ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

Analysis of Farmers' Awareness, Perception and Responses to Climate Variability in Edo State, Nigeria

Ikheloa E. E.[1*]; Okoruwa M. I.[2]

[1]Department of Agricultural Economics and Extension, Faculty of Agriculture, Natural Resources and Food Science, Ambrose Alli University, P.M.B. 14, Ekpoma, Edo State, Nigeria
[2]Department of Animal and Food Sciences, Faculty of Agriculture, Natural Resources and Food Science, Ambrose Alli University, P.M.B. 14, Ekpoma, Edo State, Nigeria

Corresponding Author: Ikheloa E. E.[1*]

Publication Date: 2026/10/27

Abstract: Climate variability poses significant threats to agricultural productivity, food security, and farmers' livelihoods in Nigeria. This study examined farmers' responses to climate variability in Edo State, Nigeria, with emphasis on their socioeconomic characteristics, awareness, and perception of climate variability as well as adaptation strategies they used. In addition, constraints farmers face in adopting the adaptation strategies as well as government intervention to the threat of climate variability were also examined. Primary and secondary data were utilized. Primary data were collected through a structured questionnaire administered to farmers selected using a two-stage sampling procedure involving twelve Local Government Areas of Edo State. Descriptive statistics, including frequency counts, percentages, means, and Likert-type scales, were employed for data analysis. The findings revealed that farmers were mainly male (86.89%), fairly old (mean age of 53.83±3.02 years), poorly educated (only 5.11% had tertiary education), generally aware of climate variability (at least 71% awareness and perceived noticeable changes in temperature, rainfall, sunshine, and cloud cover. In response to these changes, farmers adopted various adaptation strategies, including crop diversification, adjustment of planting and harvesting dates, modification of chemical use, soil conservation, mulching, tree planting, and other indigenous practices. However, the adoption of these strategies was constrained by inadequate funds, insecure land tenure, poor access to information, labour shortages, limited water availability, and inadequate education. The study also identified government interventions involving flood and erosion control, environmental governance, climate-smart farming, and agricultural support programmes. The findings highlight the importance of strengthening agricultural extension services, improving farmers' access to affordable credit, promoting climate-resilient technologies, enhancing land tenure security, and expanding climate information dissemination. The study concludes that effective institutional support and farmer-centered policies are essential for improving adaptation capacity, sustaining agricultural productivity, and enhancing the resilience of farming households in Edo State.

Keywords: *Climate Variability, Farmers, Adaptation Strategies, Agricultural Productivity, Edo State, Nigeria.*

How to Cite: Ikheloa E. E.; Okoruwa M. I. (2026) Analysis of Farmers' Awareness, Perception and Responses to Climate Variability in Edo State, Nigeria. *International Journal of Innovative Science and Research Technology*, 11(10), 1823-1828. https://doi.org/10.38124/ijisrt/26oct834

I. INTRODUCTION

Climate variability has continued to be an important international environmental concern attracting both governments and individuals alike. Climate variability in form of higher temperature, reduced rainfall and increased rainfall variability tends to reduce agricultural yields and threatens food security. Agriculture is a very important sector in the Nigerian economy. It accounted for 23.16% of Gross Domestic Product and 30.1% of total workforce. (NBS, 2026). Unfortunately, Nigeria's agriculture is severely threatened by climate variability in a number of ways. For example, uncertainties in the onset of the farming season due to changes in rainfall characteristics have led to unusual sequence of crop planting and replanting and these have often resulted in harvest failure and food shortages. In addition, extreme weather events such as thunderstorms, heavy winds and floods continue to devastate farmlands.(Ayanlade *et al*., 2017)

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

Nigeria's coastal zone which spans about 830 km. (NESG, 2024) is low lying and prone to sea level rise and salt water intrusion which contaminates freshwater resources. Mangroves are reducing (Akinuolie *et al*., 2024) and sea-beds worked over by storm waves threaten off shore buried oil pipes with possibility of rupture and oil spillage which would further affect agriculture. Indeed, it has been estimated that with just 1m sea level rise, Nigeria may lose over 18,000sqkm .of coastal land, coastal resources as well as have some of her socio-economic activities destroyed, (Oloyede,2021).

Reductions in Agricultural yield (estimated to be as high as 90% by 2100 with small scale farmers being most affected) is expected to increase extreme poverty (Stern, 2007) These will in turn result in low agricultural production and consequently a decline in net farm revenues of farmers.

The manufacturing sector is also at risk. Harvest failure for example, directly affects the food manufacturing and processing industries while increased floods and storms affect the distribution of goods within the country.

Policy responses to climate variability have been mainly driven by debates among scientists, whilst the insights of poor people living on the frontline have been largely neglected, (Mutekwa, 2009). Therefore, there is an urgent need to find out what farmers perceive about climate variability and at the same time the coping strategies they are using to overcome the challenges.

Although many researchers have focused on climate variability at the micro-level in countries such as Ethiopia, South Africa, and the United States, only few studies have emerged in Nigeria's literature and they focused mainly on the impact of climate variability on agricultural output with little attention to adaptation. The overall objective of the study therefore, was to examine the response of Edo State government and farmers to climate variability and the constraints associated with these responses. In addition, it identified Edo farmers' socio-economic characteristics and assessed their level of awareness and perception of climate variability. No doubt, the study would help in providing a framework for policy formulation and better research orientation.

II. METHODOLOGY

The study area is Edo State. It was created on August 27, 1991 and the capital is Benin City. It has eighteen local government areas and is located in South, South geopolitical zone of Nigeria. It has an estimated population of about 5.2 million and a land mass of 19,559km$^{2.}$ (Wikipedia, 2024). The main occupation of the people is farming.

Primary and secondary data were used in this study. Secondary data were sourced from publications from Nigeria Meteorological Station (NIMET) and Central bank of Nigeria. A two-stage sampling procedure was adopted in the collection of the primary data using structured questionnaire. In the first stage, simple random sampling was used to select twelve out of the eighteen local government areas that made up Edo state. In the second stage, forty (40) respondents were selected from each of the already selected 12 LGAs using snowball sampling techniques (making a total of 480 respondents) to make the sample size. These respondents were administered structured questionnaire.

Descriptive statistics such as means, tables, frequency counts, range and percentages were extensively used in the analysis. Likert type scale was used to assess the severity of the constraints to adoption of climate variability strategies.

III. RESULTS AND DISCUSSION

➢ *Socio-Economic Characteristics of Farmers in Edo State*

The respondents in the study area differ in socio-economic characteristics. The data in Table 1 indicates that 408 (86.81%) of the respondents were male while only 62 (13.19%) were female. This agrees with Akioya and Onemolease (2024) who observed that male headed households were more (70.99%) than female headed ones. In Edo State, inheritance of land is patrilineal as male heads control medium farms while women control micro or small farms. This certainly has implications for response to climate variability as male headed farms have more access to credit and other resources than female headed ones. Many of the respondents were fairly old. For example, the youngest respondent was 21 years, while the oldest was 76 years. The average age was calculated to be 53.83±3.02 years. This agrees with Emokaro and Ugbekie (2014) submission that the mean age of oil palm farmers in Edo State was 55 years. This suggests that much effort will be needed in convincing the farmers to adopt climate adaptation strategies because old farmers tend to berisk averse.

A further observation of the data in Table 1 suggests that the respondents were not adequately educated. Twenty one respondents (4.47%) did not attend any formal educational institution, 154 respondents (32.77%) had primary education while 271 respondents (57.66%) had secondary school education. Only 24 respondents (5.11%) had tertiary education. Education plays a positive role in responding to climate variability. It empowers farmers with the capacity to determine the possible benefits of adopting climate variability strategies.

It is also observed in Table 1 that 380 (80.85%) respondents were married suggesting that only 19.15% were not married. However, the respondents maintained fairly large families. In terms of farmland ownership structure, data in Table 1 present a picture of farmers that were not wealthy as only 232 (209 males and 23 females) representing 49.36% were the owners of their farm land. 238 respondents (199 males and 39 females) were not owners of the farm-land they cultivated. They were mainly tenants or had the farm plots leased to them. Adoption of adaptation strategies is easier with farmland owners than tenants (Ogundele *et al*., 2023).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

In terms of farming experience, it is observed that many of the respondents have impressive record of farm experience. Indeed, the average farming experience was 20.39 years with the lowest being two years and the highest twenty seven years (a range of 25 years). Experience in farming is important and indispensable for efficient farm management (Alhassan and Haruna, 2024). It promotes better resource allocation and utilization, reduces or eliminates waste and therefore, enhances farm returns.

Table 1 Socio- Economic Characteristics of Farmers in the Study Area

Socioeconomic Characteristics	Frequency	Mean	Percentage %	Standard deviation
Male	404		86.81	
Female	62		13.19	
Age (years)		53.83		3.02
Married	380		80.85	
No formal education	21		4.47	
Primary education	154		32.77	
Secondary education	271		57.66	
Tertiary education	24		5.11	
Household size		8		2.02
Owned farmland	232		49.36	
Rented farmland	238		50.64	
Farming experience		20.39		3.87
Access to farm credit	346		73.62	
No access to farm credit	124		26.38	
Access to extension	275		58.51	
No access to extension	195		41.49	
Adopted adaptation strategies	324		68.94	
Did not adopt adaptation strategies	146		31.06	

Source: Field Survey, (2026)

- *Climate Variability Awareness and Perception Among Edo State Farmers.*

Climatic change has become an important issue in public discourse and media. Indeed, the National Council on climate change was inaugurated by formal President Buhari on September 28, 2022. (Federal Ministry of Environment, 2021). However, it is important to establish the extent to which farmers are aware and perceive climate variability. These are presented in Tables 2 and 3. It is observed that farmers in all the LGAs were well informed about climate variability. In addition, their perception about changes in the climatic factors followed almost the same pattern.

Table 2 Awareness of Climate Variability by LGA Among Farmers in Edo State

L.G.A Surveyed	% of Awareness
Esan west	81
Ovia South West	74
Etsako East	74
Ikpoba – Okha	89
Orhionmwon	84
Akoko –Edo	73
Owan East	71
Egor	81
Esan North East	73
Uhunmwonde	75
Ovia North East	83
Igueben	77

Table 3 Perception of Climate Variability by Farmers in Edo State

CLIMATE FACTORS	PERCEPTION (%)		
	INCREASING	DECREASING	NO CHANGE
TEMPERATURE	84	14	2
RAINFALL	83	13	4
SUNSHINE	84	13	3
CLOUND COVER	74	20	6

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

The perception of changes in climate variables by the respondents would be a major determinant of their responses. If they believe that rising temperatures and decreasing rainfall were responsible for the low yield of crops or crop failure, they are most likely to seek for and use adaptation strategies to cushion the harmful effects (Nhemachema and Hassan 2007; Ayanlade *et al.*, 2018).

➢ *Edo State Farmers' Response to Climate Variability.*

In order to reduce the harmful impacts of climate variability on the yield of crops and therefore, net farm revenues, Edo farmers responded by adopting various adaptation strategies.

➢ *Types of Adaptation Strategies Used by the Respondents*

The adaptation strategies used by the farmers were grouped into: Crop Diversification, (CD), Changing Planting and Harvesting Dates (CPHD), Changing Use of Chemicals (CUC), Soil Conservation Measures (SCM), and other adaptation measures. Crop diversification involves planting different crops in order to avoid the possibility of total crop failure. Different varieties of crops were also planted by the respondents. Adjusting both the planting and harvesting dates of crops were adopted by the respondents as a way of taking advantage of favourable weather condition as the climate changes. It enabled the farmers to plant and harvest either earlier or later than the usual pattern (Hassan and Knight, 2023). In addition to the use of these strategies, farmers from time to time changed the types of chemicals used in their farms. Such chemicals include herbicides, pesticides, fertilizers and fungicides.

The soil conservation measures employed by the farmers include those of reducing use of heavy machinery, crop rotation, cautious use of fertilizers, mixed farming as well as irrigation, mulching and planting of trees. Planting of trees was employed to reduce both wind and water erosion. Other adaptation measures include such measures as bush fallowing, migration, praying, and fasting. Some of the respondents refused to use any adaptation measures identified earlier.

➢ *Government Policies to Protect Agriculture from Climate Variability*

Edo State responds to climate variability with different strategies such as targeted flood interventions, environmental legislation, and agricultural resilience programs. Experiencing severe seasonal rainfall and gully erosion, the state responds strategically in three specific areas:

- *Flood and Erosion Control*

✓ Infrastructure Remediation**:** capital investment in desilting, drainage expansion, and gully remediation at critical sites to mitigate flood risks and prevent topsoil erosion are currently being undertaken.
✓ NEWMAP Compliance**:** The Nigeria Erosion and Watershed Management Project (NEWMAP) enjoys active counterpart funding and support in order to restore degraded lands in the state.
✓ Early Warnings**:** The Ministry of information continues to issue flood alerts advising residents in vulnerable local government areas to avoid flood-prone zones and maintain clear drains.

- *Environmental Policy and Governance*

✓ Environmental Compliance Crops was established to strictly enforce environmental laws and ensure proper waste disposal in the State.
✓ Green School Initiative**:** Edo State Universal Basic Education Board (SUBEB) conducts training and tree-planting campaigns in schools to promote clean environment.

- *Agricultural Adaptation and Food Security:*

Using the Fadama Cares Initiative**,** the state continues to support small-scale farmers to recover from climate shocks and the economic disruptions of recent years. This includes:

✓ Climate-Smart Farming**:** To combat the unpredictability of rain-fed agriculture, local farmers are utilizing adaptation strategies such as mixed cropping, crop rotation, adjusted planting dates, and shifting to resilient crops like cassava, maize, and melon.
✓ Data-Driven Agriculture**:** State agricultural ministries are engaging directly with farmers to provide continuous support and facilitate access to better seedlings and farming resources.

➢ *Constraints to Climate Variability Response by Farmers in Edo State*

Farmers in Edo State were constrained in responding to climate variability with respect to use of specific adaptation strategies. As shown in Table 4, inadequate funds were not a serious constraint in adopting crop diversification, different planting and harvesting dates as well as the use of other adaptations. However, in the use of chemicals, soil conservation, mulching and planting of trees, inadequate funds were considered a serious constraint. This observation is in agreement with the report of Ajewole *et al*. (2023) who noted that chemical, soil conservation and planting of trees are serious constraint in adopting crop diversification in an area

Land tenure was considered a serious constraint in the use of all the adaptation strategies except those of other adaptations. Land tenure system has always been a problem in agricultural production in Nigeria (Adegeye and Dittoh, 1985). Farmers that would have used some of the adaptation strategies such as planting of trees could be discouraged. Similarly, poor information, labour and water were considered serious constraints to use of all the strategies except those of "other adaptations". Poor information was considered a serious constraint because farmers hardly have access to extension services (Chukwuone and Amaechina, 2021). Some of them were not even aware of the problem of climate variability neither did they know the various strategies that could be employed to reduce the impacts. The extension service in the country is really very weak and as

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

such lacks the capacity to give farmers any meaningful input. Agundele *et al*. (2024) reported that only 18% of farmers in Kano State had extension visit in six months.

Education was considered a serious constraint to the use of all the adaptation strategies as indicated in Table 4 and supported by Akioya and Onemolease (2024). Education enhances one's ability to properly assess a situation, note the challenges and strive to overcome them. Unfortunately, farmers in the study area were not properly educated. Indeed, only 5.11% of them had tertiary education.

Table 4 Constraints to Use of Adaptation Strategies by Farmers in Edo State

Constraints	CD	DPAHD	Changing use of chemicals	Soil conservation	MAPT	Other adaptations
Inadequate funds	1.97	2.01	2.88*	2.92*	2.64*	1.53
Land tenure	2.85*	2.92*	1.88	3.25*	3.42*	3.02*
Poor information	3.51*	3.62*	3.15*	3.28*	3.25*	1.18
Labour	3.24*	2.87*	2.99*	2.68*	3.03*	2.41
Water	3.34*	3.57*	3.25*	3.45*	3.23*	2.16
Education	2.65*	2.60*	2.84*	2.80*	2.52*	2.66*

CD = Crop Diversification; DPAHD=Different Planting and Harvesting Dates;
MAPT=Mulching and Planting of Trees ; *Serious

IV. CONCLUSION

The issue of climate variability is well understood by farmers in Edo State. In order to reduce its impacts they have continued to adopt adaptation strategies despite the challenges. Edo State government needs to strengthen its institutional supports especially those of credit and extension in order to help farmers adopt effective adaptation strategies and improve their productivity.

ACKNOWLEDGMENTS

This work was supported by the Ambrose Alli University, Ekpoma, Nigeria under TETFund assisted Research for financial support to carry out this study.

REFERENCES

[1]. Adegeye, A.J and A.S. Dittoh.(1985). Essentials of Agricultural Economics. Impact Publishers Limited, Ibadan. Pg 10 - 21

[2]. Akioya A.0 and Onemolease, E.O (2024). Household characteristics and agricultural extension services as correlates of socioeconomic status among farming households in Edo State, Nigeria. ADAN *Journal of Agriculture, 2(1), 44-58.*

[3]. Akinkuolie, T. A., Ogunbode, T. O., & Oyebamiji, V. O. (2024). Evaluating constraints associated with farmers' adaptation strategies to climate change impact on farming in the tropical environment. *Heliyon*, *10*(16), Article e36086. https://doi.org/10.1016/j.heliyon.2024.e36086

[4]. Alhassan, U. and Haruna, E. U. (2024). Rural farmers' perceptions of and adaptations to climate change in Sub-Saharan Africa: Does climate-smart agriculture (CSA) matter in Nigeria and Ethiopia. *Environmental Economics and Policy Studies*, 26, 613–652. https://doi.org/10.1007/s10018-023-00388-8

[5]. Ajewole, O. C. Abdu-Raheem, K. A. and Fadumila, A. I. (2023). Farmers' Perception of Climate Variability Effects on Arable Crop Productivity in Ondo State, Nigeria. *Asian Journal Research in Agriculture and Forestry*, 9(3), 65–74. DOI: 10.9734/ajraf/2023/v9i3207

[6]. Ayanlade, A., Radeny, M., & Akin-Onigbinde, A. I. (2018). Climate variability/change and attitude to adaptation technologies: A pilot study among selected rural farmers' communities in Nigeria. *GeoJournal*, *83*(2), 319–331. https://doi.org/10.1007/s10708-017-9771-1

[7]. Ayanlade, A., Radeny, M., & Morton, J. F. (2017). Comparing smallholder farmers' perception of climate change with meteorological data: A case study from southwestern Nigeria. *Weather and Climate Extremes*, *15*, 24–33. https://doi.org/10.1016/j.wace.2016.12.001

[8]. Chukwuone, N. A., & Amaechina, E. C. (2021). Factors affecting climate change coping strategies used by smallholder farmers under root crop farming systems in derived savannah ecology zone of Nigeria. *Environmental Development*, *39*, Article 100627. https://doi.org/10.1016/j.envdev.2021.100627

[9]. Emokaro, C. O., & Ugbekile, P. C. (2014). Economic analysis of oil palm processing in Ovia Northeast and Ikpoba-Okha Local Government Areas of Edo State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, *10*(2), 70–78

[10]. Federal Ministry of Environment. (FME,2021). Nigeria's National Climate change policy, 2021-2030.

[11]. Hassan, B. A., & Knight, J. (2023). Adaptation to climate change and variability by farming households in North-Central Nigeria. *Sustainability*, *15*(23), Article 16309. https://doi.org/10.3390/su152316309

[12]. Mutekwa, V. T. (2009). Climate change impacts and adaptation in the agricultural sector: The Case of smallholder farmers in Zimbabwe. Journal of Sustainable Development Africa (Volume 11, No.2, *2009*). ISSN: 1520-5509.

[13]. National Bureau of Statistics (NBS,2026). Annual abstract of statistics. National Bureau of Statistics official data catalogue

[14]. Nhemachema C, and S Hansan (2007). Determinants of African farmers' strategies for adapting to climate change: multinomial choice analysis. IFPRI

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26oct834

Discussion paper 00714 Nigeria(1999- 2007). Perspective and implications for SLISSFAN
[15]. Nigerian Economic Summit Group (NESG, 2024). Macroeconomic outlook. NESG official report.
[16]. Oloyede, M. (2021). Sea level rise projection for Nigerian coastline. IOP Conference. series: Earth and Environmental Science, 665.
[17]. Ogundele, O.T., Akpulu, H.I., Ngwu, S. and Odo, K.O. (2024) 'Analysis of rice farmers' awareness and adaptation to climate variability in Kano State, Nigeria', *FUDMA Journal of Agriculture and Agricultural Technology*, 10(2), pp. 62–70. Available at: https://doi.org/10.33003/jaat.2024.1002.10.
[18]. Stern, N. (2007). Economics of climate change. The stern Review, Cambridge, U.K: Cambridge University Press
[19]. Wikipedia, (2024). Edo State. Retrieved from en.wikipedia.org.