


Perceived Effects of Climate Variability on the Rice Farmers in Niger State, Nigeria

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Abstract

The study analyzed the perceived effects of climate variability on the rice farmers in Niger State, Nigeria. Two stage sampling procedure was used in the selection of 248 rice farmers. The data was collected with the use of a questionnaire. The findings revealed that rice farmers in the Niger State were mostly male 75.4% and their average age was 39.5 years. About 98% of the rice farmers had moderate usage levels of climate adaption strategies. The most severe perceived effect of climate variability was instability of planting calendar (M.S=2.78). The highest ranked constraint limiting the usage of climate adaptation strategies was financial constraints (M.S=3.72). This study thus recommended the provision of accurate and prompt information on weather forecasts and also there should be provision of financial incentives to the farmers.

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Introduction

Rice is among the vital essential foods globally and it's ranked third among the most consumed food (World Rice Production, 2023). According to Samal *et al.*, (2018) globally, rice production is an important source of livelihoods. According to World Rice Production (2023) Nigeria was estimated to produce 5,040,000 million tons in the year 2023.

Oloyede *et al.* (2021) stated that the cultivation of rice has been increasing at about 5% annually in Nigeria. The domestic consumption of rice in Nigeria has been increasing due to the increase in the population (Bamidele *et al.*, 2010).

Climate variability means the variations in the rate of excesses of climate over a period of time (IPCC, 2001). It comprises short-term occurrences which include fluctuations

in temperature and rainfall outlines (Boko *et al.*, 2008). Climate variability refers to climatic parameters of a region varying over a short-term mean. Climate variability ranges over many times and space scales (National Oceanic and Atmospheric Administration (NOAA, 2018).

Nigeria which is part of the Sub-Saharan Africa has been reported to be one of the most susceptible countries to climate variability (IPCC, 2007). This affects the rice production in Nigeria (Chung *et al.*, 2015).

According to Ifabiyi *et al.* (2023); Oluwasusi and Tijani (2013) climate variability in Nigeria affects people that depend on agriculture for their livelihoods. Landaverde *et al.* (2022) reported that small-holder farmers are severely affected. The effects include droughts, floods and

heat stress which could result in reduced agricultural production and dearth of food for the populace (Ifabiyi *et al.*, 2022; Banjoko *et al.*, 2021). The research on the effects of climate variability is important as Adesiji *et al.*, (2013) reported that climate variability patterns play a dynamic role in determining the means of livelihoods of many people. According to Merem *et al.* (2017) climate variability has been reported to be one of the most serious challenges to achieving sustainable rice yield in Nigeria. So, there is a need to carry out this study as there is a dearth of information on the effects of climate variability on the rice farmers in Niger State, Nigeria. This established the lacuna that this study sought to fill. Hence, it is essential to assess the effects of climate variability on the rice farmers in Niger State, Nigeria.

The specific objectives were to:

- 1) Identify the Personal and Enterprise characteristics of the rice farmers in the study area.
- 2) Determine the Level of usage of Climate Adaptation Strategies in the study Area.
- 3) Determine the perceived effects of climate variability on respondents in the study area;
- 4) Assess the constraints affecting the use of the adaptation strategies in the study area.

Results and Discussion

Personal and Enterprise Characteristics of the Rice Farmers

Table 1. The Personal and Enterprise Characteristics of the Respondents (n=248)

Variables	Frequency	Percentage (%)	Mean	SD
Sex				
Male	187	75.4		
Female	61	24.6		
Age (Years)				
≤ 25	12	4.8	39.5 years	9.5
26 – 35	58	23.4		
36 – 45	117	47.2		
46 – 54	34	13.7		
≥ 55	27	10.9		
Marital Status				
Single	16	6.5		

Methodology

This study was conducted in Niger States, Nigeria. The state is predominantly an agrarian State and it's among the rice producing States in Nigeria. The sampling procedure for the study involved a 2-stage procedure. The 1st phase involved a purposive selection of three local government areas from each of the Agro-political zones in Niger State where there is high production of rice (Bida-1135, Shiroro-1250 and Wushishi-708). The 2nd phase involved a proportionate random selection of 8% of the total population of registered members of Rice Farmers Association of Nigeria (RIFAN) in the selected LGAs (Bida-91, Shiroro-100 and Wushishi-57). A total of 248 Rice farmers were selected from the overall 3093 farmers. To determine the effects of climate variability, a three-Point Likert Scale type was used where Not Severe (N.S) = 1; Severe (S) = 2; Very Severe (V.S) = 3. To determine the constraints to the use of adaptation strategies, a 4-Point Likert Type Scale was used where Not a Constraint (N.C) =1; Not Severe (N.S) =2; Severe (S) = 3; Very Severe (V.S) = 4. The data was obtained through the use of a questionnaire. The data was analysed with the use of frequency counts, percentages and means.

Married	207	83.5		
Otherwise	25	10.1		
Educational Attainment				
No Formal Education	8	3.2		
Primary Education	38	15.3		
Secondary Education	128	51.6		
Tertiary Education	74	29.8		
Alternative Occupation				
Civil Servant	77	31.0		
Trader	107	43.1		
Artisan	59	23.8		
Others	5	2.0		
Household Size (Persons)				
≤ 5	99	39.9	7 persons	2
6 – 9	98	39.5		
≥ 10	51	20.6		
Rice Farming Experience (Years)				
≤ 10	40	16.1	17.4 years	6.3
11 – 20	119	48.0		
≥ 21	89	35.9		
Rice Farm Size (Hectares)				
≤ 5	88	35.5	7.9 hectares	4.6
6 – 10	75	30.2		
≥ 11	85	34.3		
Land Ownership				
Inheritance	95	38.3		
Lease	129	52.0		
Purchase	24	9.7		
Annual Income from Rice Farming (₦)				
≤ ₦500,000	36	14.5	₦1,463,709.7	769,440.1
₦500,001 - ₦1,500,000	98	39.5		
₦1,500,001 - ₦2,500,000	99	39.9		
≥ ₦2,500,001	15	6.0		
Access to Extension Services				
Yes	145	58.5		
No	103	41.5		

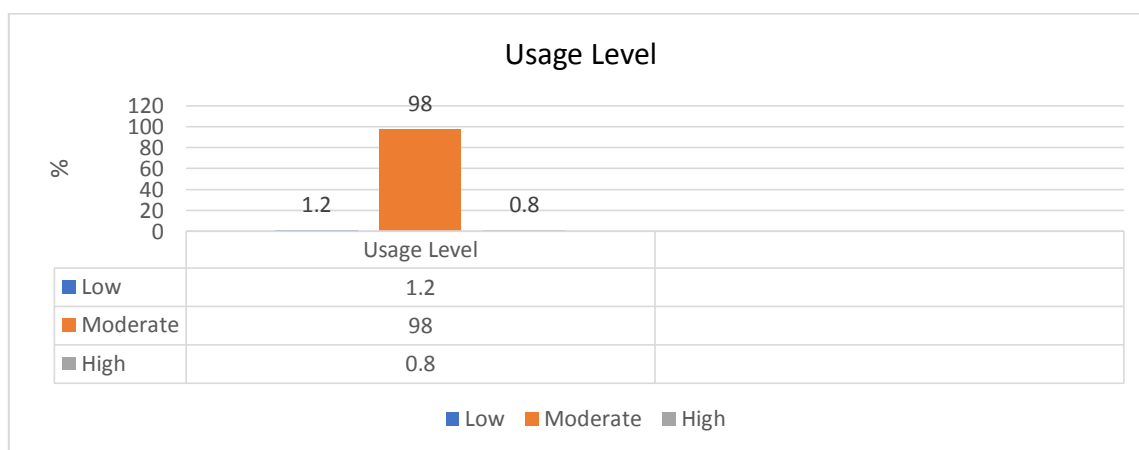
Source: Field Survey (2023). **SD** = Standard Deviation

The findings in Table 1 showed about 75.4% of the farmers were male. This denotes that the rice production is cultivated mainly by males. This finding corroborates Ologeh *et al.* (2021) which showed that rice farming is dominated by males (72%). The result revealed that 39.5 years was the mean age of the rice farmers. This infers that rice farmers are within economically active age

bracket which possesses the vital energy for rice production activities. About 51.6% had secondary education. The result supported Obot *et al.*, (2022) which stated majority of the rice farmers were educated. The average household size of the rice was 7 persons. This denotes that they had dependents whom some of them could also be used as farm labourers. The average farm size was

7.9 hectares. This denotes that rice farmers have vast land for rice production. The mean annual income of the rice farmers was

1,463, 709.7 Naira. This denotes that rice farming is a viable means of livelihood.



Source: Field Survey (2023).

Figure 1. The Usage Level of Climate Adaptation Strategies

The findings in Figure 1 revealed that about 98% of the respondents had moderate usage levels of climate adaptation strategies. The moderate usage level of the majority of the respondents might be attributed to the

facts that higher percentage of the farmers was educated. The result is in disagrees with Akintonde *et al.* (2016) which recorded high level of usage of adaptation strategies among arable farmers.

Table 2. Perceived Effects of Climate Variability as Experienced by Rice Farmers (n=248)

Perceived Effects	N.S F (%)	S F (%)	V.S F (%)	M.S	Rank
Instability of planting calendar	2 (.8)	50 (20.2)	196 (79.0)	2.78	1 st
Reduction in water bodies/Shortage of water	5 (2.0)	61 (24.6)	182 (73.4)	2.71	2 nd
Pest invasion	8 (3.2)	59 (23.8)	181 (73.0)	2.70	3 rd
Poor efficacy of agro-chemicals as a result of delay in rainfall	5 (2.0)	71 (28.6)	172 (69.4)	2.67	4 th
Drying of rice seed after germination due to high temperature	5 (2.0)	131 (52.8)	112 (45.2)	2.43	5 th
Flooding	28 (11.3)	109 (44.0)	111 (44.8)	2.33	6 th
Burning of rice farms	45 (18.1)	126 (50.8)	77 (31.0)	2.13	7 th
Land degradation	64 (25.8)	102 (41.1)	82 (33.1)	2.07	8 th
Decrease in soil moisture	43 (17.3)	154 (62.1)	51 (20.6)	2.03	9 th
Reduction in quantity of rice produced	72 (29.0)	160 (64.5)	16 (6.5)	1.77	10 th
Increased occurrence of weeds	84 (33.9)	149 (60.1)	15 (6.0)	1.72	11 th
Reduction in quality of rice produced	82 (33.1)	162 (65.3)	4 (1.6)	1.69	12 th
Withering of rice plant	94 (37.9)	146 (58.9)	8 (3.2)	1.65	13 th
Erosion occurrence and wind storm	114 (46.0)	118 (47.6)	16 (6.5)	1.60	14 th
Reduction in soil fertility	158 (63.7)	90 (36.3)	0 (.0)	1.36	15 th

Source: Field Survey (2023). N.S = Not Severe; S = Severe; V.S = Very Severe; M.S = Mean Score

The findings in Table 2 showed that instability of planting dates (M.S = 2.78) was the most severe effect of climate variability. Reduction in water bodies or

shortage of water (M.S = 2.71) and pest invasion (M.S = 2.70) was ranked second and third, correspondingly. This implies that instability of planting dates, reduction in

water bodies and pest invasion were the foremost effects of climate variability in the study area. This concurred with Nzeh *et al.* (2016); Adegoke *et al.* (2014) which

showed that climate variability influences the planting and harvesting periods and leads to pest invasion due to warmer temperatures.

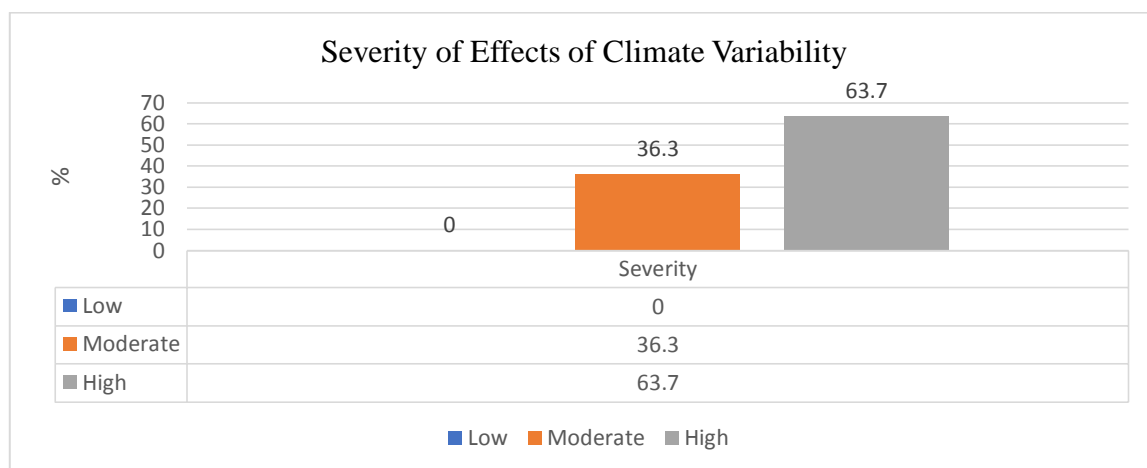


Figure 2. Level of Severity of Climate Variability

The findings in Figure 2 disclosed that about 63.7 % of the respondents have a high level of severity. This implies that the farmers are highly affected by climate

variability. This concurred with Ologeh *et al.* (2021) which stated that smallholder farmers had suffered from different adverse effects of climate variability.

Table 3. Constraints Limiting the Use of Climate Adaptation Strategies among the Respondents (n=248)

Constraints	N.C	N.S	S	V.S	M.S	Rank
	F (%)	F (%)	F (%)	F (%)		
Financial constraints	1 (.4)	0 (.0)	67 (27.0)	180 (72.6)	3.72	1 st
Reliance on single rain season	2 (.8)	1 (.4)	97 (39.1)	148 (59.7)	3.58	2 nd
Inadequate access to weather forecasting information and early warning	3 (1.2)	51 (20.6)	45 (18.1)	149 (60.1)	3.37	3 rd
Inadequate irrigation facilities	2 (.8)	47 (19.0)	71 (28.6)	128 (51.6)	3.31	4 th
Little or no access to water for irrigation	3 (1.2)	67 (27.0)	50 (20.2)	128 (51.6)	3.22	5 th
Insufficient access to agricultural credits	6 (2.4)	65 (26.2)	116 (46.8)	61 (24.6)	2.94	6 th
Limited access to extension services	10 (4.0)	78 (31.5)	112 (45.2)	48 (19.4)	2.80	7 th
High cost of farm labour	3 (1.2)	90 (36.4)	109 (44.1)	45 (18.2)	2.79	8 th

Insufficient drought-resistant varieties	26 (10.5)	39 (15.7)	155 (62.5)	28 (11.3)	2.75	9 th
Strict adherence to local varieties	46 (18.5)	35 (14.1)	145 (58.5)	22 (8.9)	2.58	10 th
High cost of farm inputs and fertilizers	2 (.8)	138 (55.6)	108 (43.5)	0 (.0)	2.43	11 th
Lack of non-farm employment	43 (17.3)	117 (47.2)	87 (35.1)	1 (.4)	2.19	12 th
Inadequate scientific and technical knowledge	96 (38.7)	111 (44.8)	41 (16.5)	0 (.0)	1.78	13 th
Inaccessibility to media	143 (57.7)	50 (20.2)	53 (21.4)	2 (.8)	1.65	14 th

Source: Field Survey (2023). **N.C** = Not a Constraint; **N.S** = Not Severe; **S** = Severe; **V.S** = Very Severe; **M.S** = Mean Score.

The results in Table 3 revealed that the financial constraints (M.S = 3.72) was the highest ranked constraint that militates against the use of climate adaption strategies. Reliance on single rain season (M.S = 3.58) and inadequate access to weather forecasting information and early warning (M.S = 3.37) was ranked second and third, respectively. The constraints experienced by rice farmers appeared to be mostly financial and technical. This finding agrees with Mburu *et al.* (2015) which specified that financial constraint limits the use of the climate adaptation strategies.

Conclusion

According to the research results, the study resolved that most of the farmers were male. The rice farmers were still young and agile for the strenuous activities involved in rice production and more than half have access to extension agents. The usage of climate adaptation strategies was considerably moderate. The instability of the planting calendar was most severe perceived effect of climate variability. The major constraints limiting the use of climate adaptation strategies were financial constraints, reliance on a single rain season and inadequate access to weather forecasting information and early warning. The following were recommended based on the findings;

1. Rice farmers should be provided with accurate and prompt information relating to climate and weather forecast.
2. The study recommends that financial assistants in form of grants and loans should be provided so as to enhance their capability to utilize climate adaptation strategies.

Conflict of Interest

The researchers declared no conflicts of interest.

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