

CORRELATION AND REGRESSION ANALYSIS OF WOMEN FARMERS' CHARACTERISTICS AND THEIR SENSITIVITY TOWARDS EFFECTS OF CLIMATE CHANGE ON CEREAL CROPS

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ABSTRACT

Climate change significantly impacts agricultural systems, particularly in rainfed regions like Dahod district, Gujarat, India, where cereal crops such as maize form the dietary staple. Women farmers, integral to smallholder agricultural systems, are highly vulnerable to climate change due to socio-economic constraints, limited resource access and a reliance on climate-sensitive livelihoods. This study examines the how women farmers' characteristics affect the sensitivity towards effect of climate change. The study utilized an ex-post-facto research design, selecting 40 women farmers from two talukas of Dahod district through random sampling. Correlation and regression analyses were performed on data collected for 14 independent variables. Sensitivity towards effects of climate change on cereal crops served as the dependent variable. The findings reveal significant positive correlations between sensitivity and variables such as education, irrigation source, extension contact, change proneness, scientific orientation, and risk orientation, while age and farming experience demonstrated negative correlations. Regression analysis highlighted farming experience, landholding, extension contact, and cosmopolitanism as key predictors, explaining 61.5% of the variation in sensitivity. Step-wise regression analysis indicated that cosmopolitanism alone accounted for 39.5% of the variation, increasing to 58.5% when combined with farming experience and extension contact.

Keywords: *cereal crops, climate change, women farmers, sensitivity,*

INTRODUCTION

Climate change poses a severe threat to agricultural systems worldwide, particularly in regions dependent on rainfed agriculture, such as Dahod district in Gujarat, India. Women farmers, who play a critical role in smallholder agricultural systems, are disproportionately affected due to their socio-economic vulnerabilities, limited access to resources and greater reliance on climate-sensitive livelihoods (Vinaya and Tapan, 2023). These vulnerabilities exacerbate the sensitivity of women farmers to the adverse effects of climate change on cereal crops, which are staple crops in the region.

Several studies highlight the unique challenges faced by women farmers in the context of climate change. According to Jost *et al.* (2016), gendered roles in agriculture shape how men and women perceive and adapt to climate variability, with women often facing greater barriers to accessing adaptation technologies. Similarly, Mersha and van Laerhoven (2019) emphasize the importance of addressing gendered inequalities in resource access and participation in decision-making to enhance climate resilience. Factors such

as age, education, landholding size, access to information and institutional support influence women's sensitivity and adaptive capacity (Huyer *et al.*, 2015).

The Dahod district is vulnerable to climate change due to erratic rainfall, frequent droughts and rising temperatures, which directly impact the productivity of key cereal crops like maize, and sorghum. Women's perception of and response to these challenges are influenced by their socio-demographic and economic characteristics. Research by Agarwal (2018) underscores the need for gender-sensitive policies that consider these factors to support women farmers in adopting effective adaptation strategies. Moreover, the integration of local knowledge with scientific approaches is crucial to address the intersection of gender and climate change vulnerability (Nyasimi *et al.*, 2017; Pokiya *et al.*, 2024; Bhabhor *et al.*, 2024; Tiwari *et al.*, 2024; Thakor *et al.*, 2024; Ghasura *et al.*, 2024).

OBJECTIVES

- (1) To ascertain the relationship between women farmers and their sensitivity towards climate change effect on cereal crops

- (2) To carry out regression analysis to see the effects of independent variable on dependent variable

METHODOLOGY

The present study was carried out in Dahod district of Gujarat state. In Dahod district, 2 talukas were selected after discussion with the experts on the basis of prevalence of production and area of maize crop. From each talukas, two villages were selected randomly. And from each village, ten women farmers were selected for the study, randomly. So total 40 women farmers were selected for the study. *Ex-Post-Facto* research design was used in the present study (Kerlinger,1976). The data were gathered, processed and analyzed to draw the meaningful conclusion. The statistical tools used for the analysis of the data were correlation and regression analysis. Data was analyzed by SPSS software. Fourteen variables were selected as independent variable. And sensitivity towards cereal crops were selected as dependent variable.

RESULTS AND DISCUSSION

Table 1: Correlation between profile of respondents and their sensitivity towards effects of climate change on cereal crops (n=40)

Sr. No.	Variable	Correlation coefficient ('r' value)
X ₁	Age	-0.411*
X ₂	Education	0.775**
X ₃	Farming experience	-0.408**
X ₄	Land holding i) Land under cereal crop	0.032 -0.126
X ₅	Annual family income	0.024
X ₆	Irrigation source	0.468**
X ₇	Agricultural mass media	0.070
X ₈	Extension contact	0.359*
X ₉	Social participation	0.251
X ₁₀	Credit orientation	0.406
X ₁₁	Change proneness	0.433**
X ₁₂	Cosmopolitaness	0.547**
X ₁₃	Scientific orientation	0.433**
X ₁₄	Risk orientation	0.602**

Positive association between education and their sensitivity of respondents among high education group as compared to low education group of farmwomen helps to interact the ideas in rational thinking and better educated

respondents shows better perception, awareness, attitude and comprehension about climate change effects on cereal crops. Thus, it can be said that sensitivity of respondents was influenced by level of education. The findings are similar with findings of Khati (2020) and Mundhe (2019). Results are showing that irrigation source is positively influencing female respondents towards climate change effects on cereal crops. The findings are similar with findings of Kudale (2019) and Mundhe (2019).

In case of extension contact, Exposure to various media formats enhances respondents' ability to retain and process information, leading to improved perception, awareness, and knowledge. This, in turn, influences their behavior. Thus, it is found that respondents' exposure to mass media had a considerable impact on their sensitivity to the effects of climate change on cereal crops. While, extension contact had no any influence on sensitivity towards climate change effects on cereal crops on male respondents. The findings are similar with findings of Fazely (2024), Khati (2020) and Tajpara (2020).

Positive association between change proneness and their sensitivity towards climate change effects on cereal crops shows that respondents who are prone to change will naturally employ more pressure and try to become more aware and gain more knowledge resulting change in attitude and perception. Further, those who are more prone to change also have tendency to have positive risk orientation. The findings are similar with findings of Khati (2020) and Uttam (2019).

The probable cause for the positive association between scientific orientation and sensitivity towards climate change effects on cereal crops could be that the respondents expands their mental horizon acts as a motivation for improving their ability to receive information and thereby creating positive attitude towards it, which ultimately reflected in better knowledge and perception. Therefore, it is logical to assume that respondents having higher scientific orientation had better sensitivity towards climate change effect on cereal crops. Thus, scientific orientation of respondents was the vital variable in shaping perception, awareness and knowledge of the respondents. The findings are similar with findings of Khati (2020) and Manjunath (2018).

The probable cause for positive association between risk orientation and climate change effect on cereal crops might be due to fact that respondents are oriented to take risk and has courage to face uncertainties caused due to climate change. The respondents with higher level of risk orientation normally would be much ahead of others in exploiting the potentiality of technology. The findings are similar with findings of Parikh & Chauhan (2021), Kudale (2019) and Mundhe (2019).

Table 2 : Multiple regression analysis of sensitivity of female respondents of Dahod district

(n=40)

Sr. No.	Independent variables	Regression Co- efficient (b)	't' value
X ₁	Age	-0.133	-0.829
X ₂	Education	0.209	1.348
X ₃	Farming experience	0.293*	2.03
X ₄	Land holding	0.497**	1.873
X ₅	Annual family income	0.111	0.41
X ₆	Irrigation source	-1.225	-0.824
X ₇	Agricultural mass media	0.018	0.142
X ₈	Extension contact	0.184*	1.057
X ₉	Social participation	0.021	0.166
X ₁₀	Credit orientation	0.095	0.707
X ₁₁	Change proneness	0.276	1.817
X ₁₂	Cosmopoliteness	0.260*	1.743
X ₁₃	Scientific orientation	-0.035	-0.264
X ₁₄	Risk orientation	-0.086	-0.506

* Significant at 0.05 per cent level R² = 0.615

R = 0.786 ** Significant at 0.01 per cent level

Table 2 shows that the variables evaluated in

Table 3: Step-wise multiple regression analysis of sensitivity of female respondents of Dahod district

(n=40)

Model	Name of Variables	Unstandardized Coefficients		Standardized Coefficients	't' Value	Sig.	Multiple correlation coefficient (R)	Coefficient of Determination (R ²)
		B	Std. Error	Beta				
1	(Constant)	9.741	5.932		1.642	0.109	0.629	0.395
	Cosmopoliteness	1.832	0.368	0.629	4.982	0		
2	(Constant)	4.48	5.76		0.778	0.442	0.709	0.503
	Cosmopoliteness + Farming Experience	1.571	0.35	0.539	4.484	0		
		0.437	0.154	0.34	2.828	0.008		
3	(Constant) Cosmopoliteness + Farming Experience + Extension Contact	3.353	5.353		0.626	0.535	0.765	0.585
		1.147	0.361	0.394	3.174	0.003		
		0.567	0.151	0.441	3.75	0.001		
		2.881	1.081	0.325	2.666	0.011		

CONCLUSION

In correlation analysis, here, six variables had established positive and significantly correlated with their sensitivity towards climate change effect on cereal crops. Those independent variables that had exerted positive and significant relationship were education, irrigation source, extension contact, change proneness, scientific orientation and risk orientation. While, two variables, age and farming experience were negative and significantly correlated with their sensitivity towards climate change effect on cereal crops.

One unit change in farming experience, land holding, extension contact, and cosmopoliteness would affect

the regression equation accounted for 61.50 percent of the overall variation in the sensitivity of female respondents. The unexplained variation was 38.50 percent, which might be explained to extraneous variables. The estimated 't' values of the partial regression coefficient were significant for farming experience (X3), land holding (X4) extension contact (X8), and cosmopoliteness (X12).

From the regression analysis, it was concluded that out of fourteen variables, five variables namely farming experience, land holding, extension contact, and cosmopoliteness would affect 0.293* units, 0.497** units, 0.184* and 0.260** units change in sensitivity of female respondents, respectively.

From table 3, it can be conclude that 39.50 per cent variation is explained by cosmopoliteness. However, cosmopoliteness along with farming experience explains 50.30 per cent variation, cosmopoliteness, farming experience and extension contact explains 58.50 per cent variation. Every stage of step-up regression showed significant R² values. Table 3 shows how independent variables contribute to the overall sensitivity of female respondents.

0.293* units, 0.497** units, 0.184* and 0.260** units change in sensitivity of female respondents, respectively.

In case of female respondents, total 39.50 per cent variation is explained by cosmopoliteness. However, cosmopoliteness along with farming experience explains 50.30 per cent variation, cosmopoliteness, farming experience and extension contact explains 58.50 per cent variation. All the independent variable together were contributing 61.50 per cent variation.

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

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