



Assessing the Knowledge and Attitude of Farmers towards Climate Change in Kishanganj District, Bihar, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2023/v13i102976

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/105662>

Original Research Article

Received: 01/07/2023

Accepted: 05/09/2023

Published: 13/09/2023

ABSTRACT

Climate change is viewed as the main problem of agriculture development in India. High dependence on agriculture and allied sectors makes the Indian state of Bihar vulnerable to climate change. Farmers' perceptions of climate change and their preferences for adaptation strategies must be understood in order to improve policies for addressing the issues that climate brings to farmers. Therefore, the main aim of the present study was to understand farmer's perception of awareness of the climate change and their perception towards coping mechanism for changing climate. A total of 240 respondents were selected using purposive sampling in the % villages of Kishanganj district from March to May 2023. A descriptive research design was used in the study. Data was collected through face to face interview method using a semi structured interview

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schedule and analyzed using suitable statistical tools and techniques. It was found that the majority of farmers had a medium level of socio-economic characteristics. From the study result it was found that farmers were aware of about the climate change. Farmers agreed that the peak time of seasons has changed and there is a change in the onset of monsoon. Farmers exhibited resilience to changing climate through various local adaptation practices such as Switch to timely weather forecasting information, Climate-resilient practices, etc. The findings will help to refine and enrich the knowledge among the stakeholders to provide an effective framework for decisions and policy making.

Keywords: Awareness; climate change; farmers; perception; resilient.

1. INTRODUCTION

The impacts of climate change on agriculture and agricultural livelihoods have been identified as one of the primary barriers to sustainable development. Various consequences of climate change on agriculture include decreased crop output, altered water availability, soil erosion, an increase in pests and diseases, and—most significantly—affecting the socioeconomic stability of farming communities [1]. Changes in the climate influence agriculture around the world. The effects of climate change on society have become an international issue of common concern to governments, societies, and scientific communities. Agricultural production is deceptively affected by climatic shock, which is usually demonstrated by the outbreak of pests and disease, and land degradation problems. The supply of diverse crops and livestock products while protecting the environment is a significant challenge in the near future. Climate change may decrease world food production by 1.5% per decade. Climatic factors such as temperature, solar radiation, relative humidity, and carbon dioxide (CO₂) concentration have affected plant growth and yield [2]. India's large population, reliance on agriculture, and extensive usage of natural resources make them more vulnerable. India has "self-sufficiency" in the production of food grains, notwithstanding this. In addition, it brought with several socioeconomic and environmental problems, including increased pests and diseases, water logging, ground and surface water contamination, and loss of soil fertility [3,4]. A large rise in temperature, frequent heat waves, droughts, extremely high precipitation events, and powerful cyclonic activity were all recently documented by researchers [5,6,7]. Since Bihar is state a dependent on agriculture, agriculture is essential for the total growth of the state's economy. About 81% of the population in Bihar, which is significantly more than the national average, is employed in agriculture and related businesses.

The phonology, physiology, and productivity of the majority of crops have been disrupted in India as well as in Bihar over the past few decades due to climate change, which has taken the form of severe drought, unpredictable rainfall, high temperatures, etc. [8].

As the climate and agricultural production system change, food security will be impacted, and farmers will be the first to feel the severe repercussions [9]. Crop failure has negative effects on the economy, including inflation and farmer misery. India is quite concerned about climate change and the difficulties may bring because 85% of farmers there have inadequate financial resilience [10]. In this situation, farmers are the top implementers of adaptation measures to lessen the effects of climate change on the production system. Long regarded as a prerequisite for taking adaptation measures, perception of climate changes [11]. Farmers who understand climate change and its negative effects are more likely to support policy measures to address it [12].

To reduce the risk of climate change, perception, awareness, and adaptation are necessary [13]. In her research in four villages in Maharashtra and Andhra Pradesh, found that knowing farmers' perceptions is crucial for creating adaptation strategies to deal with the growing effects of climatic unpredictability and shocks. In a study conducted in Namibia, [14] discovered that Farmers were aware of the situation with regard to climate change, and they had seen major fluctuations in the amount of rainfall and temperature that had an adverse effect on their farms and crops.

Despite possessing fertile soil, adequate rainfall, and groundwater availability, Bihar is vulnerable to several of natural and man-made calamities that reduce the productivity of the agriculture sector, including floods, droughts, hailstorms, cyclones, and earthquakes. North Bihar makes

up 74% of the region's total area and experiences floods more frequently than South Bihar does. To enhance policy for addressing the problems that climate presents to farmers, it is important to understand how farmers view climate change, what adaptation techniques they prefer, and what barriers to adaptation they face [15]. Farmers had been watching the consequences of climate change on their own, it was discovered after completing a proper exercise with them. The current study aims to investigate the socioeconomic position and climate change knowledge of farmers. This study aims to: (1) examine respondents' socioeconomic circumstances; and (2) ascertain farmers' perceptions of the effects of climate change.

2. MATERIALS AND METHODS

The study is based on primary data obtained from a household survey in the Kishanganj district of Bihar using a semi-structured interview schedule from March to May 2023. The data for the study is purposively selected from the Kishanganj district as this district is severely affected by floods. Multi-stage sampling design was used for the study. A Three stage sampling frame was formulated to select the sampling unit. In the first stage, Kishanganj district was selected based on the vulnerability to climate change. In the second stage, five villages namely Chagaliya, Kashipur, Kashipur Belwa, Lohadanga and Motihara Taluka from Kishanganj block were selected. Qualitative methods such as face to face method of data collection, focus group discussion were applied to study farmers' perception of flood climatic variability, and occurrence of flood. Data were collected using random sampling. In each villages, 48 farmers were selected thus the total number of farmers was 240. Collected data were scored, tabulated, computed and analyzed using appropriate statistical tools and technique such as frequency, percentage mean, mean ranking to provide necessary interpretations.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Status of Respondents

Table 1 displays the socioeconomic position of farmers, and it is evident that 44.1% of respondents had a medium level of socioeconomic status followed by 29.5% having high level of socio-economic status, and the rest

26.2% of respondents had a low level of socioeconomic status respectively. The findings of the study were similar to the findings of Varadan and Kumar [16].

3.2 Farmer's Perception of Awareness of Climate Change

It can notice from figure that the respondents' awareness of climate change. From the data, it was found that 94% of farmers perceived that the peak timing of the summer, rainy and winter season has changed in a few years. The findings show similarity with the findings of Hein, Y et al. [17] that the peak time of seasons and their duration has been changed. 92% of farmers agreed that the timing of monsoon onset has been changed. A similar result was found by Pandey et al. [18]. 88% of farmers were aware that there was an uncertain distribution of rainfall and 87% farmers perceived that there was an increase in temperature in the summer season. Dhanya and Ramachandran [19], and Shashidahra and Reddy [20] also reported the similar findings. 85% of farmers reported high occurrences of heat waves during the summer season and 83% of farmers reported changes in rainfall pattern in the rainy season. The findings of the study were in line with the findings of Nizam [21] and Singh [22]. 82% of farmers reported that the temperature was increasing the in summer season. Similar findings were reported by Dhanya and Ramachandran [23], and Dupdal et al. [24].

3.3 Farmer's Perception of Coping Strategies to Climate Change

Farmers' main adaptation strategies in response to climate change have been recognized as adopting climate-resilient methods and converting to reliable weather forecasts. There are a lot of climate resilient practices which can be adopted by the farmers and farmers found it one of the main coping strategies against climate change (Fig. 1).

If farmers get timely weather update they can choose appropriate and suitable climate-smart practices to cope with climate change. Governments programs were found as the third main strategy to cope with climate change problems. There are many capacity development and awareness programs provided by Krishi Vigyan Kendra at the district level where farmers can benefited from technological information to reduce the risk of climate change. Crop

Table 1. Distribution of respondents based on socio-economic status

S. No.	Category	Frequency	Percentage
1	Low	63	26.2
2	Medium	106	44.1
3	High	71	29.5
	Total	240	100

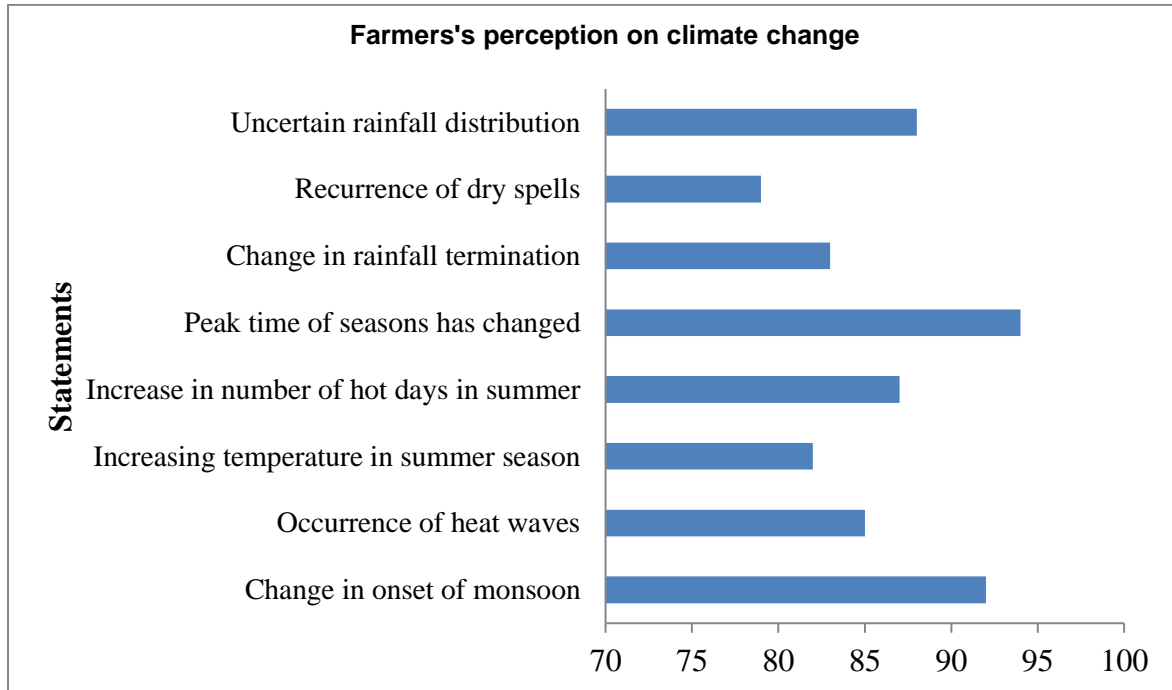


Fig. 1. Distribution of respondents based on their perception of climate change

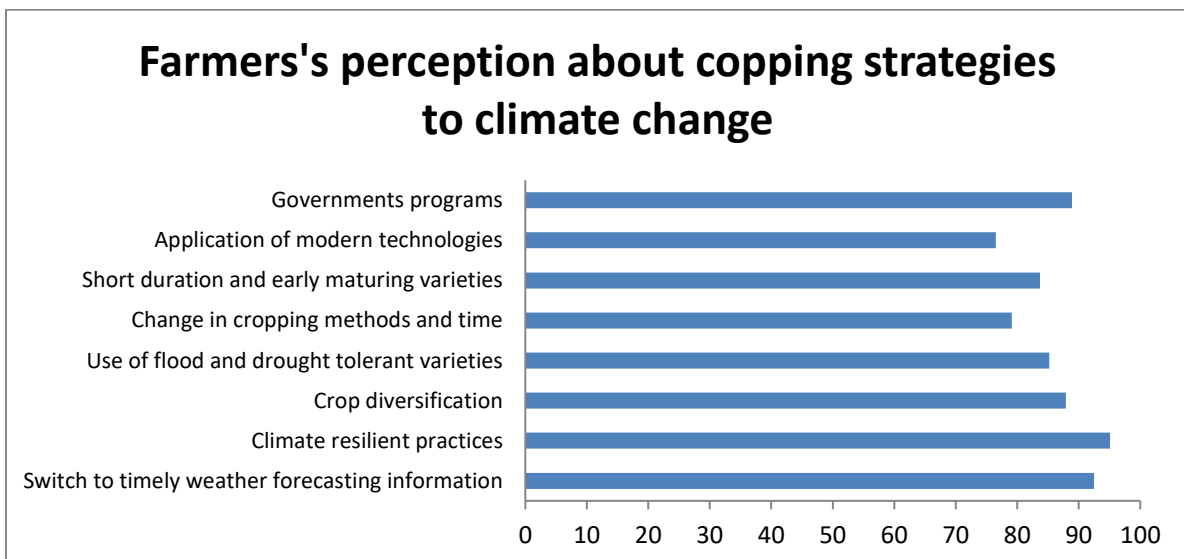


Fig. 2. Distribution of respondents according to their coping strategies to climate change

diversifications with short-duration crops such as pearl millets, cowpea was found as an important coping mechanism. As the study area is affected

by the flood, farmers agreed that using flood tolerant and short-duration varieties could be beneficial to cope with climate change. The result

of the mean Garret ranking further revealed that change in cropping method and sowing time according to climate change will be beneficial for farmers. The application of modern agricultural technologies was found another coping mechanism for climate change. The findings of the study were in line with the findings of Dupdal et al. [25], Raghuvanshi and Ansari [26] (Fig. 2).

4. CONCLUSION

The current study demonstrates the significance of understanding farmers' perceptions of climate change in creating adaptation strategies to combat the escalating effects of climate change and its variability. Studies have shown that the majority of farmers had a medium level of socio-economic characteristics. From the study result it was found that farmers were aware of climate change. Farmers agreed that the peak time of seasons has changed, there is a change in the onset of monsoon, uncertain rainfall distribution, recurrence of dry spells etc. are some of the main problems of climate change. However, farmers demonstrated adaptability to the changing climate through a variety of local strategies, including switching to timely weather forecasting information, Climate-resilient practices, Use of flood and drought-tolerant varieties, Change in cropping methods and time, Application of modern technologies. Based on these findings, it would be crucial for agricultural scientists to address climate change and identify the elements that have a detrimental impact on agricultural productivity, production efficiency, and farm profitability.

ACKNOWLEDGEMENT

We are grateful for the financial support provided by Krishi Vigyan Kendra, Kishanganj from BAU, Sabour for this study. Additionally, we would like to thank the Directorate of Extension Education, BAU, Sabour for their necessary support and guidance which helped us complete this work successfully.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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