

Farmer's Adaptive Strategies To Climate Change in Akinyele Local Government Area, Oyo State, Nigeria

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Abstract

Agriculture and climate change are inextricably linked to crop yield, biodiversity, water use, as well as soil health. The research sets the objectives of describing the socioeconomic characteristics of farmers in Akinyele L.G.A of Oyo state, identifying various adaptive measures and the determinants of appropriate climate-change adaptation measures used by farmers in the agricultural communities of the study area. A sample of farmers who have registered with the Federal Ministry of Agricultural, Growth Enhancement Support Scheme (GES) Akinyele chapter were recruited in the research. Questionnaire was used to gather data on the age, gender, education and farming experiences of the farmers. Data was also collected on these adaptive capacity measures: Membership of social organizations, mixed farming, change from crop production to animal rearing, seeking early warning information on climate change among others. Percentages, frequencies were used to analyze the data. The variables were also subjected to regression analysis. 70% of the farmers in the study area are male and about the same percentage of them fall within the age range of 31-60 years. Only 33% of the farmers have post- primary education. The result of the regression analysis reveal that planting of improved varieties (0.841,0.001) intensive fertilizer/manure application (0.005,0.421) have positive and significant relationship in determining farmer's adaptation strategies while contour ridging (1.950, 0.970) has positive but not significant relationship in determining farmer's adaptation strategies .Change from crop production to animal rearing (-1.766, 0.567) has negative and insignificant relationship in determining farmer's adaptation strategies

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INTRODUCTION

Agriculture is an important source of food and fiber, employment and foreign exchange for most developing countries. Agriculture contributes over 40% of Nigeria's GDP, employs about 70% of the population, and produces about 80% of the food needs according to (Aye, 2013). Although, agriculture still accounts for about 88% of non-oil export earnings, its contribution has seriously declined over the decade falling from about 75% of total export earnings in the 1960s to less than 3% currently (Oji-Okoro, 2011). Increasing productivity in agriculture depends heavily on a number of factors including weather and climate conditions. Agriculture and climate change are inextricably linked as crop yield, biodiversity, and water use, as well as soil health are directly affected by a changing climate. Climate change arises due to a number of factors but basically due to human activities, such as the emission of greenhouse gases and changing land uses. It is already affecting the Earth's temperature, precipitation, and hydrological cycles (Intergovernmental Panel on Climate Change, 2007).

Many African countries, Nigeria in particular, which have their economy largely based on weather sensitive agricultural production system are particularly vulnerable to the effects of climate change (Action Aid, 2008).

Oyo state which provides the bulk of arable food crops consumed locally and in other parts of Nigeria have been faced with the problems of crop failure, or low yield arising from variation in climate particularly the delayed onset of rains and the increasing length and frequency of dry spells during the growing season (Adebayo, 2010).

Adaptation is one of the policy options for reducing the negative impact of climate change (Adger et al., 2003; Kurkulasuriya & Mendelsohn 2008). Studies show that without adaptation, climate change is generally detrimental to the agriculture sector; but with adaptation, vulnerability can largely be reduced (Smit & Skinner 2002).

Common adaptation methods in agriculture include use of new crop varieties and livestock species, irrigation, crop diversification, adoption of mixed crops and livestock farming systems, and changing planting dates (Bradshaw et al., 2004; Nhemachena & Hassan 2007). Studies have been undertaken to analyze the impact of climate change and factors affecting the choice of adaptation methods in crop, livestock and mixed crop livestock production systems in Africa at regional level (Maddison, 2006; Kurkulasuriya & Mendelsohn 2008; Seo & Mendelsohn, 2008; Nhemachena & Hassan, 2007; Hassan & Nhemachena, 2008). Findings showed that these studies have little importance in identifying country specific impacts and adaptation methods given the heterogeneity of countries included. Therefore, there is limited information on types of adaptation strategies used by farmers in Nigeria. Furthermore, the determinants of appropriate climate-change adaptation strategies used by farmers in Nigeria and Oyo state in particular have not been fully investigated. Other past studies on determinants of climate change adaptation used by farmers in Nigeria focused on cash crops and fisheries production with limited emphasis on food crop production (Oyekale et al., 2009; Oyekale & Oladele, 2012; Obatolu et al., 2003; Arimi, 2014). It is therefore based on this concern that this research seeks to identify the various adaptive measures the farmers adopted in tackling the problems of climate change in Akinyele Local Government of Oyo state and their determinants.

Study Area

Akinyele is a local government in Oyo State, Nigeria. The local government lies between latitude 7°26'23"N to 7° 40'30"N and between longitude 3° 47'4"E to 4° 05'00"E (Figure 1). Akinyele local government shares boundaries with Afijio Local Government to the north, Lagelu local government area to the east, Ido local government area to the west and Ibadan North local government area to the south. It occupies a land area of 404,892 square kilometers According to the 2006 census as released by the National Population Commission, the population of Akinyele local government was 211,359 (Tokede et al., 2020).

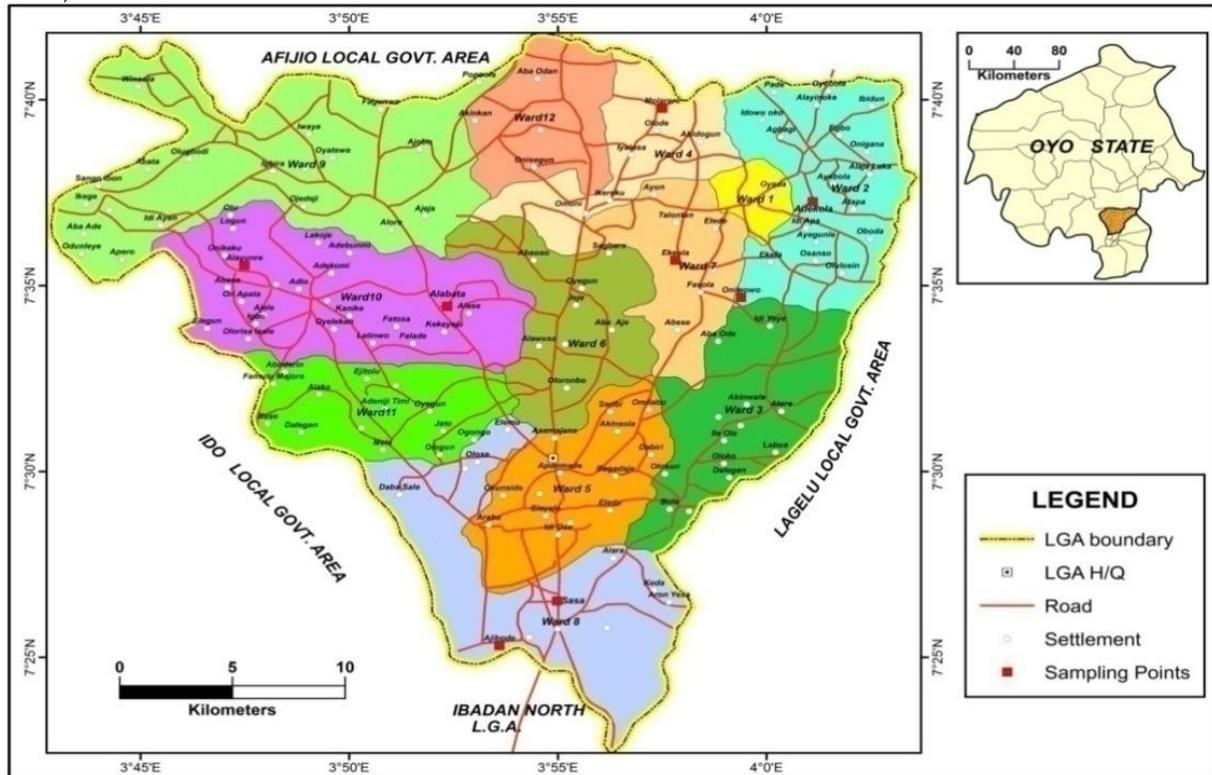


Figure 1: Map of Akinyele Local Government.
(Source: GIS LAB, UNIVERSITY OF IBADAN)

Akinyele Local Government is covered with basement complex rocks, which are mainly metamorphic rocks with few intrusions of granites. The soils of the region were formed under moist semi deciduous cover and belong to the major soil group called ferruginous soil (Tokede et al., 2020).

The local government falls within the tropical wet and dry climate (Koppen climate classification Aw) with a lengthy wet season and relatively constant temperatures throughout the course of the year. The wet season runs from March through October, there is usually a drop in precipitation in August. Akinyele local government falls within the rainforest region. The composition is basically the large tall crowned trees with thick undergrowth. Generally the vegetation in the area is broadly dominated by palm trees and the area may be referred to as dry forest belt

METHODOLOGY

Data on the population of registered farmers in the areas was collected from the Federal Ministry of Agricultural, Growth Enhancement Support Scheme(GESS)Akinyele chapter for the selected wards.

TABLE 1: Selected Ward and Populations of Farmers

SELECTEDWARD	POPULATIONOFFARMERS
Labode	2600
Alabata	2300
Ojoo	1200

Source: Federal Ministry of Agricultural, Growth Enhancement Support Scheme(GESS)Akinyele chapter 2020.

Multi stage sampling was used in this research. In the first stage, three wards were purposively sampled from Akinyele local government in a manner that will ensure geographical spread. In the second stage, two communities were randomly sampled from each ward, this is because the communities are numerous and they are all crop farming communities. Finally, farmers were sampled randomly since almost everyone in these communities is farmer. The random sampling was carried out using Probability Proportional to the Sizes (PPS) of the population according to Neuman (2006). The determination of the sample size for the farmers was worked out as 10% using "Representative Sample Size" distribution suggested by Neuman (2006).

The distribution of sampled farmers according to selected wards in Akinyele L.G.A is presented in Table 2:

TABLE 2: Selected Ward and Sampled Farmers

SELECTEDWARD	SAMPLED FARMERS
Labode	260
Alabata	230
Ojoo	120

Source: Fieldwork, 2020

This study employed the use of primary data. The primary data was obtained through the administration of scaled structured questionnaire to sampled farmers in the study areas. The structured questionnaire included questions on socio-economic parameters, adaptive strategies employed by farmers and their determinants.

RESULTS AND DISCUSSION

From the data presented in Table 4, majority (70%) of the farmers are male. This implies that male dominates farming in the study area. This is in agreement with the findings of Ejembi & Ejembi (2006) that the dominant gender in the agricultural sector in Nigeria is the male. Similarly, most of the sampled farmers fall within the age range of 31-60 years. The implication of this is that the farmers are matured enough to know the importance of employing adaptive strategies to combat the effects of climate change. Some previous studies have indicated that experienced farmers have a higher probability of using adaptive strategies to climate change as they are exposed to past and present climatic conditions over the longer perspective of their life span (Maddison, 2006;Ishaya & Abaje 2008;Deressa & Hassan 2009; Maddison, 2006;).

TABLE 3: Socioeconomic Characteristics of the Selected Farmers

VARIABLES	DESCRIPTION	PERCENTAGE
SEX	MALE	71
	FEMALE	29
AGE RANGE (YEARS)	< 30	12
	31-40	26
	41-50	30
	51-60	22
	61-70	5.0
	ABOVE 70	5.0
EDUCATIONAL STATUS	NO FORMAL	26.0
	PRIMARY	41.0
	SECONDARY	17.0
	TERTIARY	16.0
MARITAL STATUS	SINGLE	20.0
	MARRIED	80.0
SIZE OF FARMLAND	>1 ACRE	28.0
	2-4 ACRE	50.0
	5-7 ACRE	19.0
	8-10 ACRE	3.0

Source: Fieldwork, 2020

Furthermore Table 3 also shows that only 33% of the farmers have post- primary education and about a quarter of the sampled farmers are not formally educated at all. This has a negative implication because their low level of education may impede access to useful climatic information and adaptive technologies. Ozor.,*et al*(2010) noted that poor climate change information and farmers' lack of access to weather forecast technologies are major barriers to climate change adaptation among farming households in Southern Nigeria.

Similarly, 80% of the respondents are married. Marital status is a factor, which is likely to encourage the sustainability of adoption decisions. About three-quarter of the farmers cultivate lands that are less than four acres. Most rural farmers in southwestern Nigeria are small scale holders (Adejare and Arimi, 2013). Respondents with larger farm size tend to take more proactive measures in order to reduce loss which could be greater than their counterparts with smaller farm size. This is also in agreement with Ayanwuyi.,*et al* (2010), observed that farm size was significantly related to farmers' adaptation strategies. About 60% of the farmers earn between the ranges of ₦31,000-₦60,000. Only 20% of them earn higher than this. Benhin (2006) reported that lack of access to credit or saving are some of the major constraints encountered by farmers in adapting to climate change in Africa.

TABLE 4: ADAPTIVE STRATEGIES EMPLOYED BY FARMERS

ADAPTIVE STRATEGY	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
	YES	YES	NO	NO
Planting of improved varieties	479	78.5	131	21.5
Intensive fertilizer/manure application	247	40.5	363	59.5
Mulching	452	74.1	158	25.9
Contour ridging	137	22.4	473	77.6
Shifting planting date	212	34.7	398	65.3
Shifting harvesting date	204	33.4	406	66.6
Move to a different site	297	48.6	314	51.4
Diversification into other business	283	46.4	327	53.6
Insuring farm against risk	92	15	519	85
Seeking early warning information on climate change	215	35.3	395	64.7
Change from crop production to animal rearing	157	25.7	484	79.3
Mixed farming	79	12.9	531	87.1
Membership of social organizations	483	79.1	134	21.9
Avoidance of flood prone areas	232	38.0	378	62.0

Source: Fieldwork, 2020

Majority of the farmers (78.5%) plant improved varieties of crops while a lesser but substantial percentage (59.5%) apply fertilizer on their farms. Kawasaki and Herath (2011) observed that improved crop varieties have high capacities for coping with climate change. Most of the farmers employ mulching while contour ridging is practiced by a small percentage (22.4%). Only a third of them practice the changing of planting and harvesting dates in the area while close to half of them are able to move to a different farm site or diversify their means of livelihood when the need arises. Some adaptive strategies like insuring farm against risk, change from crop production to animal rearing and mixed

farming are not significantly employed in the area. More than half of the sampled farmers seek early warning information on climate change. About 36% of the sample farmers seek early warning information on climate change. Most of the farmers are members of social organizations.

Table 6: Results of Regression Analysis

	B	S.E	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	Relationship	Significant Difference
Planting of improved varieties	0.841	0.023	8.247	1	0.001	1.081	1.031 2.974	Positive	Significant
Intensive fertilizer/manure application	0.005	0.231	0.546	1	0.421	1.004	0.853 1.876	Positive	Significant
Mulching	0.910	0.541	5.356	1	0.010	1.974	0.543 9.645	Positive	Significant
Contour ridging	1.950	0.345	5.765	1	0.970	0.615	0.423 1.753	Positive	Not Significant
Shifting planting date	-1.750	0.342	6.874	1	0.011	0.543	0.870 6.534	Negative	Significant
Shifting harvesting date	-0.617	0.000	2.453	1	0.021	0.654	2.097 6.439	Negative	Significant
Move to a different site	-0.657	0.126	5.643	1	0.044	7.026	1.086 4.231	Negative	Significant
Diversification into other business	-1.760	0.453	9.675	1	0.000	6.453	3.097 6.864	Negative	Significant
Insuring farm against risk	1.860	0.654	2.655	1	0.002	1.056	0.534 1.506	Positive	Significant
Seeking early warning information on climate change	1.970	0.543	0.000	1	0.032	1.067	0.765 0.999	Positive	Significant
Change from crop production to animal rearing	-1.766	0.654	0.564	1	0.567	1.276	0.763 0.834	Negative	Not Significant
Mixed farming	-1.875	0.564	0.345	1	0.087	1.754	0.865 1.965	Negative	Not Significant
Membership of social organisations	-1.007	0.765	0.453	1	0.231	1.982	0.003 0.567	Negative	Not Significant
Avoidance of flood prone areas	1.654	0.342	0.231	1	0.004	7.430	0.006 0.423	Positive	Significant
Constant	-	.303	0.34	1	.000	.104			
	2.26		2						
	0								

The result in Table 6 reveals Planting of improved varieties (0.841,0.001) intensive fertilizer/manure application (0.005,0.421) mulching (0.910,0.010) insuring farm against risk(1.860,0.002), seeking early warning information on climate change (1.970,0.032)and avoidance of flood prone areas (1.654,0.004) have positive and significant relationship in determining farmer's adaptation strategies while contour ridging (1.950, 0.970) has positive but not significant relationship in determining farmer's adaptation strategies. Shifting planting date (-1.750, 0.011), Diversification into other business (-1.760, 0.000),Shifting harvesting date (-0.617, 0.021), Move to a different site (-0.657,0.044) have negative but significant relationship in determining farmer's adaptation strategies while Change from crop production to animal rearing (-1.766, 0.567), Mixed farming (-1.875, 0.087), Membership

of social organizations (-1.007, 0.231) has negative and insignificant relationship in determining farmer's adaptation strategies.

CONCLUSION

It can be concluded from the research that planting of improved varieties, mulching and membership of social organizations are adaptive strategies that are strongly employed by farmers in Akinyele L.G.A. It is recommended that farmers in the area should be enlightened about the importance of seeking early warning information on climate change by concerned authorities. This will enhance their ability to adjust planting and harvesting dates accordingly. The enlighten campaign should also beam its light on the merits of diversification.

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