

## Farmer' Perception about Climate Change and its Association with Socio-economic Attributes in Ranchi, Jharkhand

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### ABSTRACT

*This paper analysed farmer perception about climate change in Ranchi district of Jharkhand. Causal factor underlying the perception also analysed through correlation and multiple regression analysis. 72.5 per cent farmers perceived climate change while 27.5 per cent either have not perceived or shown ignorance. Further, at block level, the maximum climate change perception was recorded in Kanke while Namkum block scored the minimum. Correlation analysis revealed highest degree of association bet farmer perception and level of individual awareness. Further, it was reinforced by the study that highly experienced farmers with older age are likely to have more information and knowledge on changes in climatic conditions and crop and livestock management practices.*

**Key words:** Farmer perception; Correlation; Regression; Coefficient; Socio-economic attributes;

There is no doubt that climate is changing and it will go on changing which is a great threat to agriculture and ecology. Globally, many studies have been used to understand farmers' perceptions about climate change and its associated effects on agriculture. Perception has been defined as the process by which organisms interpret and organize sensation to produce a meaningful experience of the world. It is based on individual experiences with natural and other environmental factors (Harig *et al.*, 2001). Ironically, state like Jharkhand in India have very limited information with respect to farmer's perception about climate change. To bridge the information gap present study undertaken.

### METHODOLOGY

The study was carried out in Jharkhand state during the years 2017-18 and 2018-19. Out of 24 districts Ranchi was selected for the present study. Three blocks of the district selected randomly for the selection of villages. From each selected block, 2 villages (Total  $2 \times 3 = 6$ ) were selected randomly for the selection of respondents. From each selected village, 40 farmers were selected through stratified sampling among

population with more than 40 years age. In this way, a total of 240 farmers (Total  $6 \times 40 = 240$ ) were constituted universe of the present study.

To ascertain level of perception regarding climatic events/changes, respondents were asked about 24 selected events/changes occurred in each summer season, rainy season & winter season. Responses of respondents were collected on two-point continuum scale viz. change (Increase or Decrease) and no change on climatic phenomena providing score 1 and 0, respectively.

Pearson's correlation coefficient (r) was computed in order to know the nature of relationship between the dependent and selected independent variables. The values of the correlation coefficients were then tested for statistical significance. The coefficient (r) was calculated by using following formulae:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{n}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{n}}}$$

To find out the best predictor and appropriate fit model for predicting perception of farmers' about climate change a step down multiple regression analysis was worked out. In each step of analysis one variable was

dropped that showing more than 10 and maximum value of variable inflation factor (VIF). In this way best fit model was found by dropping the variable.

## RESULTS AND DISCUSSION

In the present study, among respondents from Ranchi district of Jharkhand 72.5 per cent farmers perceived climate change while 27.5 per cent either have not perceived or shown ignorance. Further, at block level, the maximum climate change perception was recorded in Kanke while Namkum block scored the minimum (Table 1). The scoring was done based on ranking of agro-weather and socio-economic indicators suggested by Varsha Kumari (2016). The differential perception pattern across region is obvious as perception is a cognitive process involving receiving of sensory information and interpreting it. Despite perceiving initial indicators underlying a phenomenon, sometimes people do not respond due to constraints, including lack of capacity, lack of resources, and lack of information. Apart from these constraints, people do not respond to perceived climate change because of their orientation or beliefs. Hence, it is important to understand local level people's perception, its correctness, and how perception of climate change motivates adaptation.

**Table 1. Perception of farmers about climate change**

Perception	Namkum		Ormajhi		Kanke		Total	
	No.	%	No.	%	No.	%	No.	%
Perceived	129	53.8	192	80	201	83.8	174	72.5
Not perceived	111	46.2	48	20	39	16.2	66	27.5
Total	240	100	240	100	240	100	240	100

*Association between climate change perception and socio-economic attributes:* Correlation analysis reveals degree and nature of relationship as well as direction of association between independent and dependent variables. The results are presented in Table 2. Out of twenty four socio-economic variables taken in the study, eighteen variables like Age, Educational status, Farming experience, Social participation, Land holding, Irrigation, Annual income, Annual expenditure, Distance to market, Socio-economic status, Crop insurance, Sources of information, Contact with extension personnel, Cosmo politeness, Awareness, Innovativeness, Scientific orientation, Risk orientation were found significantly

correlated in positive direction with perception of farmers about climate change (PCC) at 0.05 level of probability.

**Table 2. Correlation analysis of socio-economic attributes with climate change perception of farmers**

Attributes	(r)
Age	0.41**
Educational Status	0.19**
Farming Experience	0.38**
Social Participation	0.17**
Land Holding	0.29**
Irrigation	0.20**
Annual Income	0.37**
Annual Expenditure	0.35**
Distance to Market	0.24*
Socio-economic Status	0.28**
Crop Insurance	0.21**
Information Source	0.28**
Contact with Extension Personnel	0.35**
Cosmo politeness	0.28**
Awareness	0.62**
Innovativeness	0.42**
Scientific Orientation	0.40**
Risk Orientation	0.37**

**Table 3. Multiple regression analysis of best fit model among significantly associated socio-economic attributes with perception of farmers' about climate change**

Variable	Regression Coefficient	
	b value	t value
Age	0.146*	2.337
Land holding	-0.254*	-2.011
Irrigation	0.800*	2.571
Annual income	0.020*	2.578
Exposure to mass media	-2.304*	4.626
Awareness	0.568*	6.490
Innovativeness	0.213*	2.266

\* Significant at 0.05 level of probability

Multiple R<sup>2</sup>= 0.525, Intercept = 6.956,

'F' Value = 10.391 at 23, 216 df

*Multiple regression analysis :* Regression analysis worked out to determine strength of relationship between dependent and independent variables. In the present study we performed multiple regression analysis. The analysis consisted of choosing and fitting an appropriate model, done by the method of step down regression analysis. Results are presented in Table 3.

Out of twenty-three variables considered in the model, seven variables like age, land holding, irrigation, annual income, exposure to mass media, awareness and innovativeness showed significant contribution on predicting perception of farmers' about climate change at 0.05 level of probability. The model revealed that 52.50 per cent of the variation in perception of farmers about climate change can be explained by considering twenty threesocio-economic variables and one dependent variable. The model is significant in predicting dependent variable with 10.391 'F' value at 0.05 level of probability.

These findings are in partial accordance with those reported by *Shiferaw and Holden (1998)* that age of the head of household can be used to capture farming experience, *Nhemachena and Hassan (2007)* argued that higher age with highly experienced farmers are likely to have more information and knowledge on changes in climatic conditions and crop and livestock management practices. They also discovered that higher income farmers might however be less risk-averse and have enough access to information and access to extension services with mass media exposure was one

of the important determinants of farmer's perception on climate change and farm-level adaptation. Total size of farm area also had positive effect on climate change perceptions but the likelihood of farmers' adaptation to climate change varied.

## CONCLUSION

In nut shell, present study revealed majority respondents in Ranchi district well perceived initial indicators of climate change. Socio-economic attributes like Age, Educational status, Farming experience, Social participation, Land holding, Irrigation, Annual income, Annual expenditure, Distance to market, Socio-economic status, Crop insurance, Sources of information, Contact with extension personnel, Cosmo politeness, Awareness, Innovativeness, Scientific orientation and Risk orientation were positively associated with the perception. Further, regression analysis identified seven variables like age, land holding, irrigation, annual income, exposure to mass media, awareness and innovativeness important for predicting farmer perception for the phenomenon.

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