



ANALYSIS OF CLIMATE CHANGE INFORMATION AND FLOOD ADAPTATION STRATEGIES AMONG RICE FARMERS IN HADEJIA AGRICULTURAL ZONE, JIGAWA STATE, NIGERIA

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ABSTRACT

The study analyzed climate change information and flood adaptation strategies among rice farmers in Hadejia agricultural zone, Jigawa State, Nigeria. Multi-stage sampling procedure was employed in the selecting of 278 respondents for the study. Data were collected using structured questionnaire and analyzed using descriptive and inferential statistics. The results showed that almost all (96%) of the respondents were male and over half (53%) of the respondents were in the age bracket of 25 - 40 years while majority (79%) of the respondents were married. The finding indicated that 48% of the respondents had household size of 1-5 persons and 42% of the respondents had formal education while 60% of the respondents had more than 11 years of farming experiences. Majority (70%) of the respondents had 0.1 - 2.5 hectares of land for cultivation. The chi-square text revealed that X² of 13.565 is greater than table X² with 4.60517. The finding concludes that there is positive relationship between climate change information and rice farmers' flood adaptation strategies in the study area. The study recommends that government and non-governmental organizations should encourage participation of women in rice production activities in the area by giving incentives and subsidy. This will minimize gender variation among rice farmers in the study area.

Keywords: Climate change, Information, Flood, Adaptation strategies, Rice farmers.

INTRODUCTION

Climate is usually considered as the "average weather", or more distinctively, as statistical expression with respect to the mean and variability of relevant quantities in a given period of a month, a year, thousands or millions of years, the pertinent quantities are most often surface climatic elements such as temperatures, precipitations and wind. According to Maurine (2014) climate information is information about past, present and future climate situations from local and scientific sources, and resultant consequences on development, people's life and environment. Adaptation strategies lessen the negative effect of climate change and their related risks and provide enabling atmosphere for employing strategies and innovations in the agricultural production activities of farmers in the country (Locatelli, 2015). Adaptation to climate change means taking action to prepare for and adjust to both the current negative effects of climate change and the predicted impacts in the future. Adaptation to climate information is accessible, understandable and used in a timely way (Carr and Onzere 2018). In this regard, Adeagbo, *et al.*, (2021) in their study recommended





that; Policies and investment strategies of government should be directed towards supporting better extension services, providing on-farm demonstration training, and disseminating information about climate change adaptation strategies, mainly for smallholder farmers in Nigeria. This implies that, effective dissemination of climate information and early warning information to farmers would facilitate adoption of adaptation strategies among farming communities.

Climate change and its related extreme events like flood and drought are incessantly affecting farmers and agricultural activities in Jigawa state. This is adjudged to further exacerbate the vulnerability of the rural poor who relies heavily on agricultural production activities for livelihood, with attendant spiraling effects on the economy of the state. A number of studies have been conducted in relation to climate change information, most of these works focused on information effect on output, sources, access, availability, effectiveness and efficiency. So far there has not been much literature related to the analysis of climate change information and flood adaptation strategies of rice farmers in Hadejia Agricultural Zone Jigawa State, Nigeria. Hence, this research work analyzed climate change information and flood adaptation strategies among rice farmers in Hadejia Agricultural Zone Jigawa State, Nigeria. Thus, this informs the need to carry out a study to analyzed climate change information and flood adaptation strategies among rice farmers in Hadejia agricultural zone, Jigawa State, Nigeria. The specific objectives were to:

- I. describe the socio-economics characteristics of respondents in the study area; and,
- II. determine the relationship between climate change information and rice farmers' adaptation strategies to flood in the study area.

METHODOLOGY

The Study Area

Jigawa state is located in the North-western part of the country. It lies between Latitudes $12^{0} - 13^{0}$ North and Longitudes $10^{0} - 1050^{0}$ East of the meridian. Jigawa state borders Yobe state to the North-east, Bauchi to the South-east and South, Kano to the South-west and Katsina to the North-west. Jigawa state also shares an international border with the republic of Niger. According to the Nigerian Population Commission (NPC) (2006) Jigawa state had a land mass of approximately 22,410 square kilometers and the state had a total population projection of 9,907,877.1 with the growth rate of 3.5% by the year 2022. Garba *et.al* (2019) reported that about 80% of the populations of Jigawa state were found in rural areas, with about 90% of that engaging in subsistence farming and other rural based livelihood activities. Jigawa state is also blessed with large expense of agricultural land, rivers, and flood plains suitable for crops, livestock and fish production. Based on this over 80% of the state's total land mass is considered arable. And this makes it one of the most agriculturally endowed states in Nigeria.

Sampling Procedure

Multi stage sampling procedure was used in the selection of respondents for this study. In the first stage; the eight (8) Local Government Area of Jigawa Rice Farmers Association of Nigeria (RIFAN) Hadejia zonal offices were considered. In the second stage; five (5) Local Government Areas were selected randomly out of eight local government areas and the rice farmers list was collected from Rice Farmers Association of Nigeria (RIFAN) Hadejia zonal office. In the third stage; five communities (Auyo, Guri, Hadejia, Kiri Kasamma and Malammadori) from each local government area were selected purposively due to their intensity of rice production (wet and dry season farming). In the fourth stage; a total number which forms the population's size of the sample was 918. The number was compared in the





table for determining sample size from a given population (Kreijcie and Morgan, 1970) according to the table 274 respondents was selected as sample size at 95% level of confidence

Data Collection

Primary data were obtained directly from the respondent through the use of structured questionnaire complemented with interview schedule. However, the questionnaire was pretested on few selected respondents. Both the researcher and trained enumerators were engaged in data collection. The questionnaire sought information on climate change information and farmers' adaptation to flood in the study area.

Method of Data Analysis

Data were analyzed using both descriptive and inferential statistics. The descriptive statistics used were frequency distribution, mean and percentage. The inferential statistic used chi-square test, which is a parametric method appropriate for testing independence between two categorical variables. To determine the relationship between climate change information and farmers' adaptation to flood in the study area, Chi- square statistic was used to test for statistical significance between climate change information and adaptation strategies to flood by farmers which tested whether or not there is significant association between the two variables.

The chi-square test statistic is denoted by \mathcal{X}^2 and computed as

$$\mathcal{X}^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Where O_i is called observed frequencies (this is the observed value in class i) and E_i is called the expected frequencies (this is the theoretical distribution frequency under the null hypothesis).

In chi-square test for independence, we wish to test the hypothesis that the two categorical variables are independent that is;

 H_0 : The two variables are independent

 H_A : The two variables are dependent

Then, the null hypothesis has an approximately chi-square probability distribution with (r-1)(c-1) degree of freedom.

The null hypothesis will be rejected if \mathcal{X}^2 cal > $\mathcal{X}^2_{\alpha(r-1)(c-1)}$ and vise vasa.

Chi-Square Statistic for Examining the Relationship in Two Samples Mean Chi-square statistic

H₁: The mean difference in climate change information is not equal to 0, two sided test.

H₀: The mean difference in climate change information is 0

df = 2 $\alpha = 10\%$

Formulae explicit $X^2 = \sum \frac{(0-E)2}{E}$ Where; $X^2 = Chi$ - Square O = Observed ValueE = Expected Value $\Sigma =$ Submission





RESULTS AND DISCUSSIONS Socio-economics of Respondents in the Study Area

The results in Table 1 showed that almost all (96%) of rice farmers in the study area were found to be male. The result is in line with the findings of Abdullahi, *et al* (2018) which shows that almost all of the total respondents were male. Also, the result is similar with that of Garba (2015) in Hadejia valley irrigation project, Jigawa state which indicated that, all the respondents in the study area were male. This implies that female farmers do not fully participate in rice production. Like their male counterpart in the study area. This may be as a result of both religious and cultural reasons of the people living in the area. Men are the head of household and are responsible for all family needs including feeding, clothing, shelter among many others while females were responsible for most of the activities at home like taking care of children, cleaning and cooking among many others.

Respondents age distribution as captured in table 1 reveal that over half (52.2%) of the respondents were in the age bracket of 25 - 40 years. The result is agree with the study of Abdullahi, *et al.*, (2018) where they reported that, the average age of the respondents in their area of study was 40 years of age. Thus, this age group is expected to contribute more in agricultural production activities than the other groups, because the group constituted active people capable of farming activities. Age distribution in most rural society determines the sharing responsibilities of agricultural production activities, in addition to that, age distribution also determine farmers working experiences in Agricultural production activities. Older age farmers have long term farming experiences unlike younger age farmers. Age is an important factor in production, especially in African agriculture where human labour is extensively used in production; younger persons tend to be stronger and agile. They have the capacity to contribute so much to the high needed energy for farm activities.





Variables	Frequency	Percentage	
Sex			
Male	266	95.7	
Female	12	5.3	
Age (Years)			
Below 25	19	6.8	
25 - 40	145	52.2	
41 – 55	98	35.2	
Above 55	16	5.8	
Marital Status			
Married	220	79	
Single	58	21	
Household Size			
1 - 5	134	48.2	
6 - 10	77	27.7	
11 – 15	44	15.8	
Above 15	23	8.3	
Educational Level (Years)			
Non- Formal Education	48	7.3	
Adult Education	21	7.6	
Primary Education	32	11.5	
Post – Primary	91	32.7	
Post – Secondary	86	30.9	
Farming Experience (Years)			
1-5	37	13.3	
6 - 10	72	25.9	
11 – 16	65	23.4	
Above 16	104	37.4	
Farm Size			
0.1 - 2.0	199	71.6	
2.1 - 3.0	53	19.0	
3.1 - 4.0	14	5.0	
Above 4.0	12	4.3	
Total	278	100	

Table 1: Socio-economic Characteristics of Respondents in the Study Are

Source: Field Survey, (2024)

The finding indicates that Majority (79%) of the respondents were married with just 21% who were unmarried. The result corresponds with that of Abdullahi *et al.*, (2018) which indicated that majority of the respondents were married. Additionally, the result indicates the importance of marriage institution in the study area which is also in conformity with the culture, tradition and religion of the people in the study area. The result revealed that 48.2% of the respondent household size ranged between 1-5 persons. The result implies that, majority of the respondents have small size household of five and below. The result corresponds with Adamu *et al.*, (2018) which reported similar findings. Household size in rural areas determines work force of a particular family. Those families with larger household size are expected to produce more compared to those with small size household. The result of the survey implies those small size households which lack man power are the majority in the study area and the situation make it necessary for them to employed labour outside the family (Hired labour).





The results of educational levels of the respondents indicated that 11.5%, 32.7% and 30.9% of the respondent's primary, post-primary and post-secondary school certificate, respectively. The result goes in line with Adamu *et al.*, (2018) which shows that majority of the respondents have acquired formal education in their area of study. Also, the result is in line with that of Garba, (2019) which indicates that over 80% of the respondents possessed formal education. This implies majority of the respondents in the study area can read and write and this situation could help them in accessing and utilizing climate information in the study area. Also, educational attainment is often used as one of the most important social and economic indicator to ascertain the state of development educations also help to elevate the mind and intellectual horizon of the people.

The results also revealed that 37.4% had farming experience of above 16 years while 25.9% and 23.4% had rice farming experience of 6 - 10 and 11-16 years, respectively. The result shows that majority of the respondents had more than 11 years of farming experiences. This implies that, majority of the respondent in the study area have been farming for a long time and could be aware of the negative effect of climate change and its related risks, particularly flood disaster. The result agrees with the finding of Adamu *et al.*, (2018) which showed that majority of the respondent had above 15 years farming experiences. Long term experiences of farmers make it possible for them to predict future weather conditions such as flood, drought, climate variability and other climate related events and makes sound conclusion. Also, The results further revealed that majority (70%) of the respondents had 0.1 - 2.5 hectares of land conversely, only 4% of the respondents had above 6 hectares of land. Thus, the result implies majority of respondents had small size farms (small scale farmers). The result agrees with the findings of Falakemi, (2022) which reported that 80% of the Nigerian farmers owned less than two hectares of land. Thus, practice subsistence farming system

The Results of Chi-square Test between Climate Change Information and Rice Farmers Flood Adaptation Strategies of the Respondents in the Study Area

The result of chi-square in Table 2 shows that X^2 Calculated is 13.565 which is greater than table X^2 with a value of 4.60517 therefore, the null hypothesis is rejected and alternative hypothesis is accepted. This means, the average paired difference does not equal to zero. The result implies there is significant positive difference between those respondents that received climate information and those that did not. The result is similar to the findings of Victor *et al.*, (2020) where the result of their study shows statistical differences between farmers that accessed climate information and those that do not accessed. Those that have access to climate information found having high adoption level than those that did not. Also, Burtukan and Abraham (2016), who reported that, access to climate information, enhance farmer's level of adaptation strategies to climate extreme events.

0	E	O – E	(O - E) ²	$(0 - E)^2$	
				E	
132	142.5	-10.5	110.25	0.7737	
101	80	21	441	5.5125	
45	40.5	4.5	20.25	0.5	
153	142.5	10.5	110.25	0.77	
59	80	- 21	441	5.5125	
36	40.5	-4.5	20.25	0.5	
Total				13.565	
Source: Field Survey, (2024). Note; Calculated $x^2 = 13.565$, Table $x^2 = 4.60517$					

 Table 2: Relationship between Climate Change Information and Rice Farmers Flood

 Adaptation Strategies in the Study Area





CONCLUSION AND RECOMMENDATIONS

The study concludes that there is positive relationship between climate change information and rice farmers' flood adaptation strategies in the study area.

The following recommendations were made:

- 1. Timely, accurate and up to date climate change information should be given to farmers. This will encourage and increase adoption level of farmers.
- 2. The providers of climate information services should acknowledge the usefulness of indigenous forecast and combine it with scientific forecast to enhance trust in the mind of farmers in the study area.
- 3. Farmers' organizations should be included in disseminating climate change information to rice farmers. This will enhance adoption of adaptation strategies of farmers.

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