CLIMATE CHANGE ADAPTATION STRATEGIES USED BY WOMEN FARMERS IN EKITI STATE, NIGERIA

***Grace Tolulope AJAYI, Ayotunde Ola KOLAWOLE and Samuel Adegbenga ARULEBA**
Department of Agricultural Economics and Extension Services,
Ekiti State University, Ado-Ekiti, Nigeria

Abstract
Climate change has emerged as a major threat to agricultural productivity in Nigeria, consequently contributing to food insecurity. Thus, the study examined climate change adaptation strategies used by women farmers in Ekiti State, Nigeria. A multi-stage sampling procedure was used to select 120 respondents for the study. Primary data were collected using a well-structured interview schedule and analysed using descriptive statistics such as frequency counts, percentages and means. The mean age of the respondents was 54.0 years. The mean farm size and the mean farm experience were 1.3 hectares and 20.0 years respectively. Most respondents (85.5%) were aware of climate change, with the extension agent (33.3%) as a major source of information. The major adaptation strategies employed included the use of improved varieties (4.1) crop rotation (3.9), shift cultivation (3.8), mixed cropping (3.7) and organic manure application (3.6). However, the use level of adaptation strategies of irrigation practices (2.7) was relatively low. The respondents indicated continuous temperature rise (4.3), reduced working hours (4.1), rapid loss of soil nutrients (4.1), reduced labour availability (4.1), pest infestation (4.1) and poor germination rate (3.9) as major perceived effects of climate change. Major constraints included lack of credit facilities (3.8), high cost of inputs (3.3), time-consuming activities (3.2), and poor access to relevant information (3.2). The level of use of adaptation strategies of irrigation practices was low among women. The study recommends improved access to credit facilities and relevant information to motivate women to use irrigation practices as adaptation strategies for enhanced food security.

Keywords: Climate change, Adaptation strategies, and Women farmers

Introduction

Ensuring food security is an important challenge in the face of climate change in Nigeria. This is due to high dependence on rain-fed farming. Increased global temperatures bring unprecedented risks to vulnerable populations as a result of disrupting natural systems; such as an increase in the frequency and severity of droughts, floods and other extreme weather events; increased global sea-level rise; and biodiversity loss (Lakshmi *et al.,* 2025). According to the Intergovernmental Panel on Climate, the Earth's climate system is undergoing unprecedented changes such as alterations in temperature, precipitation patterns, and extreme weather events due to the accumulation of greenhouse gases in the atmosphere (IPCC, 2016 cited in Tangney, 2020). Such shifts have direct consequences for agricultural systems, leading

to disruptions in growing seasons, shifts in plant and animal distribution, and increased vulnerability to pest and disease outbreaks.

Agriculture is the most vulnerable to climate change, particularly for rain-fed farming, which is the primary source of livelihood for most farmers (Tarfa *et al.,* 2019). Agriculture is a primary source of food and livelihood for many communities, especially in Ekiti State. Adapting practices helps maintain stable yields and ensures food availability, reducing the risk of food shortages and associated social and economic disruptions (FAO, 2017). However, farmers' perception of climate change influences their response to climate-related risk and uncertainties, as well as their use of coping strategies to mitigate its impact on agriculture (Ansari *et al.,* 2018).

Female and male farmers differ significantly in their ability to adapt to climate change due to differences in access to assets, education and other critical services such as credit, technology and inputs supply (Azadi *et al.,* 2019). These inequalities often place women at a disadvantage despite their crucial role in agricultural production and household food security. Women are actively involved in the production of food crops such as cassava, maize, rice, cowpea, yam, sweet potatoes, pepper, vegetable as well as livestock production, all of which contribute greatly to meeting the food consumption needs of rural households. However, women farmers often rely on rain-fed agriculture, which has become increasingly unreliable due to erratic rainfall patterns associated with climate change.

Furthermore, rural women are often the most vulnerable to the impacts of climate change due to their socio-cultural roles have limited access to credit and face socio-cultural discrimination (Mishra *et al.,* 2024). Norms that limit women's mobility or restrict their participation in decision-making processes can hinder their ability to adapt to changing conditions (Antwi-Agyei *et al.,* 2021).

Despite the increasing recognition of the vulnerability of women farmers to climate change, there is inadequate information on the specific adaptation strategies employed by women farmers in Ekiti State. Without this knowledge, it becomes difficult to develop targeted policies and interventions that effectively support the resilience and sustainable livelihoods of women farmers in the face of climate change. Furthermore, erratic rainfall, prolonged droughts, and unpredictable weather events continue to disrupt traditional farming practices, thereby affecting crop yields and livelihoods. At the same time, the demand for food has increased drastically due to rapid population growth. Therefore, it is imperative to analyse the adaptation strategies of the adaptation strategies used by women farmers in Ekiti State. Consequently, this study was carried out to i. determine the level of use of adaptation strategies to climate change employed

by women farmers; ii. determine the respondents' perceived effects of climate change on food crop production; and iii. identify constraints to adaptation strategies faced by women farmers in the study area.

Methodology

The study was carried out in Ekiti State, Nigeria. Ekiti State is situated in the Southwest region of the country. The state has 16 Local Government Areas (LGAs) and enjoys a tropical climate with two distinct seasons: the rainy season (April–October) and the dry season (November–March). The average temperature ranges between 21° and 28 °C with high humidity.

A multi-stage random sampling procedure was employed for this study. In the first stage, from the sixteen Local Government Areas, four (4) were randomly selected. Then, three (3) communities were randomly selected from each Local Government Area. Finally, ten (10) women farmers were randomly selected from each community, making a sample size of one hundred and twenty (120) households.

A well-structured interview schedule was used to collect information from the respondents. The level of use of adaptation strategies to climate change employed by women farmers was measured on 5-points Likert-type scale of very high (VH-5), high (H-4), moderate (M-3), low (L-2) and very low (VL-1). Thereafter, the composite score of each identified strategy was used to re-categorize the level of use into 3 levels of high (3), moderate (2) and low (1) with mean(x) ± SD and this corresponds to censoring values 3, 2, and 1 respectively. Respondents' perceived effects of climate change on food crop production were measured using a 5-points Likert scale: strongly agreed (SA-5) agreed (A-4), undecided (U-3), disagreed (D-2), and strongly disagreed (SD-1). Constraints to climate change adaptation strategies were measured as very severe (VS-4), severe (S-3), less severe (LS-2), and not severe (NS-1). Descriptive statistics analysis such as frequency counts, percentages and means were used to analyze the objectives.

Results and Discussion

Socio-economic characteristics of the respondents

The results from Table 1 revealed that the mean age of the respondents was 54.0 years. This means that women of this age were aging farmers. This implies that these women were mature and might have more experience in farming. This could influence their decision-making in the use of adaptation strategies. This agrees with Dwomoh *et al.* (2023) that older women were found to be more autonomous in making decisions in agricultural activities. Most (59.2%) of the respondents were married with

a mean household size of 5.0 persons. This implies that women farmers could have access to family labour in their farming activities. This is in line with Paul and Meena (2016) that the majority of women had medium household size. The respondents had a mean farming experience of 20.0 years, implying that they might be more experienced and have mastered more various farming techniques. The mean farm size was 1.25 hectares. This means that most of the respondents were operating on a small scale with a mean farm size of less than 2.0 hectares. This implies that most of the respondents were small-scale farmers. This might limit their participation in large-scale commercial agriculture and yield would remain low. This finding concords with Alabi *et al.* (2023) women were small-scale farmers. More than two-third (69.2%) of the respondents had access to credit. This means that majority of the respondent had access to credit. This could encourage the use of adaptation strategies to increase production among women farmers. This finding is in line Yenglier Yiridomoh and Nwosu (2022) who reported that women farmers' adaptation measures were mainly influenced by access to credit. The results further revealed that 27.5 percent each of the respondents were members of women group and co-operative society. This implies that majority of the farmers might get a loan from either women's group or co-operative society. This finding agrees with that of Basiru *et al*. (2022) that most women are members of women's group and cooperative societies.

Table 1: Socio-economic characteristics of the respondents

Socio-economic Variables	Frequency (n=120)	Percentage (%)	Mean
Age (years)			
≤ 30	3	2.5	54
31- 40	13	10.7	
41 -50	30	25.0	
≥ 50	74	61.8	
Marital status			
Single	30	25.0	
Married	71	59.2	
Divorced	13	10.8	
Widowed	6	5.0	
Household size (persons)			
< 3	18	15.0	5
4- 6	79	65.8	
7 – 9	22	18.3	
> 9	1	0.8	
Farm Experience			
≥ 10	27	22.5	20.0
11 -20	33	27.5	
21 – 30	47	39.2	
> 30	13	10.8	

Farm size			
< 1	31	25.8	1. 25
1 – 2	84	70.1	
3 – 4	3	2.5	
> 4	2	1.6	
Access to credit			
Access	83	69.2	
No access	37	30.8	
Source of information			
Extension agent	40	33.3	
Farmers' group	33	27.5	
Mass media	31	25.8	
Friends	16	13.3	
Membership of Social Organization			
Yes	106	88.3	
No	14	11.7	
Social Group			
Women group	33	27.5	
Co-operative society	33	27.5	
Rural community group	21	17.5	
Farmers' group	19	15.8	
Religion group	14	11.7	

Source: Field survey, 2024

Level of use of adaptation strategies to climate change employed by women farmers

The results revealed that the respondents had high use of adaptation strategies such as cultivating improved varieties (4.1), crop rotation (3.9), shift cultivation (3.8), and mixed cropping (3.7). Furthermore, it was revealed that organic manure application (3.6) and construction of ridges across the slope (3.6), fertilizer application (3.6) and mulching (3.6) were indicated as major constraints. The level of use of irrigation practices (2.7) as an adaptation strategy by women was low. The low use of irrigation practices among women farmers implies that food crop production remains highly dependent on rainfall, making crops vulnerable to drought and pest infestation caused by climate change. This can lead to reduced crop yield, unstable food supply, and lower income for women farmers. This finding agrees with Dibakoane *et al.* (2022) that the majority of the female farmers do not use modern scientific-based adaptation strategies such as the use of irrigation systems because of lack of livelihood assets.

Table 2: Level of use of adaptation strategies to climate change employed by women farmers

Adaptation strategies	VH	H	M	L	VL	Mean	Rank
Use of improved varieties	36(30.0)	71(59.2)	9(7.5)	1(0.8)	3(2.5)	4.1	1st
Crop rotation	39(32.5)	55(45.8)	12(10.0)	6(5.0)	8(6.7)	3.9	2nd
Shift cultivation	26(21.7)	51(42.5)	35(29.2)	8(6.7)	0(0)	3.8	3rd
Mixed cropping	31(25.8)	37(30.8)	44(36.7)	3(2.5)	5(4.2)	3.7	4th
Organic manure application	29(24.2)	38(31.7)	35(29.2)	9(7.5)	9(7.5)	3.6	5th
Ridges across the slope construction	31(25.8)	39(32.5)	21(17.5)	26(21.7)	3(2.5)	3.6	6th
Fertilizer application	26(21.7)	35(29.2)	42(35.0)	16(13.3)	1(0.8)	3.6	7th
Mulching	20(16.7)	44(36.7)	40(33.3)	15(12.5)	1(0.8)	3.6	8th
Cover crop planting	12(10.0)	61(50.8)	31(25.8)	10(8.3)	6(5.0)	3.5	9th
Altering of plant date	15(12.5)	49(40.8)	37(30.8)	16(13.3)	3(2.5)	3.5	10th
Alley cropping	26(21.7)	34(28.3)	23(19.2)	13(10.8)	24(20.0)	3.2	11th
Irrigation practices	13(10.8)	24(20.0)	22(18.3)	30(25.0)	31(25.8)	2.7	12th

Source: Field survey, 2024

Respondents' perceived effects of climate change on food crop production

The results in Table 3 showed that a continuous rise in annual temperature (4.3), reduced working hours (4.1), rapid loss of soil nutrients (4.1), poor labour availability (4.1), and pest infestation (4.1) were major perceived effects of climate change on food crop production. The grand mean was 3.9. This means that the level of perception of effects of climate change was high by women farmers. This finding is in line with Mishra and Pede (2017) that climate change risk is also greater for women because they typically lack the necessary production resources.

Table 3: Respondents' perceived effects of climate change on food crop production

Perceived Effects	SA	A	UD	DA	SD	Mean
Continuous temperature rise	73(60.8)	42(35.0)	3(2.5)	0(0.0)	2(1.7)	4.3
Reduced working hour	38(31.7)	63(52.5)	14(11.7)	4(3.3)	1(0.8)	4.1
Loss of soil nutrient	30(25.0)	77(64.2)	9(7.5)	1(0.8)	3(2.5)	4.1
Poor labour availability	44(36.7)	46(38.3)	20(16.7)	4(3.3)	6(5.0)	4.1
Pest infestation	26(21.7)	72(60.0)	14(11.7)	6(5.0)	2(1.7)	4.1
Poor germination rate	49(40.8)	36(30.0)	25(20.8)	8(6.6)	2(1.7)	3.9
Poor harvest	22(18.3)	56(46.7)	32(26.7)	10(8.3)	0(0)	3.8
Decreased production	61(50.8)	25(20.8)	10(8.3)	23(19.2)	1(0.8)	3.7
Soil erosion	12(10.0)	67(55.8)	36(30.0)	3(2.5)	2(1.7)	3.7
Flooding	15(12.5)	48(40.0)	38(31.7)	17(14.2)	2(1.7)	3.5
Grand mean	3.9					

Source: Field survey, 2024

Constraints to adaptation strategies faced by women farmers

The study revealed that lack of credit facilities (3.8) was the first major constraint to adaptation strategies faced by women farmers. This could be because the women were smallholder farmers. This implies difficulty in adopting modern scientific adaptation strategies, such as irrigation system implying total reliance on rain-fed farming. This finding is in line Lakshmi *et al.* (2025) who asserted that small and scattered land holdings reduce economies of scale, limit access to credit, and make it challenging to adapt various coping measures to climate change. This was followed by high cost of inputs (3.3), time consuming activities (3.2), and poor access to relevant information on climate change (3.2). This means that the respondents will be limited in adopting adaptation strategies with high cost implications and may also have limited access to relevant information on climate change. This finding agrees with Pandey and Arya (2022) who reported high cost of inputs and inadequate/limited knowledge concerning climate change as major constraints to adaptation strategies. The results further revealed that scarcity of improved seed (3.1), inadequate source of water (3.1), insufficient land (3.1) and inadequate knowledge (3.1) were indicated as major constraints to adaptation strategies. This means women would be limited in their abilities to adopt climate change adaptation strategies. Consequently, they may experience poor crop yields, low income, and food insecurity. This finding agrees with Ojo (2020) that limited capacity of farmers to respond to climate change is one of the causes of food insecurity. This finding further agrees with the assertion of Namdeo *et al.* (2023) that the high cost of inputs limits the adaptation strategies to climate change and causes more vulnerability of farmers to climate-related shocks.

Table 4: Constraints to adaptation strategies faced by women farmers

Constraints	VS	S	LS	NS	Mean	Rank
Lack of credit facilities	100(83.3)	17(14.2)	2(1.7)	1(0.8)	3.8	1st
High cost of inputs	52(43.3)	53(44.2)	14(11.7)	1(0.8)	3.3	2nd
Time-consuming activities	48(40.0)	57(47.5)	11(9.2)	4(3.3)	3.2	3rd
Poor access to relevant information	43(35.8)	62(51.7)	11(9.2)	4(3.3)	3.2	4th
Scarcity of improved seed	46(38.3)	40(33.3)	31(25.8)	3(2.5)	3.1	5th
Inadequate sources of water	44(36.7)	45(37.5)	27(22.5)	4(3.3)	3.1	6th
Insufficient land	49(40.8)	35(29.2)	31(25.8)	5(4.2)	3.1	7th
Inadequate knowledge	30(25.0)	74(61.7)	10(8.3)	6(5.0)	3.1	8th
Inadequate access to fertilizer	41(34.2)	45(37.5)	31(25.8)	3(2.5)	3.0	9th
Irregular extension services	19(15.8)	71(59.2)	27(22.5)	3(2.5)	2.9	10th

Source: Field survey, 2024

Conclusion and recommendations

The study concludes that the majority of women farmers indicated high use of adaptation strategies except in irrigation practices in the study area. The level of

perception of effects of climate change on food crop production was high. Lack of credit facilities, high cost of inputs, time consuming activities, and poor access to information were the major constraints to adaptation strategies by women. The study, therefore, recommends that the government should encourage women farmers through the provision of credit facilities, subsidized inputs and improved extension services to enhance their access to relevant information and encourage the adoption of irrigation practices as climate change adaptation strategies for improved food crop production and enhanced food security.

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