Farmers' Perception of Climate Change Effects on Arable Crops Production in Kwara and Oyo states, Nigeria

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ABSTRACT

The vulnerability of Nigeria's agriculture sector to climate change has serious implications for food security and rural livelihood. This is because climate change has serious impacts on agricultural production, therefore significant proportion of arable crop farmers in the agricultural sector suffer more affronts from climate. It is against this background that the study examined the Perceived Effects of Climate Change on Arable Crops Production in Kwara and Oyo States, Nigeria. A total of 10% of 3,050 (305) registered arable crop farmers were randomly selected using multi-stage sampling procedures. Primary data were collected using structured interview schedule. The data were analyzed using descriptive statistics (frequency, percentages, mean and grand mean) and inferential statistics (Chi-Square, Pearson Product Moment Correlation (PPMC) were used to test the relationship between the variables

The result revealed that the pooled mean age is 50 years, 77.3% and 80.8% were male in Kwara and Oyo state respectively, and 92.1% were married and were educated (90.8%). The mean farming experience is 20 years. The result further revealed that 64.3% of the arable crop farmers perceived the effects of climate change as high, being higher than the mean score of 59.07. The grand mean of 3.0 in Kwara state indicated that arable crop farmers agreed that effects of climate change on arable crop production and livelihood are moderately high. While the grand mean of 3.29 in Oyo state which is above decision mean of 3.0 and higher than Kwara state' decision mean of 3.0 indicated strong agreement and higher perceived effects among arable crop farmers in Oyo state . Chi- Square test revealed a Significant Relationship between Selected Socio-economic Characteristics of Arable Crop Farmers and Effect of Climate Change on Arable Crops Production.

Key words: Arable crop, Production, Arable farmers, Oyo, Kwara, Climate change,

INTRODUCTION

Climate change is a global environmental phenomenon that poses significant threats to agricultural production and the livelihoods of farmers, particularly in semi-arid regions of Africa (Mugambiwa and Tirivangasi, 2017; Roy et al., 2018). It is characterized by long-term alterations in temperature, rainfall patterns, and other climatic conditions resulting from both natural processes and human activities. These changes have far-reaching consequences for food production, water resources, biodiversity, and socio-economic development. Increasing occurrences of droughts, floods, heat waves, and other extreme weather events have heightened global concern regarding the impacts of changing climatic conditions on human societies and natural ecosystems (Osakede et al., 2016; Olubanjo and Adebolu, 2018).

These phenomena pose significant threats to food security, water resources, public health, and sustainable development, particularly in developing countries that have limited adaptive capacity. The Earth's climate system is inherently dynamic and exhibits variations across seasonal, annual, decadal, and longer time

scales. Such fluctuations may result in periods that are warmer or cooler, wetter or drier, and characterized by varying levels of storm activity. According to the Intergovernmental Panel on Climate Change (IPCC, 2014), climatic changes may arise from natural internal processes, external forcing mechanisms such as volcanic eruptions and variations in solar radiation, or persistent anthropogenic changes in atmospheric composition and land-use patterns.

Agriculture is regarded as a climate-sensitive sector whose productivity and sustainability are closely linked to prevailing weather and climatic conditions. The ecological characteristics of a region, which are largely determined by temperature, rainfall, solar radiation, and other climatic factors, play a significant role in shaping agricultural activities and production systems (Mugabinwa and Trivagasi,2017).Arable crops production is however highly sensitive to climate variability. Kwara and Oyo states in the derived savannah zone experience rain fed farming system that are vulnerable to changes in temperature and rainfall pattern.

Perception refers to the way individuals observe, interprets and understands phenomena. Farmers' perception of climate change is critical because it determine their willingness to adopt adaptation measures. Studies across Africa show that farmers perceive climate change through changes in rainfall timing, crop failure, and increased heat stress.

Climate change has emerged as a major threat to socio-economic development across the globe, affecting both developed and developing nations. Several studies have highlighted the increasing severity of climate-related challenges in Nigeria. For instance, Ughaelu (2017), and Ikem (2018) observed that recurrent environmental disasters have contributed significantly to declining agricultural productivity and increased human hardship over the past decade. Despite growing evidence of climate change, empirical data on how arable crop farmers in Kwara and Oyo states perceive its effects is limited. This study therefore examined farmers' perception of climate change effects on arable crops production in the study areas. This study addressed the following questions

1.What are the Socio-economic Characteristics of Arable Crop Farmers in Oyo and Kwara States?

2.What is the Perceived effects of climate change on the yield of arable crops in Oyo and Kwara states?

METHODOLOGY

The study was carried out in Oyo and Kwara states of Nigeria. Oyo state is one of the states in south- west geopolitical zone of Nigeria and lies between latitude $7^0 2^1$ and $9^0 1^1$ North and longitude $2^0 4^1$ and $4^0 3^1$East. It is an inland state in southwestern Nigeria with its capital in Ibadan. It is bounded in the north by Kwara State, in the east by Osun State, in the south by Ogun State and in the west partly by Ogun State and partly by the Republic of Benin.

Kwara state is located in the North central geographical zone, and has a land mass of about 32,500 square kilometers (km^2). It is situated between the coordinates 6.50^0 and11.50^0 North latitudes of the equator and longitudes 2.80^0 and 7.50^0 east. The state is bounded in the south with Oyo, Ekiti and Osun State. It is bounded in the West by Benin Republic while in the North and the East; it is bounded by River Niger, and Kogi State, respectively. The state has a land area of 32, 5002 km (3,250,000 ha) with a temperature range between 30 and 35°C. The vegetation in the northern parts of the State is mainly savannah grass land while to the southern part is wooded Guinea Savannah. The targeted populations for the study comprise all arable crops farmers in the study areas.

Multistage sampling procedure was used in selecting the arable crops farmers across the states in the study areas. Oyo and Kwara states were purposively selected for the study because of the similarities in the ecology of the areas. In the first stage, 50% of the 4 zones in each state were randomly selected giving two zones from each state. In Oyo state, Saki and Ogbomoso zones were selected while Zones A and D were selected in Kwara state making a total of four zones out of eight zones. This selection was informed by the fact that these are the rural areas where farming production and other primary activities are prevalent.

In the second stage, random selection of 50% of the blocks from each state was selected. In Oyo state, Ogbomoso zone has five blocks while Saki zone has ten blocks. From the block, 50% were selected. Thus, three out of five blocks were selected in Ogbomosho zone while in Saki zone, five Out of ten blocks were randomly selected giving a total of eight blocks out of fifteen blocks. While in Kwara state, zone A has two blocks while Zone D has seven blocks. Thus, one block namely Patigi was selected in zone A while three blocks were selected in zone D making a total of four blocks in Kwara state. Thus, eight blocks from Oyo state and four blocks from Kwara state were sampled giving a total of twelve blocks from both states.

In the third stage, there are sixty-four cells comprising of twenty-four cells in Ogbomoso zone and forty cells in Saki zone of Oyo state while in kwara state, there are forty cells comprising of eight cells in Zone A and thirty-two cells in Zone D, 50% of the cells across the states were purposively selected in the study areas. Thus, thirty-two cells from Oyo state and twenty cells from Kwara state making a total of Fifty-two cells out of One hundred and four cells.

In the fourth stage, the lists of registered arable crop farmers in each cell were collected through the Extension agents. There are 1,770 registered arable crop farmers in Oyo state and 1,280 farmers in Kwara state making a total of Three thousand and fifty arable crop farmers in the study areas. From the list, 10% of the registered arable crop farmers were randomly selected giving a total of three aundred and five (305) registered Arable crop farmers as sample size in the study area.

Structured interview schedule was used to collect data from arable crop farmers because most of the farmers in the study areas were illiterate. The data collected were subjected to both descriptive statistics such as frequency count, percentages, Mean and standard deviation while inferential statistics such as Chi-square was used to test the hypothesis.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Arable Crops Farmers

The results presented in table 1 showed that in kwara state 43.75% and 24.29% of arable crop farmers were between the age bracket of 46-55 and 56-65 years respectively while in Oyo state 24.29% and 22.60% indicated that arable crop farmers were between the age bracket of 56-65 and 46-55 years of age respectively. The pooled result revealed that most respondents were within the economically active age groups; with 31.5% aged 46–55 years and 26.6% aged 56–65 years. The mean age of arable crop farmers was 50 years (±11.4), indicating that farming in the study area is dominated by middle-aged and older individuals. This finding is consistent with previous studies that reported an ageing farming population in Nigeria due to youth migration to urban areas (Awotide et al., 2015; Ogunniyi et al., 2021). Ageing farmers may face limitations in adopting labor-intensive or technologically advanced adaptation strategies, potentially increasing vulnerability to climate change impacts (FAO, 2018). The predominance of older farmers may therefore influence both perception and adaptive responses to climate change in Oyo and Kwara States.

The result in Table 1 also revealed that in Kwara state, more than half (60.2%) of arable crop farmers were male while 39.8% were female. In Oyo state, more than half (61.0%) of arable crop farmers were male while 39.0% were female. The pooled result also indicated that more than half (60.7%) of arable crop farmers were male while 39.3% were female. This indicates male dominance in arable crops farming in the study areas. This pattern aligns with existing literature indicating that men dominate land-intensive agricultural activities in Nigeria due to cultural norms and land ownership structures (FAO, 2011; World bank, 2020). Male farmers typically have greater access to productive resources such as land, credit and extension services which enhances their adaptive capacity to climate change. However, female farmers often face greater vulnerability due to limited access to these resources, despite playing critical roles in agricultural production (IPCC, 2022). The lower representation of female farmers in the study areas may therefore reflect structural gender inequalities in agricultural system and distribution of resources.

The result showed that in Kwara state majority (92.1%) were married while 6.6% were single. In Oyo state, majority (64.99%) were married while 4.52% were single. The pooled result indicated that overwhelming majority of respondents (92.1%) were married, while only 6.6% were single and very few were divorced or widowed. This suggests that farming in the study area is primarily a family-based livelihood activity. Marital status is an important determinant of agricultural productivity because married farmers often have access to family labour, which enhances farm operations and climate adaptation activities such as mulching, irrigation, and crop diversification (Abid et al., 2015). Family labour reduces dependence on hired labour, thereby lowering production costs and improving farm resilience. The high proportion of married farmers may therefore enhance adaptive capacity to climate change through shared labour and household resource pooling.

Educational status of arable crop farmers as presented in table 1 revealed that in Kwara state majority (91.85%) had formal education right from primary school to tertiary institutions while 5.47% had no formal education and 4.69% had non -formal education. In Oyo state, majority (91.56%) of arable crop farmers had formal education while 6.2% had no formal education and 2.3% with non-formal education. The pooled result revealed that educational attainment varied among respondents. About 26.2% had completed tertiary education, 21.6% had completed secondary education, and 18.0% had completed primary education. However, 5.9% had no formal education. Education is a critical determinant of climate adaptation capacity because educated farmers are more likely to understand climate information, adopt improved technologies, and implement adaptive strategies.

The relatively high proportion of farmers with secondary and tertiary education suggests good potential for climate adaptation in the study area. However, farmers with low education levels may face challenges in accessing and applying climate information effectively. Overall, the socio-economic profile of respondents indicates moderate adaptive capacity but also highlights potential vulnerability factors. The predominance of older farmers may limit technological adoption, while gender disparities may restrict female farmers' access to adaptive resources.

Education levels appear relatively favourable, suggesting potential for effective climate adaptation if supported by extension services and institutional interventions. These findings are consistent with the Intergovernmental Panel on Climate Change (2022), which emphasizes that socio-economic factors such as age, education, and gender significantly influence vulnerability and adaptive capacity in agricultural systems.The result of arable crop farmers farming experience is presented in Table 1. The result revealed that arable crop farmers in the study areas are well experienced with a mean farming experience of 20 years. The distribution is spread across all categories, showing a mix of new entrants and old arable crop farmers.

In Kwara state,14.1% have 1-5 years, 15.6% have 6-10 years and 15.6% have 11-15 years. Above 54.2% have 20 years and below experience. In Oyo state, the modal experience is 16-20 years with 19.8%, followed by 26-30 years with 18.1 %. About 45.1% have above 20 years' experience. The pooled result showed that the highest proportion (16.7%) is in the 16-20 years bracket, followed by 26-30 years (15.4%) and 11-15 years (14.8%). Only 11.5% have 1-5 years' experience. This confirms that majority of the arable crop farmers are not new in arable crop production. The high proportion of arable crop farmers with 16-30 years' experience explains the mean of 20 years.

The mean of 20 years farming experience implies that arable crop farmers have long-term observation of climate. They have witnessed changes in rainfall onset, cessation, flooding and drought over two decades. Therefore, their perception of climate change effects is not based on hearsay but on personal long-term experience and indigenous knowledge.

This make their perception highly reliable. Also, with 20 years farming experience, arable crop farmers are well grounded in arable crop production practices such as appropriate planting dates, soil management and varietal selection. This experience helps them to device local adaptation strategies

Table1. Some selected Socio-economic Characteristics of Arable Crops Farmers

Variable	Kwara (n=128		Oyo(n=177)		Pooled(n=305)		Mean
	F	%	F	%	F	%	
Age:							
20-35	18	14.1	22	12.4	40	13.1	50years
36-45	22	17.2	37	20.9	59	19.3	
46-55	30	23.4	51	28.8	81	26.6	
56-65	30	23.4	34	19.3	64	21.0	
66-75	28	21.9	33	18.6	61	20.0	
Sex:							
Male	99	77.3	143	80.8	242	79.3	
Female	29	22.7	34	19.2	63	20.7	
Marital Status:							
Single	06	4.7	14	7.9	20	6.6	
Married	119	93.0	162	91.5	281	92.1	
Divorced	02	1.6	01	0.6	03	1.0	
Widow	01	0.7	00	0.0	01	0.3	
Educational status							
No formal Education	11	8.6	07	4.0	18	5.9	
Non formal Education	04	3.1	06	3.4	10	3.3	
Primary Education Attempted	10	7.8	12	6.8	22	7.2	
Primary Education Completed	25	19.5	30	16.9	55	18.0	
Secondary Education Attempted	14	10.9	15	8.5	29	9.5	
Secondary Education Completed	26	20.3	40	22.6	66	21.7	
Tertiary Education Attempted	20	15.7	05	2.8	25	8.5	
Tertiary Education Completed	18	14.1	62	35.0	80	26.2	
Farming Experience							
1-5	18	14.1	17	9.6	35	11.5	20 years
6-10	20	15.6	21	11.9	41	13.4	
11-15	20	15.6	25	14.1	45	14.8	
16-20	16	12.5	35	19.8	51	16.7	
21-25	15	11.7	16	9.0	31	10.2	
26-30	15	11.7	32	18.1	47	15.4	
31-35	08	6.3	10	5.6	18	5.9	
36-40	13	10.2	17	9.6	30	9.8	

Source: Field Survey, 2025

Perceived Effects of Climate Change on Arable Crops Production

Table 2. Presented arable crop farmers' perceptions of the effects of climate change on arable crop production, including effects on crop yield, income, soil fertility, land quality, production cost, farm operations, and farmer well-being. As presented in Table 2, arable crop farmers in Kwara state strongly agreed that climate change has grossly reduced crop yield (Wms=4.58), followed by income (WMS=4.09).

This is the core effect of climate change on arable crop production. Also, high temperature (WMS=4.04) and erratic rainfall (WMS=4.03) was also high. The least effect was flooding (WMS=2.30) which crop damage. This result revealed that arable crop farmers in Kwara state are more affected by drought, heat and yield loss than by flooding.

In Oyo state, arable crop farmers ranked erratic rainfall affecting farm decision high (WMS=4.37), followed by degraded farm land (WMS=4.05). Unlike arable crop farmers in Kwara state where yield loss was ranked first, in Oyo state rainfall unpredictability was ranked first. Also, health risk (WMS=3.90) and difficulty in ploughing as a result of hard land(W MS=3.89) were major in Oyo state and minor in Kwara state(WMS=2.71, WMS=2.95). The findings indicated that arable crop farmers in Oyo state are more affected by land degradation and flooding related effects.

Severity of climate change for yield reduction was high (WMS=4.58) as reported by arable crop farmers than in Oyo state (WMS=3.39).Also, income reduction in Kwara state was high (WMS=4.09) compared with Oyo state (3.51). This result revealed that arable crop farmers in Kwara state feel economic impact more severely. The grand mean revealed that arable crop farmers in both states, Kwara(3.31), Oyo state (3.30) agreed that climate change has overall negative effect, but the type of effect differs.

The implication of this finding is that arable crop farmers in Kwara state need drought –tolerant varieties and heat adaptation since yield loss (WMS=4.58) and high temperature(4.04) ranked high. Arable crop farmers in Oyo state needs drainage, land management and rainfall prediction tools since erratic rainfall (4.37) and degraded land (4.05) ranked high.

This finding aligns with the report of Hatfield and Prueger (2015) that reduced crop yield is primarily caused by erratic rainfall, increased temperature, drought, and soil degradation. High temperatures increase evapotranspiration, reduce soil moisture availability, and disrupt plant physiological processes such as photosynthesis and nutrient uptake. Similarly, the Food and Agriculture Organization (2019) reported that climate variability reduces agricultural productivity and threatens food security in developing countries. According to the Intergovernmental Panel on Climate Change (2021), increased temperature and humidity significantly affect crop productivity and increase crop disease incidence. These findings are consistent with Ayanlade et al. (2017), who reported that increasing temperature and humidity negatively affect agricultural productivity in Nigeria.

Table 2(a): Arable Crop Farmers Perceived Effects of Climate Change on Arable Crops Production in Kwara state

Statement	SA	A	U	SD	D	WMS	RANK	MEAN
	Freq. %	Freq. %	Freq. %	Freq. %	Freq. %			
Climate change has grossly reduced crop yield	98 76.6	20 15.6	1 0.8	5 3.9	4 3.1	4.59	1st	**3.29**
Climate change has reduced my income from my farm business	78 60.9	20 15.6	2 1.6	20 15.6	8 6.3	4.09	2nd	

High temperature affects crop performance	73 57.0	25 19.5	2 1.6	18 14.1	10 7.8	4.04	3rd	
Erratic rainfall affects decision on date and time of planting	63 49.2	40 31.3	3 2.3	10 7.8	12 9.4	4.03	4th	
Climate change has resulted in hike of localized food price	60 46.8	38 29.7	2 1.6	17 13.3	11 8.6	3.93	5th	
Agricultural land has been degraded due to climate change	51 39.8	38 29.7	2 1.6	20 15.6	17 13.3	3.67	6th	
Inconsistency in climate variable leads to high cost of production	43 33.6	37 28.9	8 6.3	12 9.4	28 21.8	3.43	7th	
Soil fertility has declined as a result of excessive rainfall	30 23.4	38 29.7	5 3.9	32 25.0	23 18.0	3.16	8th	
Climate change caused displacement of farmers from their place of abode	29 22.7	42 32.8	10 7.8	10 7.8	37 28.9	3.13	9th	

Table 2b: Arable Crop Farmers Perceived Effects of Climate Change on Arable Crops Production in Kwara state

Statement	SA	A	U	SD	D	WMS	RANK	MEAN
	Freq. %	Freq. %	Freq. %	Freq. %	Freq. %			
Low temperature affects the performance of the crops on the farm	36 28.1	28 21.9	7 5.5	30 23.4	27 21.1	3.13	9th	
Harvesting of farm crops on the farm is affected due flooding caused by excessive rainfall	40 31.3	19 14.8	15 11.7	18 14.1	36 28.1	3.07	10th	
Farm crops are damage as a result of lodging caused by excessive rainfall	20 15.6	39 30.5	25 19.5	10 7.8	34 26.6	3.01	11th	
Heavy down pour causes high weed infestation resulting in high cost of production	30 23.4	25 19.5	16 12.5	28 21.9	29 22.7	2.99	12th	
Farm operations such as ploughing and ridging becomes difficult due to	35	28	00	25	40	2.95	13th	

inadequate rainfall	27.3	21.9	0.0	19.5	31.3			
Climate change exposes farmers to health risk, thus affects farmers effectiveness on the farm	28 21.9	22 17.2	3 2.3	35 27.3	40 31.3	2.71	14th	
Persistence of High humidity hindered photosynthesis resulting in poor crop performance	6 4.7	42 32.8	10 7.8	40 31.3	30 23.4	2.64	15th	
Pest infestation is on the high side as a result of excessive rainfall	22 17.2	18 14.1	5 3.9	50 39.0	33 25.8	2.58	16th	
Flooding, due to excessive rainfall causes serious damage to farm crops	16 12.5	25 19.5	2 1.6	23 18.0	62 48.4	2.30	17th	

Source: Field Survey, 2025

Arable Crop Farmers Perceived Effects of Climate Change on Arable Crops Production in Oyo state

Table 3 presented the arable crop farmers perception of the effects of climate change on arable crop production in Oyo state. The result from table 3 revealed that arable crop farmers agreed that the effect of climate change on arable crop production is high. The grand mean of 3.29 is above the decision mean of 3.0. This implies that arable crop farmers in Oyo state feel climate effects more severely than their counterpart in Kwara state. The result further showed that there is high temperature (4.22) while Kwara has 4.04, erratic rainfall (4.37), housing asset loss (4.43), inability to meet financial obligations (4.36) implying that apart from climate effect on arable crop production, socio-economic effects also hit arable crop farmers

Table 3 a: Arable Crop Farmers Perceived Effects of Climate Change on Arable Crops Production in Oyo state

Statement	**SA**	**A**	**U**	**SD**	**D**	**WMS**	**RANK**	**MEAN**
	Freq. %	**Freq. %**	**Freq. %**	**Freq. %**	**Freq. %**			
Erratic rainfall affects decision on date and time of planting	101 57.1	60 33.9	1 0.6	10 5.6	5 2.8	4.37	1st	**3.29**
Agricultural land has been degraded due to climate change	96 54.2	43 24.3	5 2.8	16 9.1	17 9.6	4.05	2nd	
Climate change has resulted in hike of localized food price	100 56.5	30 16.9	7 4.0	25 14.1	15 8.5	3.99	3rd	

Climate change exposes farmers to health risk, thus affects farmers effectiveness on the farm	74 41.8	62 35.0	10 5.6	12 6.8	19 10.7	3.90	4th	
Farm operations such as ploughing and ridging becomes difficult due to inadequate rainfall	83 46.9	46 26.0	8 4.5	25 14.1	15 8.5	3.89	5th	
Inconsistency in climate variable leads to high cost of production	92 52.0	30 16.9	15 8.5	14 7.9	26 14.7	3.84	6th	
Harvesting of farm crops on the farm is affected due flooding caused by excessive rainfall	67 37.9	52 29.4	2 1.1	50 28.2	6 3.4	3.70	7th	
High temperature affects crop performance	60 33.9	59 33.3	10 5.6	18 10.2	30 17.0	3.57	8th	
Climate change has reduced my income from my farm business	60 33.9	51 28.8	2 1.1	48 27.1	16 9.1	3.51	9th	

Table 3b: Arable Crop Farmers Perceived Effects of Climate Change on Arable Crops Production in Oyo state

Statement	**SA**	**A**	**U**	**SD**	**D**	**WMS**	**RANK**	**MEAN**
	Freq. %	**Freq. %**	**Freq. %**	**Freq. %**	**Freq. %**			
Flooding, due to excessive rainfall causes serious damage to farm crops	77 43.5	23 13.0	12 6.8	25 14.1	40 22.6	3.41	10th	
Climate change has grossly reduced crop yield	98 76.6	20 15.6	1 0.8	5 3.9	4 3.1	4.59	11th	
Soil fertility has declined as a result of excessive rainfall	32 18.1	38 21.5	7 3.9	80 45.2	20 11.3	2.90	12th	
Farm crops are damage as a result of lodging caused by excessive rainfall	35 19.8	22 12.5	10 5.6	80 45.2	30 16.9	2.73	13th	
Climate change caused displacement of farmers from their place of abode	35 19.8	12 6.8	15 8.5	91 51.3	24 13.6	2.68	14th	
Low temperature affects the performance of the crops on the farm	15 8.5	35 19.8	10 5.6	85 48.0	32 18.1	2.53	15th	

Pest infestation is on the high side as a result of excessive rainfall	25 14.2	30 16.9	5 2.8	66 37.3	51 28.8	2.50	16th	
Heavy down pour causes high weed infestation resulting in high cost of production	15 8.5	35 19.8	18 10.2	59 33.3	50 28.2	2.47	17th	
Persistence of High humidity hindered photosynthesis resulting in poor crop performance	16 19.1	15 8.5	6 3.4	40 22.6	100 56.4	1.91	18th	

Source: Field Survey,2025

Mean Ranking of the climate change effects on Arable crop Production in Kwara and Oyo state

The effects of climate change on arable crop production between Kwara state and Oyo state is presented in Table 4. From the table, the grand mean of 3.0 in Kwara state indicated that arable crop farmers agreed that effects of climate change on production and livelihood are moderately high. This implies that climate change has caused notable reduction in hectares cultivated (4.69) and yield (4.58), and income (4.61) among arable crop farmers in Kwara state. The grand mean of 3.29 in Oyo state which is above decision mean of 3.0 and higher than Kwara state' decision mean of 3.0 indicated strong agreement and higher perceived effects among arable crop farmers in Oyo state. This implies that arable crop farmers in Oyo state are more vulnerable to high temperature (4.22), erratic rainfall(4.37) and socio-economic losses such as housing assets(4.43) and inability to meet financial obligations(4.36). The difference of 0.29 between Kwara state and Oyo state may be due to more intensive urbanization and higher temperature stress in Oyo state, and proximity to urban markets causing higher income expectation which are not met when climate reduces yield. Both means above 3.0 confirmed that climate change is real and significant in both states, but more severe in Oyo state

Table 4. Mean Ranking of the climate change effects on Arable crop Production in Kwara and Oyo state

Effect of Climate change on Arable crop production in Kwara and Oyo states	Kwara(wms)	Oyo(wms)	Pooled mean
Erratic rainfall affects decision on date and time of planting	4.03	4.37	4.20
Climate change has resulted in hike of localized food price	3.93	3.99	3.96
Climate change has grossly reduced crop yield	4.59	3.39	3.99
Agricultural land has been degraded due to climate change	3.67	4.05	3.86
High temperature affects crop performance	4.04	3.57	3.81
Climate change has reduced my income from my farm business	4.09	3.51	3.80
Inconsistency in climate variable leads to	3.43	3.84	3.63

high cost of production			
Soil fertility has declined as a result of excessive rainfall	4.09	1.91	3.00
Climate change caused displacement of farmers from their place of abode	3.13	3.89	3.51
Climate change exposes farmers to health risk	3.16	2.73	2.95
Harvesting of crop if affected by flooding	3.13	2.90	3.02
Low temperature affects the performance of crop on the farm	3.13	3.90	3.52
Farm crops are damage as a result of lodging	3.07	2.68	2.88
Heavy down pour causes high weed infestation resulting in high cost of production	3.01	2.53	2.77
Pest infestation is on high side as a result of excessive rainfall	2.99	3.70	3.35
Flooding due to excessive rainfall causes serious damage to farm crop	2.58	2.47	2.55
Farm operation such as ploughing become difficult due to inadequate rainfall	2.30	2.50	2.40
Persistent of high humidity hindered Photosynthesis	3.13	3.41	3.27

Source: Field survey, 2025

Categorization by Perceived Effect of Climate Change on Arable Crop Production (Mean)

Table 5 presented the categorization by perceived effect of climate change on arable crops production in Kwara and Oyo state. Eighteen (18) perceptional statements were constructed to determine farmers' perception of the effect of climate change on arable crops production where the lowest score was eighteen (18) and the highest score was nighty (90). The mean score was 59.07. The table revealed that 35.7% of arable crop farmers perceived the effect of climate change as low because it lower than the mean score which is 59.07 while 64.3% of the arable crop farmers perceived the effects of climate change as high being higher than the mean score. This implies that the effects of Climate change on agricultural production are well perceived by arable crop farmers having unfavourable effects on arable crop production. This finding is in line with Food and agricultural organization, 2017 who reported that all stages of agricultural production are influenced by weather and climate condition.

Table 5: Categorization by Perceived Effect of Climate Change on Arable Crop Production (Mean)

Category	**Frequency**	**Percentage**	Minimum	Maximum	Mean	SD
Low effect of climate change	109	35.74	18	90	59.07	±12.07
High effect of climate change	196	64.26				
Total	305	100.00				

Source: **Field Survey, 2025**

Significant relationship between Selected Socio-economic characteristics of Arable Crop Farmers and effect of Climate change on Arable Crops Production

Hypothesis was tested by the use of Chi-square analysis at 0.05 level of significance. The test of significant relationship between some selected socio-economic characteristics of arable crop farmers and effect of climate change on arable crops production is presented in Table 6. The result of chi-square test revealed that a significant relationship exist between marital status (χ^2=90.77., P = 0.000), Religion (χ^2= 43.63, P=0.000), Sex (χ^2= 12.26., P= 0.0005), educational level (χ^2=178.04, P=0.000) and primary occupation (χ^2= 13.34., P= 0.009) of arable crop farmers and effect of climate change on arable crop production. Therefore, the null hypothesis is hereby rejected while the alternate hypothesis is hereby accepted. Hence, there is a significant relationship between some selected socio-economic characteristics and effect of climate change on arable crop production.

Educational level had the highest Chi -square value (178.04), indicating it is the strongest determinant of how farmers perceive climate change effects. This implies that climate change interventions must be stratified by Education. Gender, Marital status and Occupation to be effective. The result is in agreement with the findings of Food and agricultural organization, (2018) and Panel on climate change, (2022) who reported that socio-economic characteristics are critical in climate change studies because socio-economic attributes significantly influence farmer' vulnerability, adaptive capacity and productivity.

Table 6: Summary of Chi-square test Showing Relationship Between some Selected Socio- economic Characteristics of the Arable Crop Farmers and the Effect of Climate Change on Arable Crops Production.

Variable	χ^2	Df	P – value	Remark
Marital Status	90.77	3	0.000	Significant
Sex	12.16	1	0.0005	significant
Religion	43.63	2	0.000	Significant
Educational level	178.04	7	0.000	Significant
Primary Occupation	13.34	4	0.009	Significant

Source: Computed data, 2025

Significance level: P< 0.05

CONCLUSION AND RECOMMENDATION

It is concluded that climate change has significantly affected arable crops production through reduced crop yield, erratic rainfall, increased temperature, land degradation, and increased production costs. These impacts threaten food security and farmers' livelihoods. There was a Significant Relationship Between the Socio-economic Characteristics such as Age, Marital Status and years of Farming experience and Effect of Climate change on Arable Crops Production.

It is recommended that there is a need for climate adaptation strategies such as irrigation, climate-resilient crop varieties, improved extension services, and climate-smart agricultural practices. The NGOs and Philanthropists in the study areas should develop a programme that will address the need of the arable crop farmers on climate adaptation strategies such as drought-resistant crop varieties, irrigation systems, and climate-smart agricultural practices.

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