RESEARCH ARTICLE

MAIZE FARMERS' PERCEPTION OF CLIMATE CHANGE IN ASA LOCAL GOVERNMENT AREA, KWARA STATE, NIGERIA

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ARTICLE DETAILS

ABSTRACT

Climate change is a major challenge to agricultural systems globally, especially in Nigeria where altered rainfall pattern and extreme weather events threaten maize production, a vital staple crop for citizens. This study identified the sources of information, respondents' awareness of climate change, investigated the perception and constraints faced on climate change adaptation strategies by maize farmers in Asa Local Government Area, Kwara State. A total of 240 maize farmers were sampled and administered questionnaire for the purpose of the study. Results of socio-economic characteristics indicated that most (83.3%) of the respondents were male and had a mean age of 42years. While, internet (mean=2.64) and radio (mean=2.06) ranked first and second sources of information, respectively. Most farmers perceived climate change as posing long-term threats to livelihood security and identified key constraints to adaptation as limited finances (mean=2.90), information (mean=2.41), and institutional support (mean=2.31). A Pearson Product Moment Correlation result showed a positive correlation between socio-economic characteristics (formal education and extensive farming experience) of the farmers and their perception of climate change. The result of the study also shows that knowledge gaps exist among the farmers regarding locally documented climate impacts and human activities. The study concludes that strengthening climate education, forecasting tools, financing are critical for adaptation while better climatic actions from the government and agricultural agencies would promote resilience among farmers.

Introduction

Millions of people worldwide, particularly in developing countries, primarily rely on agriculture as their source of livelihood. In Nigeria, agriculture plays a significant role in the economy by creating jobs, lowering poverty rates, and ensuring food security (Pawlak & Kołodziejczak, 2020). The agricultural sector's extraordinary susceptibility to the changing climate has a negative impact on productivity, revenue, and overall sustainability.

Due to its adaptability, maize is one of the most important cereal crops in the world and is useful for both industrial and human use. Maize is a staple grain that millions of people eat, particularly in Asia, Latin America, and Africa. Nearly half of Nigeria's total cereal production is produced from maize, the primary crop grown for

cereal crops (Erenstein et al., 2022). Maize is a major source of income for smallholder farmers in every agro-ecological zone in the country (Mwambo et al., 2020). Nigerian maize farmers have complex, multidimensional perspectives on climate change that take into account their awareness of changing weather patterns and strategies for adapting to them. Global climate change happens and presents significant challenges to global agriculture systems. Temperature and precipitation changes, in addition to extreme weather occurrences, can have a direct impact on agricultural productivity. These factors may lead to lower crop yields and monetary losses (Woolway et al., 2020).

Due to its excessive reliance on rain-fed agriculture and its inadequate application of sophisticated adaptation techniques, Nigeria is more vulnerable than other nations to the adverse effects of climate change on agriculture (Raimi et al., 2021). This vulnerability is associated with the nation's agricultural sector. Throughout history, Nigerian farmers have shown themselves to be exceptionally adaptable in the face of changing social, economic, and environmental conditions. However, it is uncertain if Nigerian farmers will be able to adapt given the unusual rate at which climate change is expected to materialize in the future years (Altea, 2020). Fierros-González and Lopez-Feldman (2021) predict that producers who rely on rain-fed agriculture, those with restricted access to credit and insurance, and those without connections to local or national markets will probably be disproportionately impacted by these trends.

The agriculture industry has challenges due to climate change, which has led to unpredictability in rainfall patterns, increased temperatures, and severe weather. The changes have had a substantial influence on agricultural productivity, which puts the livelihoods of native farmers at significant risk because agriculture is the area's primary source of income and survival (Malhi et al., 2021). Because the precise effects of climate change on agricultural productivity are not fully understood, there are few management strategies that are spatially specific.

There is a dearth of research on the specific perspectives held by Nigerian maize farmers on climate change and how much these perspectives influence their adaptation tactics. Climate change poses a severe threat to agriculture worldwide, but Nigeria is particularly vulnerable due to its heavy reliance on rain-fed agriculture, which includes the production of maize. Because Nigerian maize farmers rely primarily on this major crop, it's critical to comprehend their perspectives on and reactions to climate change in order to develop policies that would strengthen their resilience and ensure food security.

The general objective of the study was to assess maize farmers' perception of climate change in Asa Local Government Area, Kwara State, Nigeria. The specific objectives were to;

1. Identify the socioeconomic characteristics of maize farmers in the study area;
2. Assess the awareness of climate change among maize farmers in Asa Local Government Area;
3. Investigate the maize farmers' perception of climate change among maize farmers in the study area;
4. Assess the sources of information on climate change among the respondents; and
5. Identify the constraints faced by maize farmers on climate change adaptation strategies in the study area.

Hypothesis

HO₁: There is no significant relationship between socio-economic characteristics and perception of respondents on climate change.

Methodology

The Asa Local Government Area in Kwara State served as the study location. It is one of Kwara State, Nigeria's sixteen local government areas. It is situated in the nation's North Central geopolitical zone. The area is predominantly rural, with agriculture serving as the main economic activity.

Kwara State was created on May 27, 1967 and the state is inhabited by various ethnic groups such as the Yorubas, Fulanis, Nupe, and Bariba. Over the years, Kwara State has experienced cultural interactions and migrations, shaping its diverse heritage and traditions. The latitude and longitude coordinates for Kwara State are approximately Latitude: 8.7547° N to 9.9572° N Longitude: 2.4014° E to 5.0349°E, the landmass of the State is approximately 36,825 Km².

Population for the Study

This study comprised of all farmers involved in maize production in Asa Local Government Area, Kwara State.

Sampling Procedure and Sample Size

For this study, a two-step sampling procedure was employed to choose participants. Due to their predominance in maize farming, eight (8) villages—Budo-Egba, Aiyepe, Ojola, Gbogun, Alapata, Ogboluana, Foko, and Oniyamo—were purposefully selected for the first stage. Thirty (30) farmers from the chosen communities were randomly picked for the second stage. For the study, a total of 240 respondents made up the sample.

Instrument of Data Collection and validation

A well-structured questionnaire was utilised for data collection in gathering information for this study. The instrument for data collection was validated by experts in the field of Agricultural Extension and adjudged to be valid and reliable for the purpose of the study.

Data Analysis

Statistical tools for inference and description were used to analyze the data. A Pearson Product Moment Correlation (PPMC) was employed to examine the relationship between respondents' perceptions of climate change and their socio-economic characteristics, while mean, standard deviation, and frequency counts were utilized as descriptive methods.

Results and Discussion

Socio-Economic Characteristics of Respondents

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency (240)	Percentage	Mean ± SD
Sex			
Male	200	83.3	
Female	40	16.7	
Age (years)			
≤ 30	24	10.0	
31 – 40	68	28.5	42.4 years ±8.49
41 – 50	108	45.0	
≥ 51	40	16.7	
Level of education			
No formal education	24	10.0	
Primary education	142	59.2	
Secondary education	50	20.8	
Tertiary education	24	10.0	
Years of farming experience (years)			
≤ 10	52	21.7	
11 – 20	76	31.7	20.7 years ±10.40
21 – 30	68	28.3	
≥ 31	44	18.3	
Mode of farming occupation			
Farming	168	70.0	
Non-farming	72	30.0	

Source: Field Survey, 2023

Results in Table 1 indicated that most (83.3%) of the respondents were male. This implies that maize based farmers in the study area were male dominated. The reason behind men's dominance in maize farming in the study area may be attributed to gender disparities in land access, extension contacts, and other productive assets for maize production in favour of men in Kwara State (Salami et al., 2020). The age distribution of the respondents revealed that 45.0 percent were between the ages of 41 and 50, with an average age of 42.4±8.49 years. This result is consistent with the study by Ayinde et al. (2018), which discovered that 44 years old was the average age of maize farmers in Kwara State's Asa Local Government area. This suggests that the study area's maize farmers were still in their prime, which might have a good impact on maize production because growing maize requires a lot of hard labor that farmers with full physical power could accomplish.

The results in Table 1 showed that few (10.0%) of the respondents had no formal education, whereas the remaining respondents had some kind of formal education which included primary education (59.2%), secondary education (20.8%), and tertiary education (10.0%). This suggested that the Kwara State maize farmers were well educated and should have been able to decipher the writing on agricultural input labels before applying them. Additionally, the farmers should be able to compose messages to extension agencies/agents to ask for more information on growing maize and climate change. According to findings regarding farming experience, the respondents had been in the field for roughly 20.7±10.40 years. This

indicates that the study area's maize farmers had higher years of farming experience. As a result, the information the respondents provided about how they perceived climate change in the context of growing maize could be trusted for the purpose of developing policies and planning extension programs that will affect farmers' perspectives on the subject of climate change. According to the information supplied regarding the state of farming occupation, the majority of respondents (70.0%) were primarily involved in farming. This finding is consistent with the research conducted by Ajibesin et al. (2019), which found that the primary occupation of the maize farmers in his study location was farming.

Sources of Information on Climate Change

Table 2: Respondents' sources of information on climate change

Sources	Always used	Sometimes used	Rarely used	Not in Use	Mean±SD	Rank
Internet	208 (86.7)	4(1.7)	2(0.8)	26(10.8)	2.64±0.95	1st
Radio	156 (65.0)	8(3.3)	10(4.2)	66(27.5)	2.06±1.34	2nd
Television	98(40.8)	10(4.2)	4(1.7)	128(53.3)	1.33±1.45	3rd
Extension services	0	0	6(2.5)	234(97.5)	0.03±0.15	4th
Farmer's groups	0	0	4(1.7)	236(98.3)	0.02±0.13	5th

Source: Field Survey, 2023

As shown in Table 2, internet (mean=2.64) ranked highest, followed by radio (mean=2.06), television (mean=1.33), extension agents (mean=0.03), and farmers' groups (mean=0.02) as the least reliable sources of information. This result suggests that the primary information sources for maize farmers in the research area regarding climate change were the internet, radio, and television. This finding contradicts a study by Muhammad et al. (2020), which found that among his respondents, the Kaduna Maize Growers' Association was their main source of information regarding climate change. In support of findings of this study, radio and television have been shown in literature as power means of accessing climate change information by farmers (Madaki et al., 2023; Ngigi & Muange, 2022). However, this study acknowledges the limitation of not providing details on accessibility and usage pattern of internet sources, considering the potential challenge of network coverage issues in the rural communities.

Awareness of Climate Change among Maize Farmers

Table 3: Awareness of climate change among respondents

Awareness statements	Frequency	Percentage
I have heard about climate change before this survey	235	98.3
I am aware that climate change is influenced by human activities	16	6.7
I am aware that climate change poses risks and challenges to maize faming	228	95.0

I have observed any changes in local weather patterns that you attribute to climate change	42	17.5

Source: Field Survey, 2023

Results in Table 3 showed the awareness of the maize farmers on climate change. The table showed that most (98.3%) of the respondents had heard about climate change before this survey and were aware that climate change poses risks and challenges to maize faming (95.0%). However, few of the respondents had observed any changes in local weather patterns that you attribute to climate change (17.5%) and aware that climate change is influenced by human activities (6.7%). This suggests that the study area's maize producers were well aware of how climate change will affect their industry. Reports of research carried out in Pakistan (Mehmood et al., 2022) and South Africa (Akanbi et al., 2021) that separately discovered that maize farmers were highly aware of climate change are similar to this conclusion.

Perception of Maize Farmers on Climate Change

Table 4: Perception of respondents on climate change

Perception Statements	SA	A	UD	D	SD	Mean±SD	Rank
Maize farmers believe that climate change poses long-term risks to their farming livelihood.	192 (80.0)	46 (19.2)	2 (0.8)	0	0	4.78±.53	1st
Maize farmers have noticed changes in the timing of seasons (e.g., delayed onset of rains, early dry spells).	146 (60.8)	94 (39.2)	0	0	0	4.61±.49	2nd
The changing climate has affected the overall profitability of maize farming.	104 (43.3)	134 (55.8)	2 (0.8)	0	0	4.43±.51	3rd
The changing climate has resulted in higher production costs for maize farmers.	106 (44.2)	134 (55.8)	0	0	0	4.44±.49	4th
Climate change has increased the frequency and severity of pest and disease outbreaks in maize farming.	92 (38.3)	146 (60.8)	2 (0.8)	0	0	4.38±.50	5th
Maize farmers have experienced changes in the duration of the growing season due to climate change.	92 (38.3)	146 (60.8)	2 (0.8)	0	0	4.38±.51	6th
Climate change has led to increased variability in maize yields from year to year.	96 (40.0)	140 (58.3)	4 (1.7)	0	0	4.38±.52	7th
Climate change has led to reduced crop yields and productivity in maize farming.	96 (40.0)	138 (57.5)	4 (1.7)	2 (0.8)	0	4.37±.56	8th
Maize farmers have had to modify their farming practices and techniques due to climate change.	40 (16.7)	42 (17.5)	12 (5.0)	134 (55.8)	12 (5.0)	2.85±1.26	9th
Climate change has affected the availability and quality of water resources for maize farming.	8 (3.3)	6 (2.5)	16 (6.7)	18 (7.2)	192 (80.0)	1.41±.97	10th

Source: Field Survey, 2023; Strongly Disagree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD)

Table 4 showed that the perception that climate change posed long-term risks to farming livelihood (mean=4.78) ranked first position, maize farmers have noticed changes in the timing of seasons (e.g., delayed onset of rains, early dry spells) (mean=4.61) ranked second position, the changing climate has affected the overall profitability of maize farming (mean=4.43) ranked third position, the changing climate has resulted in higher production costs for maize farmers (mean=4.44) ranked fourth position, climate change has increased the frequency and severity of pest and disease outbreaks in maize farming (mean=4.38) ranked fifth position while the perception that climate change has affected the availability and quality of water resources for maize farming (mean=1.41) ranked tenth position as the least perception of the respondents about climate change. This indicates that the two main ways that the maize farmers in the study area perceived things were that they thought climate change will endanger their ability to make a living from farming in the long run and that they noticed that the seasons were changing. (e.g., delayed onset of rains, early dry spells), and the knowledge of how the changing climate has affected the overall profitability of maize farming. These results are in line with the study by Aderinoye-Abdulwahab & Abdulbaki (2021), which found that Kwara State's cereal output is negatively impacted by climate change. Similarly, Adeleke (2024) and Tajudeen et al. (2022) concluded that climate change negatively impacts the crop productivity and livelihood farmers in Ilorin and Lagos, respectively.

Table 5: Respondents' perception on climate change

Obtained score range	Categories	Frequency (240)	Percentage	Mean±SD
10 – 29	Negative	4	1.7	
30	Neutral	50	20.8	40.0±2.96
31 – 50	Positive	186	77.5	

Maximum – minimum possible score = 10 – 50

Perceptions of the respondents were further grouped in Table 5. The table showed that 1.7% had negative perception, 20.8% had neutral perception while 77.5% had positive perception. This demonstrates that maize farmers see knowledge about climate change and its effects on maize farming favorably. It is anticipated that this component will favorably affect how people seek out knowledge,

adopt improved technologies, and strengthen their resistance to technology's negative effects.

Constraints Faced by Maize Farmers on Climate Change Adaptation Strategies

Table 6: Constraints faced by respondents on climate change adaptation strategies

Constraints	Very severe	Severe	Not severe	Not a constraint	Mean±SD	Rank
Lack of financial resources	216 (90.0)	24 (10.0)	-	-	2.90 (.30)	1st
Limited access to information and knowledge about climate change adaptation strategies	98 (40.8)	140 (58.3)	2 (0.8)	-	2.40 (.50)	2nd
Inadequate support from government or agricultural agencies	78 (32.5)	158 (65.8)	4 (1.7)	-	2.31 (.499)	3rd
Lack of access to improved farming technologies and practices	70 (29.2)	150 (62.5)	4 (1.7)	16 (6.7)	2.14 (.74)	4th
Unavailability of appropriate technologies	6 (2.5)	14 (5.8)	10 (4.2)	210 (87.5)	0.23 (.67)	5th
Lack of capacity-building and training opportunities	4 (1.7)	4 (1.7)	4(1.7)	228 (95.0)	0.10 (.47)	6th
Lack of social networks and farmer associations	4 (1.8)	2 (0.8)	2(0.8)	232 (96.7)	0.08 (.43)	7th

Source: Field Survey, 2023

Results on constraints faced by respondents on climate change adaptation strategies in Table 6 showed that lack financial resources (mean=2.90) ranked first, limited access to information and knowledge about climate change adaptation strategies (mean=2.40) ranked second, Inadequate support from government or agricultural agencies (mean=2.31) ranked third position, while Lack of social networks and farmer associations (mean=0.08) ranked the seventh position as the least constraints faced by respondents. The implication is that lack financial resources, limited access to information and knowledge about climate change adaptation strategies and inadequate support from government or agricultural agencies were the topmost constraints faced by maize farmers to use climate change adaptation measures in the study area. This study supports earlier research by Olutumise (2023), Yang et al. (2022), and Ojo et al. (2021) that indicated that farmers' ability to manage the effects of climate change was hampered by a lack of financial resources.

Test of Hypothesis

H0₁: There is no significant relationship between socioeconomic characteristics and perception of respondents on climate change.

Table 7: PPMC analysis showing the relationship between socioeconomic characteristics and perception of respondents on climate change

Perception on climate change	Coef. (r)	Sig. (p)	Remark
Age (years)	0.026	0.776	Not significant
Level of education (formal 1, non-formal 0)	0.725**	0.000	Significant
Years of farming experience (years)	0.517**	0.000	Significant

**Correlation is significant at $p < 0.01$

Results in Table 7 presents the result of the hypothesis testing using PPMC to analyze the relationship between some selected socioeconomic characteristics and perception of respondents on climate change. The table showed that farmers' socio-economic characteristics like formal education (r = 0.725) and years of maize farming experience (r = 0.517) have a significant positive correlation with their perception on climate change. The finding implies; the more formal education acquired and increase years of maize farming will cause the farmers to have positive perception of knowledge about climate change, its effects and adaptation measures for maize farming. Thus, the null hypothesis that, there is no significant relationship between socioeconomic characteristics and perception of respondents on climate change was rejected. This result is in line with the finding of Thompson and Oparinde (2012) in Kwara state, where they found out that there is significant relationship between the personal characteristics of the farmers and their level of awareness about climate change. The finding regarding education is expected as farmers with formal education would have learnt about climate change issues in school, thus appreciate knowledge and practices to mitigate the effects. This research also supports the findings of Bolaji (2020), who found that their pupils had learned about climate change from in-class lectures. According to another survey, the majority of Nigerian university graduates only attended a few hours of lectures in a special elective course on climate change while pursuing their degrees (Ayanlade & Jegede, 2016).

Conclusion and Recommendations

Majority (83.3%) of the respondents were male and had a mean age of 42.4 years. Internet, radio and television were the main sources of information on climate change among maize farmers. The farmers were highly aware of climate change and its effects on maize farming business. Lack financial resources, limited access to information and knowledge about climate change adaptation strategies and inadequate support from government agricultural agencies/institutions were the topmost constraints faced by maize growers to use climate change adaptation measures in the study area.

More awareness about climate change is needed among farmers through extension training/workshop programmes. Emphasis of the training should be on local weather patterns attributed to climate change and human activities that contribute to climate changes and mitigation practices. Extension programme aimed to disseminate information on climate change to maize farmers should be disseminated through internet, radio and television to get in touch with a lot of the intended farmers. To the farmers, lack financial resources can be overcome through farmers' group and innovative platform. Farmers' group and innovative platform are powerful and

dynamic social network/capital through which farmers build resilience for adaptive ability to lessen the impact of climate change. Thus, maize farmers who have not joined a group should do so while communities where none is existing can create one. In this way, farmers can jointly harness resources to help one another.

Suggestions for Further Research

The study could not explore the gender dynamism of awareness and perception of farmers about climate change. Sequel to this, future researches can explore gender perspective on farmers' perception of climate change and gender-specific adaptation strategies. This becomes imperative considering the dominance of male folks in farming, especially in Nigeria. Other studies may also investigate the role of local governance in supporting climate adaptation strategies and gender differentials of climate change impacts on the welfare of farmers.

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