JOURNAL OF AGRICULTURAL ECONOMICS, EXTENSION & SCIENCES
Official Journal of the College of Agricultural Economics and Extension
www.jaees.org
www.uam.edu.ng
Jaees Vol. 13 No.2 2026, Page 339 - 347
ISSN (Print) 2545-5179, ISSN (Online) 2714-5018

ASSESSMENT OF ADOPTION OF DRIVERS OF CLIMATE CHANGE ADAPTATION STRATEGIES AMONG MAIZE FARMERS IN THE NORTH CENTRAL NIGERIA

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Abstract
Climate change poses significant threats to agricultural production in Nigeria, particularly maize farming, which is highly sensitive to rainfall variability and temperature extremes. This study assessed socioeconomic drivers of climate change adaptation strategies among maize farmers in the North Central Nigeria. Using a structured questionnaire, data were collected from maize farmers and analyzed through descriptive statistics. The findings revealed that most (37.3%) of the youthful and productive age bracket were in the 31–40 years. The majority (89.2%) are males and married (57.5%). About 30.2% acquired secondary education, with 39.6% farming experience. About 75.1% inherited land. Key adaptation strategies adopted included multiple cropping (x=3.15), early planting (x3.05), and use of improved maize varieties (x3.02). The study concludes that maize farmers in the North Central Nigeria were not passive recipients of climate stress but actively employed adaptive measures shaped by their socioeconomic characteristics. It was recommended that extension agents should train maize farmers on climate change adaptation strategies in the North Central Nigeria.

Keywords: *Assessment, drivers, climate change, adaptation, Farmers*

1.0 Introduction

Climate change poses a profound threat to agricultural production and rural livelihoods across sub-Saharan Africa, with smallholder systems, particularly those that are rain-fed, being largely vulnerable (Matthew *et al.*, 2025). In North Central Nigeria, recognized as part of the country, particularly in Benue State, known as the "food basket of the Nation," maize, a staple crop vital for both nutrition and income, is highly susceptible to the adverse effects of climate variability. Farmers are experiencing

increasing challenges, such as unpredictable rainfall, prolonged dry spells, extreme temperatures, and reduced water availabilityall of which undermine yields and resilience. In response, maize producers in the region have begun to adopt a variety of adaptation measures. These include adjusting planting dates, diversifying crops, utilizing drought-resistant or improved maize varieties, engaging in irrigation, and supplementing with off-farm income streams (Komolafe *et al*., 2024). The uptake and intensity of these strategies are shaped by a range of socioeconomic determinants, including farmers' education, farming experience, farm income, household size, access to credit, extension services, and climate-related information (Ikenne, 2024).

Studies have revealed that farming experience and educational attainment significantly influence both awareness and choice of adaptation strategies. Farmers adopt on-farm methods such as altering planting times, fertilizer use, irrigation, and drought-tolerant varieties, as well as off-farm approaches like small-scale trade and artisanal ventures to augment household income and build resilience (Sustainability, 2023)

Despite mounting scholarship on climate adaptation across Nigeria, a focused investigation into the unique socioeconomic factors shaping maize farmers' adaptation behaviors in North Central Nigeria remains limited. Given the crop's critical importance and the region's vulnerability to climate shocks, understanding these drivers is essential for guiding targeted, specific policy actions.

2.0 Objectives of the Study

The broad objectives of the study were to assess the socioeconomic drivers of climate change adaptation strategies among maize farmers in north-central Nigeria, and the specific objectives of the study are to:

i. Describe the socioeconomic characteristics of the respondents and

ii. Identify maize farmers' climate change adaptation strategies.

3.0. Methodology

This study was carried out in North Central Nigeria. North Central Nigeria lies between latitudes $4^0$30N and $11^0$20N of the equator and longitudes 3^0E and 14^0E of the Greenwich Meridian (FAO full meaning of FAO, 2004). The area occupies a land mass of about 296,898 km², and a population of 221,566,993. Arable crops produced in the area include sorghum, cowpea, soya bean, yams, and Irish potatoes. The economic trees grown are mango, citrus, and cashew.

The population of the study consists of all maize farmers in North Central Nigeria. A total of four hundred and twenty-four (424) respondents were selected as the sample size using a multistage sampling procedure, involving a simple random selection technique across Plateau, Benue, and Niger States.

Data were collected from a primary source. Primary data were collected using a structured questionnaire. The questionnaire was divided into two sections (A and B). Section A focused on the socioeconomic characteristics of respondents, and Section B dealt with farmers' adaptation strategies to climate change

The research instrument was validated by lecturers in the College of Agricultural Economics and Extension, Federal University of Agriculture, Makurdi, to ensure it possessed both face and content validity. The test and retest method was used to ensure the reliability of the research instrument. In this method, the research instrument was administered twice to the same group of ten (10) respondents for an interval of two weeks. The data collected were correlated to confirm the reliability of the research instrument. A correlation coefficient (rho) of 0.7 was obtained as an indication that the

instrument was reliable. The data collected were analyzed using descriptive statistics

4.0. Results and Discussion

4.1.1 Socioeconomic Characteristics of the Respondents

Table 1 indicates that 37.3% of the respondents were aged between 31 and 40 years, 36.8% were aged 20-30 years, 14.2% were between 41 and 50 years, 6.1% were aged 51-60 years, and 5.7% were aged 61-70 years. The results on socioeconomic characteristics of the respondents revealed that most (37.3%) of the maize farmers were in their youthful and productive age range of 31-40 years. This could be a result of the unavailability of white-collar job opportunities in the country. This finding agrees with Musa *et al*.(2020), who reported the average age of farmers to be 34.6 years.

Table 1 also shows majority indicated that most (89.2%) of the respondents were males and 10.8% were females. This finding could be indicative of the significant and important role played by males as household heads, which agrees with Umar *et al*. (2015), who reported that men dominate the agricultural workforce, probably due to social and religious reasons.

Table 1 indicates that the majority (57.5%) of the respondents were married, 36.8% were single, and 5.7% were widowed. This indicated the importance attached to the marriage institution in the study area, which showed that majority of the respondents who were married have greater responsibility which may encourage them to be more committed towards their farming occupation This finding is similar to Mbam and Nwibo (2013) and Oghenekohwo (2014), who reported that 64.2 and 67.9 percent of the respondents were married respectively.

Table 1 shows that most (30.2%) of the respondents had secondary education, 25% had

primary school education, 23.6% had tertiary education, and 21.2% had non-formal education. This implies that 78.8% of the respondents had formal education. This result is similar to that of Ukoku (2012), who reported that 97.2% of the respondents had formal education, and Okereke-Ejiogu *et al*. (2015), who reported that 97.2% of the respondents had formal education. The acquisition of formal education is expected to better empower farmers in different aspects of farming

Table 1 further shows that most (39.6%) of the respondents had maize farming experience of 11 - 20 years, 35.4% had farming experience between 21 -30 years, 10.8% had farming experience greater than 30 years, and 7.5% had farming experience less than 10 years. Hassan and Nhemachena (2008) reported that farming experience significantly affects farm management and decision-making.

Table 1 also shows that the majority (98.8%) of the respondents were subsistence farmers, against 1.2% who were commercial farmers. It was also found that the majority (78.1%) of the respondents had acquired land by inheritance, 12.5% by purchase, 8.8% through rent, and 1.4% acquired land through. Most of the respondents acquired land through inheritance. This implies that they are indigene or have lived in the area for a

Table 1: Socioeconomic characteristics of the respondents (n = 424)

Variables	Frequency (424)	Percentage	Mean
Age (years)			
20-30	156	36.8	
31-40	158	37.3	36.8
41-50	60	14.2	
51-60	26	6.1	
61-70	24	5.7	
Sex			
Female	46	10.8	
Male	378	89.2	
Marital Status			
Married	244	57.5	
Single	156	36.8	
Widowed	24	5.7	
Educational Level			
Non-Formal Education	90	21.2	
Primary School	106	25	
Secondary School	128	30.2	
Tertiary School	100	23.6	
Maize Farming Experience (year)			
<10	32	7.5	
11-20	168	39.6	
21-30	150	35.4	28.5
>30	46	10.8	
Farming System			
Subsistence	419	98.8	
Commercial	5	1.2	
Method of Land Acquisition			
Inheritance	331	78.1	
Purchase	53	12.5	
Rent	34	8.0	
Others	6	1.4	

4.2. Climate change Adaptation Strategies adopted among maize Farmers

Table 2 shows that use of organic manure ($\bar{x}$3.00), early planting ($\bar{x}$3.05), use of improved varieties ($\bar{x}$3.02), multiple cropping ($\bar{x}$3.15), and use of loans, grants, and subsidies ($\bar{x}$.00) were adaptation strategies used by the respondents in the study area because all had mean scores of above 3.00. Multiple cropping ($\bar{x}$3.15), early planting ($\bar{x}$3.05), and improved varieties ($\bar{x}$3.02) ranked first, second, and third, respectively. Mustapha *et al.* (2013) reported that adaptation strategies used in North Central state, Nigeria, included agroforestry practices, crop diversification, early maturing and disease/drought resistant varieties.

Table 2: Adaptation strategies adopted among maize farmer s (n = 424)

Adaptation Strategies	Sum	Mean	Decision
Use of Organic manure	861	2.03	Disagree
Use of inorganic fertilizers	1,208	3.00	Agree
Early planting	1,293	3.05	Agree
Use of improved varieties	1,280	3.02	Agree
Use of irrigation and water storage and conservation	441	1.04	Disagree
Planting of trees	428	1.01	Disagree
Late planting	377	0.89	Disagree
Early harvesting of crops	861	2.03	Disagree
Multiple Cropping	1,336	3.15	Agree
Use of pesticides, herbicides and insecticides	1,217	2.87	Disagree
Prompt and multiple weeding	852	2.01	Disagree
Use of loans, grants and subsidies	1,238	3.00	Agree

5.0 Conclusion and Recommendations

5.1 Conclusion

This study examined the socioeconomic drivers of climate change adaptation strategies among maize farmers in North Central Nigeria and revealed that demographic characteristics and farming experience significantly influenced farmers' adaptive capacity. The findings showed that most farmers were in their youthful and productive years, possessed varying levels of formal education, and had long-term farming experience, all of which enhanced their ability to adopt climate change strategies. The predominance of male farmers highlights gender disparities that may limit women's access to adaptation resources such as land, credit, and extension services.

The study also established that multiple cropping, early planting, and the use of

improved maize varieties were the most widely adopted adaptation practices, reflecting farmers' proactive efforts to reduce risks and strengthen resilience against climate variability. These strategies demonstrated that farmers were not passive in the face of climate change but actively made adjustments to safeguard their livelihoods.

5.2 Recommendations

Based on the findings of this study, the following recommendations were made:

i. Strengthen Extension Services and Climate Information Dissemination: Extension agents should be better equipped to provide timely and practical climate change information, including weather forecasts and adaptation training, to enable farmers to make informed decisions.

ii. Support Access to Improved Technologies**:** Government and development partners should facilitate the availability and affordability of drought-tolerant and early-maturing maize varieties, as well as promote sustainable practices such as irrigation

iii. Encourage Risk-Spreading Practices: Since multiple cropping and early planting ranked highest among adaptation strategies, these should be supported through farmer education programs and input subsidies to ensure sustainability and effectiveness.

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