. The Inter-governmental the Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to assess climate change based on new scientific finding**.** A Special Report of the IPCC on Greenhouse Gas Fluxes in Terrestrial Ecosystems, Food Security, Sustainable Land Management, Desertification, and Land Degradation [1]. The primary cause of global agricultural crop losses each year is direct weather-related effects. The burning of fossil fuels, rapid industrialization, and deforestation increase atmospheric carbon dioxide (CO_2) and other greenhouse gases, such as methane (CH_2), nitrous oxide (N_2O), and chlorofluorocarbons (CFC). These gases create a layer in the atmosphere that keeps the earth from emitting long-wave radiation that would have otherwise escaped into space. The average world temperature is rising as a result [2].

When compared to the scientific community, farmers have distinct opinions about climate change. In other words, farmers rely on their social values, contacts with local communities, and conceptions of climate change knowledge and understanding to adapt to climate change, while scientists frame climate change in different ways [3]. In Asia, agricultural crop yield has been forecast to decline 5 to 30 percent by the 2050s due to increasing temperatures and this decline in agricultural produce will lead to food insecurity, which will become the most serious predicted problem for humankind" [4]. Furthermore, temperature fluctuations have also been seen as a catalyst for pests and diseases by enhancing the multiplication of pathogens and their survival periods [5].

The farming sector already faces issues with sustainability, yield decline, soil degradation, water logging, price volatility, natural disasters and small farm sizes [6,7]. The growing population increases the demand for sustainable food supplies. In addition to these huge challenges, climate change puts more pressure on agriculture which has an impact on the poor population [8]. A human activity that depends on the climate is actually agriculture [9].

The present study focuses on assessing the knowledge of farmers about climate change. It helps in identifying how much knowledge farmers' have about climate change.

The following specific objectives are study in the paper

1. To assess the socio- economic profile of the farmers.
2. To ascertain knowledge level of the farmers towards climate change.
3. To find out the relationship between dependent variable with independent variables.

2. METHODOLOGY

The present study was conducted in Mavli and Vallabhnagar of Udaipur district of Rajasthan, that were purposefully selected in 2023. As it is closely located to the urban areas. Eight villages namely Akodra, Bhimal, Dabok, Ghasa, Adinda, Daroli, Maharaj ki Kheri and Peepal were randomly selected. A well structured interview schedule with relevant questions was prepared and Pretested before the study. Sample sizes of 120 participants were selected through random sampling from eight villages. Relevant questions about climate change were asked through personal interview method and the responses were recorded.

This study adopted a descriptive research design. Knowledge responses were recorded in the 3-point continuous scale; completely correct, partially correct, and incorrect are scored as 3, 2, and 1, respectively. Overall knowledge level was determined and the respondents were categorized as low (20–25 points), medium (25–30 points), and high (30–35 points). Karl Pearson's Co-efficient of Correlation was so as to analyse the relationship between selected independent variable and knowledge level of farmers' i.e. Dependent variable.

2.1 Karl Pearson's Co-efficient of Correlation

It was used to find out the relationship between two variables. Pearson's product moment correlation coefficient was calculated using the formula:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

3. RESULTS AND DISCUSSION

Socio-economic status of the respondents: as can be seen from Table 1, most of the respondents to this study were 16.66 percent in the (up to 35) year age group, followed by 65 percent in the 36–50 year age group, and 18.33 percent belonged to the 50-year-old age group. In terms of gender, the majority 60 percent of respondents were female, and 40 percent were male. Regarding caste, it was found that 35.00 percent belonged to the general category, followed by 40.83 percent in OBC, 16.66 percent in the scheduled tribe category, and 7.5 percent in the scheduled caste category. In terms of education, 27.5 percent of respondents were illiterate, 37.5 percent had a primary education, 15.83 percent of respondents had a secondary school education level, 12.5 percent of the had a high school education level. Lastly, only 6.66 percent of were intermediate or above their education level. In terms of occupation majority of the respondents were engaged in farming only, at 50.83 percent. About 35.0 percent were engaged in both farming and business. Similarly, 14.16 percent of the respondents were involved in both farming and service. Regarding annual income, the majority of respondents have a high income level (above Rs. 96,000), which is 40.83 percent of the respondents, medium-income category (Rs 48,001 to 96,000) is comprised of 32.5 percent of respondents. The low-income category (up to Rs 48,000) has only 26.66 percent of respondents. Regarding marital status, it was found that 72.5 percent of respondents were married and 25.83 percent were unmarried. Only 1.66 percent of respondents were in another category. In terms of family type, the majority 56.66 percent belong to the nuclear family type, and 43.33 percent belong to the joint family type. In terms of farming experience of respondents, a majority of 42.5 percent have high levels of participation and farming experience, while 35.83 percent have medium levels and 21.66 percent have low levels of farming experience. In terms of economic motivation among the farmers, 21.66 percent have low economic motivation, 47.5 percent have medium economic motivation, and 30.83 percent have high economic motivation.

The results in Table 2 on farmers' knowledge on climate change showed that majority of farmers 80 per cent had full knowledge about increased temperatures and 52.5 percent farmers had partial knowledge about changing rainfall pattern. Majority of farmers 53.33 percent had not aware about climate change causes massive floods. Majority of farmers had full knowledge 56.66 percent on climate change is resulting in failure of crops. Majority of farmers 73.33 percent farmers had full knowledge on climate change is causing draught. Majority of farmers 77.5 percent had full knowledge about untimely monsoons. Farmers were able to easily recognize the changes in the weather. 54.16 percent had partial knowledge on heat wave speed. The majority of farmers 70 percent were unaware that burning agricultural waste was one of the factors contributing to climate change. 55.83 percent farmers had did not have knowledge that climate change affects soil fertility through storms and heavy rainfall and 65.83 percent had full knowledge on climate change affecting food security. Majority of farmers 56.66 percent had partial knowledge about increase in crop season length. Majority of farmers 63.33 percent farmers had full knowledge about forest and tree cutting (deforestation) it was one of the cause of climate change and 60.83 percent had partial knowledge about high market price due to most of the crop spoilage that is also due to climate change. Majority of farmers 54.16 percent had partial knowledge on climate change causing disease and pest infections through heavy rainfall which is mostly unseasonal. Majority of farmers 45.83 percent had partial knowledge on high use of automobiles is also the cause of climate change.

From the Table 3, it is found that majority of the respondents (65.83 percent) fell in the medium knowledge level group, whereas (23.00 per cent) respondents were observed in the high knowledge level group and remaining (15 percent) respondents formed low knowledge level group. Similar findings were also reported by Chouhan et al. [10].

From this Table 4, we can conclude that the independent variables namely age, caste, education, family type, house, sources of knowledge and economic motivation were positively and highly significant corelated with knowledge level of the farmers about climate

change.Whereas the independent variables such as gender and farming experience had positive and significant corelated with knowledge level about climate change on crop production .The independent variables such as occupation annual income and marital status were found to be non-significant corelated with knowledge level about climate change on crop production.

Table 1. Distribution of respondents based on their socio-economic profile

S. No.	Category	Frequency	Percentage
Age			
1.	Up to 35 years	20	16.66
2.	36 to 50 years	78	65
3.	Above 50 years	22	18.33
Gender			
4.	Male	48	40
5.	Female	72	60
Caste			
6.	General	42	35.00
7.	Other Backward Class	49	40.83
8.	Scheduled tribe	20	16.66
9.	Scheduled caste	9	7.5
Education			
10.	No formal education	33	27.5
11.	Primary Level	45	37.5
12.	Secondary Level	19	15.83
13.	High School	15	12.5
14.	Intermediate level & above	8	6.66
Occupation			
15.	Farming only	61	50.83
16.	Farming +business	42	35.00
17.	Farming + Service	17	14.16
Annual income			
18.	Low income (Up to Rs 48,000)	32	26.66
19.	Medium income (Rs 48,001 to 96000)	39	32.5
20.	High income (Above Rs. 96000)	49	40.83
Marital Status			
21.	Married	87	72.5
22.	Unmarried	31	25.83
23.	Other	2	1.66
Family type			
24.	Nuclear family	68	56.66
25.	Joint family	52	43.33
Farming experience of respondent			
26.	Low level (up to 6 years)	26	21.66
27.	Medium level (7 to 10 years)	43	35.83
28.	High level (above 10 years)	51	42.5
Economic motivation			
29.	Low Economic motivation **(**11-12)	26	21.66
30.	Medium Economic motivation **(**13-14)	57	47.5
31.	High Economic motivation **(**>15)	37	30.83

Table 2. Distribution of respondent based on level of knowledge on climate change

S. No.	Statement	Fully correct (FC)		Partially correct (PC)		Not Correct (NC)	
		F	P	F	P	F	P
1.	Temperature has risen from previous years	96	80	17	14.16	7	5.83
2.	Changing rainfall pattern from previous year	52	43.33	63	52.5	5	4.16
3.	Climate change causes massive floods	22	18.33	34	28.33	64	53.33
4.	Crop failure is an effect of climate change	68	56.66	52	43.33	-	-
5.	Climate change is causing draught	88	73.33	21	17.5	11	9.16
6.	Untimely monsoons have arrived	93	77.5	23	19.16	2	1.66
7.	Increase heat waves speed	43	35.83	65	54.16	12	10
8.	One of the causes of climate change is the burning of agricultural waste.	8	6.66	28	23.33	84	70
9.	Climate change affects soil fertility through storms and heavy rainfall	19	15.83	34	28.33	67	55.83
10.	The impact of Climate change on food security	79	65.83	33	27.5	8	6.66
11.	Crop season length has increased	33	27.5	68	56.66	19	15.83
12.	Climate change is also a result of forest and tree cutting	76	63.33	31	25.83	13	10.83
13.	High market price due to most of the crop spoilage that is also due to climate change	73	60.83	40	33.33	7	5.83
14.	Heavy rains caused by climate change increase the number of pests and disease	38	31.66	65	54.16	17	14.16
15.	High use of automobiles is also the cause of climate change	47	39.16	55	45.83	18	15

Table 3. Distribution of respondent based on overall level of knowledge on climate change

S. No.	Knowledge	Frequency	Percentage
1.	Low (20-25)	18	15
2.	Medium (25-30)	79	65.83
3.	High (30-35)	23	19.16
Total		**120**	**100.00**

Table 4. Association between selected independent variables with knowledge level of the farmers about climate change

S.No.	Independent Variable	Correlation coefficient
1.	Age	0.999*
2	Gender	0.260**
3	Caste	0.718*
4	Education	0.893*
5	Occupation	0.004 NS
6	Annual income	-0.027 NS
7	Marital status	-0.252 NS
8	Family Type	0.734*
9	House	0.659*
10	Farming Experience	0.275**
10	Sources of knowledge	0.853*
12	Economic motivation	0.960*

** = Significant 0.01% level of probability.*
*** = Significant 0.05% level of probability.*
NS = non-significant

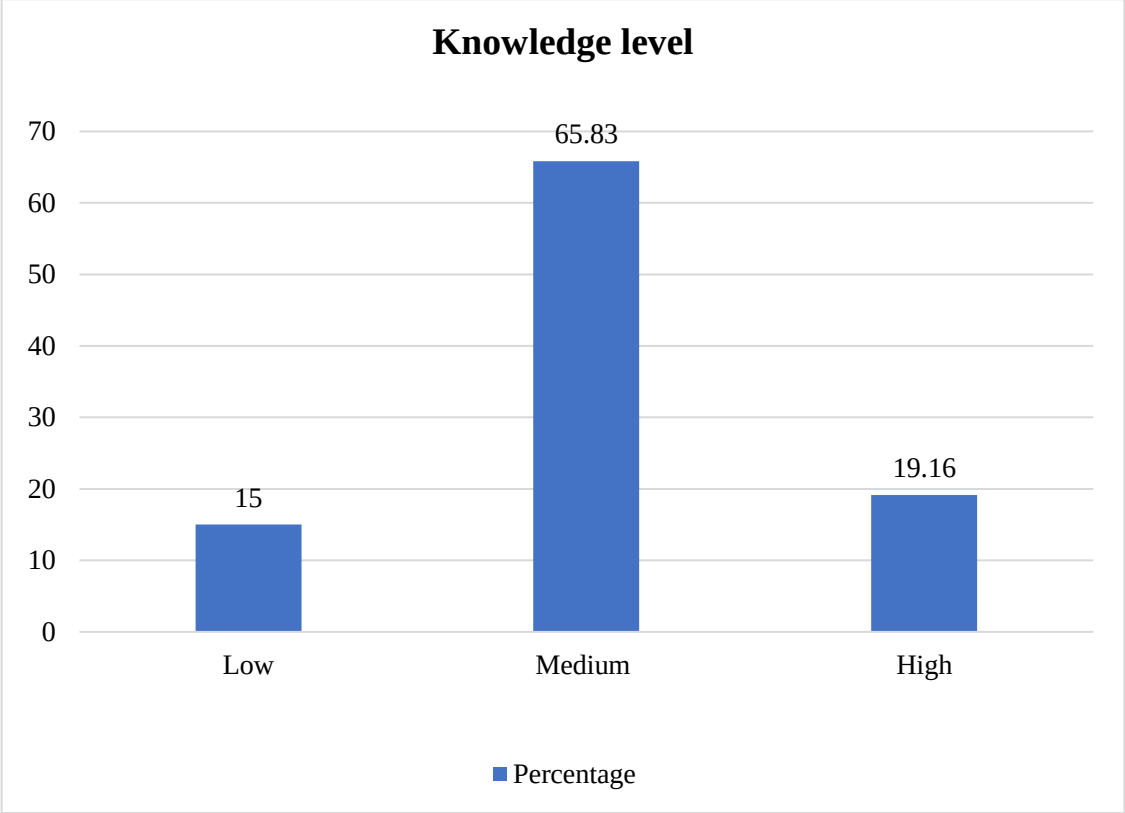

Fig. 1. Distribution of respondent based on overall level of knowledge on climate change

4. CONCLUSION

The results of this study show that farmers are unaware of climate change and are just beginning to understand it. Most farmers have an average level of understanding of climate change. And because exposure is low, most farmers do not have full knowledge of climate change. They often rely on farmers for new information or continue to rely on the knowledge of their ancestors. The knowledge level of the farmers and a few chosen independent variables also showed a significant correlation. However, the majority of farmers were unable to have medium knowledge of climate change due to poor extension interaction.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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