

CLIMATE VARIABILITY MITIGATION PRACTICES AMONG ARABLE CROP FARMERS IN KAJOLA LOCAL GOVERNMENT OYO STATE

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Abstract

This study assessed climate variability mitigating practices among arable crop farmers in Kajola Local Government Area of Oyo State. A total of 110 arable crop farmers were selected using a multi-stage sampling technique. Data were collected through structured interviews and analyzed using descriptive and inferential statistical tools. Results revealed that 52.7% of respondents were male, with a mean age of 48 years, while 27.9% were within the 61–70 age bracket. The majority were married (72.6%), nearly half (49.1%) had secondary education, and 65.5% cultivated farm sizes of 1–4 hectares. Radio was the predominant source of information on climate variability (98.2%). All respondents acknowledged temperature as a key climatic parameter influencing variability. Among mitigation practices, modified agricultural practices ranked highest (WMS = 4.05). Reduction in yield emerged as the most critical effect of climate variability (WMS = 4.31). Inferential analysis revealed significant relationships between socio-economic characteristics—marital status ($\chi^2 = 141.782$, $p = 0.000$), religion ($\chi^2 = 43.218$), education ($\chi^2 = 56.327$), and occupation ($\chi^2 = 41.364$)—and adoption of mitigation practices. Furthermore, a significant negative relationship was observed between perceived effects of climate variability and selected mitigation practices ($v = -0.236$, $p = 0.013$). The issue of increasing in temperature due to climate variability should be controlled by providing technical knowledge that will be useful in predicting the occurrence of such temperature and prevent physiological development that could result in hastened or acceleration maturation and cause yield reduction.

Keywords: *Climate variability, Mitigation practices, Arable farmers*

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Introduction

Climate variation and agriculture are strongly interrelated processes that operate on a global scale. Changes in climatic factors such as temperature, atmospheric carbon dioxide concentration, glacial runoff, and precipitation

significantly influence agricultural systems and productivity. Global warming, in particular, is projected to exert profound impacts on these elements, thereby affecting the resilience of food production systems. Over the years, climate variability has

adversely impacted agriculture, with arable crops being among the most vulnerable (Omotoso et al., 2023). For instance, between 2020 and 2024, world grain production stagnated at approximately 1.8 billion tonnes, reflecting the potential constraints posed by changing climatic conditions on agricultural output (Ayodele et al., 2025; Omotoso & Omotayo, 2024). From 2020 to 2024, grain stocks have been dropping, resulting in a world harvest of grains that lagged behind consumption by 93 million of tons in 2024 (Omotayo & Omotoso, 2025). Mitigation is a measure to avoid, reduce or mitigate adverse environmental impacts of an occurrence. Mitigation practices are practices or plans drawn up activity for avoiding, reducing or mitigating an adverse environmental impact.

Statement of Problem

It is estimated that the projected rise in temperature resulting from climate variability will accelerate physiological development in crops, leading to premature maturation and consequently reduced yields (Ajibade et al., 2024; FAO, 2018; Omotayo & Omotoso, 2025). Moisture stress induced by drought during critical growth stages such as flowering, pollination, and grain development has been identified as particularly detrimental to the majority of arable crops. Projections further indicate that Africa's food production could decline by up to 50% by 2020, highlighting the severity of climate-induced risks to agricultural sustainability. In addition to drought and heat stress, extreme weather events such as thunderstorms, flooding, heavy rainfall, and strong winds pose significant threats to both crop and livestock production, as well as human livelihoods (Khan et al., 2023; Omotayo, Adediran, et al., 2025). These conditions not only contribute to crop failure but also exacerbate pest and disease outbreaks, often triggered by the migration and proliferation of vectors influenced by changing climatic conditions.

Climate fluctuations significantly affect food and water resources, which are critical for sustaining livelihoods in Africa. The majority of the population, particularly the poor, depend heavily on local supply systems that are highly sensitive to climate variability. Disruptions in these systems pose severe threats to development and human well-being, often resulting in food insecurity, water scarcity, and livelihood vulnerability. As noted by (Khan et al., 2023; Omotayo & Omotoso, 2025), climatic sustainability is inherently linked to environmental sustainability, which underpins life-support systems and provides the resources necessary to meet the developmental needs of humans and animals alike. In Nigeria, shifts in climatic patterns have heightened risks to the food security system by influencing crop production, water availability, and resilience of rural households.

Specific objectives of the study

The study is designed to achieve the following objectives:

1. describe the socio-economic characteristics of arable crop farmers in the study area.
2. identify the sources of agricultural information on climate variability available to farmers.
3. identify the perceived climatic parameters that influence climate variability in the study area.
4. examine the mitigating practices employed by arable crop farmers against climate variability.
5. assess the perceived effects of climate variability on arable crop production in the study area.

Research Hypotheses

The following null hypotheses were tested in the course of the study:

H₀₁: There is no significant relationship between respondents' socio-economic characteristics and climate variability mitigation practices.

H₀₂: There is no significant relationship between the constraints faced by respondents and climate variability mitigation practices.

Methodology

This study was conducted in Kajola Local Government Area (LGA) of Oyo State, Nigeria, located on latitude 8°02'1.90" N and longitude 3°20'51.32" E. The population of the study comprised all registered arable crop producers within the LGA. A two-stage sampling technique was employed to select the respondents. In the first stage, Kajola LGA, which consists of 11 political wards—Okeho, Ilua, Ayetoro, Isemi-Ile, Ilero, Elewure, Ilaji, Iwere, Gboga, Imia, and Ayedade—was considered. Fifty percent (50%) of the wards were randomly selected, resulting in six wards: Okeho, Ilua, Gboga, Isemi-Ile, Imia, and Elewure. In the second stage, a sampling frame of 1,200 registered farmers across the selected wards was obtained. Using systematic random sampling, every 10th farmer on the list was selected, resulting in a final sample size of 120 respondents.

Primary data were collected through the use of a well-structured interview schedule, designed to capture information on respondents' socio-economic characteristics, sources of agricultural information, perceived climate variability parameters, mitigation practices, and the effects of climate variability on arable crop production. Data were analyzed using both descriptive and inferential statistical tools. Descriptive statistics such as frequency counts, percentages, and means were employed to summarize respondents' characteristics and address the stated objectives. For hypothesis testing, inferential statistics including Chi-square (χ^2) test and Pearson Product-Moment Correlation (PPMC) were employed to establish relationships between socio-economic characteristics, constraints, and climate variability mitigation practices.

Results and Discussion

Socio-economic characteristics

The socio-economic profile of the respondents (Table 1) shows that the mean age of farmers was 48 years, indicating that the majority of them were still in their productive and economically active age bracket. This suggests that they possess both the physical strength and farming experience necessary for engaging in agricultural activities, which is crucial for adopting climate variability mitigation practices. The gender distribution reveals that 52.7% were male while 47.3% were female, suggesting a slight male dominance in farming. This aligns with the general pattern of male-headed households being more involved in agricultural production, although the high proportion of female farmers highlights the important role of women in food security and rural livelihoods. In terms of marital status, a majority (73.6%) were married, while 15.5% were widowed, 6.4% divorced, and 4.5% single. This shows that farming households are largely organized around family labor systems, with marriage playing an important role in household decision-making and agricultural resource management.

The religious distribution indicates that 57.3% of respondents were Christians, 36.4% Muslims, and 6.4% traditionalists. This reflects the pluralistic religious composition of the study area, which may influence farming practices, social organization, and access to cooperative networks. Regarding educational status, the results show that only 0.9% had no formal education, while 49.1% had adult education, 32.7% had primary education, and 17.3% had secondary education. This suggests that most respondents had some level of formal or informal education, which is important because literacy enhances the ability to adopt innovations, access extension services, and respond to climate variability. Occupation-wise, 50% of respondents

engaged primarily in trading, 45.5% in farming, and 4.5% in civil service. This indicates that although farming is a major livelihood, trading is equally significant in the study area, reflecting the prevalence of livelihood diversification as a strategy to cope with uncertainties in agricultural income (Daud et al., 2018; FAO, 2018).

Farm size distribution shows that 65.5% cultivated 1–4 hectares, while 34.5% cultivated above 5 hectares. This indicates predominance of smallholder farming, which is typical of rural Nigeria. Small farm sizes often limit production capacity but may encourage efficient use of resources and family labour. Farming experience was relatively high, with 20.8% having 1–10 years, 29.9% with 11–20 years, 26.3% with 21–30 years, 17.1% with 31–40 years, and 6.3% with 41–50 years of farming experience. The mean farming experience of 41.7 years suggests a strong knowledge base in agricultural practices, which could influence adaptation to climate variability.

Household structure shows that 53.6% practiced monogamy, while 46.4% practiced polygamy. This reflects cultural norms in the area, with implications for household size and labor availability. Indeed, the household size distribution shows that 33.6% had 1–5 persons, 53.6% had 6–10 persons, and 12.6% had 11–15 persons, with an average household size of 8 persons. Large household sizes are common in rural areas, as they provide family labor for farming and other livelihood activities. In terms of income, 17.3% earned less than ₦100,000 annually, 75.5% earned between ₦100,000–₦500,000, and 7.3% earned between ₦500,000–₦1,000,000, with a mean income of less than ₦300,000. This indicates that most respondents operate at a subsistence level, with limited disposable income for investment in improved technologies or climate-smart practices. The low annual income reflects the vulnerability of rural farming households to climate and economic shocks.

Table 1: Distribution of socioeconomic characteristics of the respondents

Socio-economic character	Frequency	Percentage	Mean
Age (Years)			
≤ 30	20	18.0	48
31 – 40	11	9.9	
41 – 50	21	18.9	
51 – 60	24	21.6	
61 – 70	31	27.9	
≥ 71	3	2.7	
Sex			
Male	58	52.7	
Female	52	47.3	
Marital Status			
Single	5	4.5	
Married	81	72.6	
Divorced	7	6.4	
Widow	17	15.5	
Religion			
Christianity	63	57.3	
Islam	40	36.4	
Traditional	7	6.4	

Level of Education			
Primary Education	36	32.7	
Secondary Education	19	17.3	
Adult Education	54	49.1	
No formal Education	1	0.9	
Major occupation			
Farming	50	45.5	
Trade	55	50.0	
Civil Service	5	4.5	
Farm size (Hectare)			
1 – 4	72	65.5	4
≥ 5	38	34.5	
Farm Experience (Years)			
1 – 10	23	20.8	
11 – 20	32	29.0	
21 – 30	29	26.3	22
31 – 40	19	17.1	
41 – 50	7	6.3	
Household type			
Monogamy	59	53.6	
Polygamy	51	46.4	
Household size (Persons)			
1 – 5	37	33.6	
6 – 10	59	53.6	8
11 – 15	14	12.6	
Annual Income (#)			
≥ 100,000	19	17.3	
101,000 – 500,000	83	75.5	258,755
501,000 – 1,000,000	8	7.3	

2 Sources of agricultural information on climate variability

Table 2 showed the information sources on climate variability which are Radio (98.2%), Television (54.5%), Extension agent (60.0%), Neighbor (73.6%), Phone (52.7%), Newsletter (20.0%), Library (21.8%), Worship Center (93.6%), Seminar (76.4%), Workshop (26.4%), Field day (53.6%). The tables shows that the highest sources of agriculture on climate variables is Radio and

the lowest sources of agriculture on climate variables is Newsletter. 98.2% of the respondents i.e almost all of them used radio as a source of agricultural information on Climate variability. Also 54.5% of the respondents used television and 45.5% did not use it as a medium of getting agricultural information on climate variability. This implies that Radio is the effective source of agriculture on climate variability to the respondents.

Table 2: Distribution of respondents according to sources of agricultural information on climate variability

	Yes (%)	No (%)
Radio	108 (98.2)	2 (1.8)
Television	60 (54.5)	50 (45.5)
Extension Agent	66 (60.0)	44 (40.0)
Neighbour	81 (73.6)	29 (26.4)
Phone	58 (52.7)	52 (47.3)
News letter	22 (20.0)	88 (80.0)
Library	24 (21.8)	86 (78.2)
Worship centers	103 (93.6)	7 (6.4)
Seminar	84 (76.4)	26 (23.6)
Workshop	29 (26.4)	81 (73.6)
Field day	59 (53.6)	51 (46)

3 Climatic parameters that influence climate variability.

Table 3 revealed that most of the respondents 100%, 95.5% and 98.2% agreed that temperature, rainfall and sunshine respectively were the climatic parameters influencing climatic variability. This agrees with (Khan et al., 2023; Omotayo, Omotoso, et al., 2025) that rising temperatures associated with climate variability accelerate physiological development in arable crops. This rapid

progression shortens the growth cycle, resulting in hastened maturation and ultimately reduced yield, thereby threatening food security (Omotayo, Adediran, et al., 2025). This also agrees with (Ayodele et al., 2025; Omotoso et al., 2024) observations that shortages of food, water and disease outbreaks have been brought about by prolonged droughts since rainfall and temperature regimens are important in ascertaining potential productivity.

Table 3: Distribution of respondents according to climatic parameters that influence climate variability

Climactic parameters	Yes	No
Temperature	110 (100%)	0(0.0%)
Wind	27 (24.5%)	83 (75.5%)
Rainfall	105 (95.5%)	5 (4.5%)
Relative humidity	58 (52.7%)	52 (47.3%)
Sunshine	108 (98.2%)	2 (1.8%)

4 Mitigation practices used to check climatic variability.

Table 4: revealed the mitigation practices to overcome the perceived effect of climate variability with modified agricultural practice ranked highest (WMS = 4.05), implying that farmers actively adjust their farming techniques to cope with climatic stressors. This finding aligns with adaptation strategies reported in climate-smart agriculture

literature, where practices such as crop diversification, soil conservation, and improved planting methods enhance resilience to unpredictable weather conditions (Khan et al., 2023; Omotoso et al., 2024). Withdrawal from social activities and borrowing to meet domestic needs both ranked second (WMS = 3.99). These results suggests that climate variability not only affects production but also compels farmers to reprioritize their social

engagements and rely on informal credit as coping mechanisms. The ranking of reduced spending at ceremonies (WMS = 3.94) further supports the view that households manage limited resources by cutting down on cultural and social expenses, redirecting funds toward essential survival and farming activities. Similarly, use of family labour (WMS = 3.87) reflects reliance on household labour to reduce production costs, especially when climate-induced risks reduce profitability. Diversification into multiple sources of livelihood (WMS = 3.75) and joining

cooperative societies (WMS = 3.73) represent longer-term adaptive strategies. These allow farmers to spread risks, gain access to collective support, and improve resilience against shocks. Planting at different dates (WMS = 3.70) ranked lowest, yet it remains a critical practice that allows farmers to hedge against erratic rainfall and other climatic uncertainties. Though ranked last, it still shows a relatively high mean score, confirming that respondents did not disagree with its importance.

Table 4: Distribution of the respondents according to mitigation practice used to check climatic variability

Mitigation practices	SA F(%)	A F(%)	U F(%)	D F(%)	SD F(%)	WMS	RANK
Modified agricultural practices	61(55.5)	19(17.0)	10(9.1)	15(13.6)	5(4.5)	4.05	1 st
Borrowing to meet domestic	54(49.1)	26(23.3)	11(10.0)	13(11.8)	6(5.5)	3.99	2 nd
Withdrawal from social activities	54(49.1)	26(23.6)	11(10.0)	13(11.8)	6(5.5)	3.99	2 nd
Reduced spending at ceremony	51(46.4)	29(26.4)	12(10.9)	8(7.3)	10(9.1)	3.94	4 th
Use of family labour	52(47.3)	27(24.5)	8(7.3)	11(10.0)	12(10.0)	3.87	5 th
Many source of livelihood	34(30.9)	40(36.4)	19(17.3)	9(8.2)	8(7.3)	3.75	6 th
Joining cooperative society	49(44.5)	24(21.8)	13(11.8)	7(6.4)	17(15.5)	3.73	7 th
Planting at different dates	50(45.5)	14(12.7)	20(18.2)	16(14.5)	10(9.1)	3.70	8 th

WMS = Weighted Mean Score

SA = Strongly Agreed

A = Agreed

U = undecided

D = Disagreed

SD = Strongly Disagreed

5. Effect of Climate Variability on Arable Crop Production

Table 5 presents the effects of climate variability on crop output in the study area. Yield decline ranked highest with a weighted mean score (WMS) of 4.31, followed by loss of species for subsequent planting seasons (WMS = 4.00). Other notable effects include food shortages (WMS = 3.98), poverty (WMS = 3.94), and increased health risks (WMS = 3.88). Low income was also identified as a significant consequence, with a WMS of 3.85.

The results clearly indicate that yield reduction remains the most critical effect of climate variability on arable crop production in the study area. Respondents unanimously acknowledged the existence of climate variability and its adverse impacts, particularly in reducing crop productivity. These findings align with (Ayodele et al., 2025; Iyiola et al., 2023), who highlighted that climate variability contributes to major challenges in crop production, including low output and stunted growth.

Table 5: Distribution of the respondents according to effect of climate variability on arable crop

Effect of climate variability	SA F(%)	A F(%)	U F(%)	D F(%)	SD F(%)	WMS	RANK
Reduction in yield	76(66.1%)	12(10.9%)	7(6.4%)	10(9.1%)	5(4.5%)	4.31	1 st
Loss of species for other planting season	52(47.3%)	28(25.5%)	16(14.5%)	6(5.5%)	8(7.3%)	4.00	2 nd
Shortage of food	55(50.0%)	25(22.7%)	10(9.1%)	13(11.8%)	7(6.4%)	3.98	3 rd
Low income	51(46.4%)	29(26.4%)	12(10.9%)	8(7.3%)	10(9.1%)	3.94	4 th
More health risk	49(44.5%)	31(28.2%)	10(9.1%)	9(8.2%)	11(10.0%)	3.88	5 th
Poverty & displacement	50(45.5%)	30(27.3%)	5(4.5%)	13(11.8%)	12(10.9%)	3.85	6 th

WMS = Weighted Mean Score

SA = Strongly Agreed

A = Agreed

U = undecided

D = Disagreed

SD = Strongly Disagreed

6. Test of hypotheses

6.a Chi-square test showing relationship between selected socio-economic characteristics and mitigation practices among arable crop farmers

Table 6a: showed the result of relationship between selected socio-economic

characteristics and mitigation practices among arable crop farmers was analyzed using Chi-square. Chi-square analysis result as indicated in the Table 6 showed significant relationship between Socio-economic and the following mitigation practices such as Marital Status

($\chi^2=141.782$, $p = 0.000$), Religion ($\chi^2=43.218$), Level of Education ($\chi^2= 56.327$), Major Occupation($\chi^2= 41.364$) and Mitigation practices among arable crop farmers. Sex ($\chi^2=$

0.327, $P= 0.567$) show no significant relationship, Thus the null hypothesis is therefore rejected and alternative hypothesis is accepted.

Table 6a: Chi-square test showing relationship between selected socio-economic characteristics and mitigation practices among arable crop farmers

Variable	χ^2	Df	P-value	Remark
Sex	0.327	1	0.567	NS
Marital Status	141.782	3	0.000	S
Religion	43.218	2	0.000	S
Level of Education	56.327	3	0.000	S
Major occupation	41.364	2	0.000	S

6.b: PPMC test showing relationship between selected mitigation practices and effect of climatic variability

Table: showed the result of the relationship between selected mitigation practices and effect of climate variability was established

using Pearson Product Moment Correlation (PPMC) as presented in table 7. The result showed that the selected mitigation practices are significantly correlated with the effect of climate variability. Hence the null hypothesis was rejected.

Table 7: PPMC test showing relationship between selected mitigation practices and effect of climatic variability

Variable	V – value	P value	Decision
Mitigating practices	0.236	0.013	S

Conclusions and Recommendations

The study showed that most of the respondents are at their active age, and have low level of education. Radio was important source of information they may not be able to access other sources of information on mitigation measures on climatic variability, due to the low level of education and income in the study area. Furthermore, due to yield loss and low income level, there is a need for the farmers to be trained by another source on these mitigation measures on climate variability.

The following suggestions were given in light of the findings of the study:

The issue of increase in temperature due to climate variability ought to be controlled by making available technical data that will assist in predicting the occurrence of such temperature and prevent physiological

development that can cause accelerated or speedy maturation and yield loss.

Farmers need to group themselves and be willing to pay for Non-governmental Extension delivery services that will train and enlighten them on recent and modern techniques of mitigation for climatic variability.

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