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Barriers to the Adoption of Climate Smart Agricultural Practices among Female FSarmers in Ondo State, Nigeria

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Abstract

The study examined the barriers to adopting climate-smart agricultural practices(CSAP) among female farmers in Ondo State, Nigeria**.** A multistage sampling procedure was used to select one hundred and twenty respondents for the study randomly. Primary data were collected from the respondents using a structured questionnaire and analysed using descriptive and inferential statistics. This study's results showed the women's mean age to be 46.68 ± 12.85. A majority (90%) of the women were married. It was also indicated from the findings of the study that the level of adoption of CSAP was generally low (34% adopters). Lack of credit facilities (x=2.93), limited decision-making power (x=2.87), and lack of support and guidance by extension agents were the major barriers faced by the women farmers. Results of the Chi-square analysis revealed that marital status (p=0.06) had a significant relationship with the barriers to adoption of CSAP for women farmers. Based on the study's findings, it was recommended that collaboration between female and male farmers, especially spouses in the study area, should be encouraged to facilitate the adoption of CSAP by the women farmers. The government should encourage women to adopt CASP through access to financial aid. More work in terms of extension visits, training, and sensitization on CSAP should be encouraged by government and relevant agencies like the National Council on Climate Change (NCCC) and the Ministry of Agriculture.

Keywords: Adoption, Women, Climate-smart, Global warming, Climate change

Introductions

Agriculture is a fundamental component of Nigeria's economy, essential for sustaining livelihoods, facilitating economic growth, and ensuring food security (Odetola & Itunu, 2013). Nigeria's economy is typically agrarian; agriculture plays a pivotal role in the nation's GDP. The significance of the sector cuts across various dimensions, which include its contribution to gross domestic product (GDP), employment generation, export revenue, and rural development (Mohammed, 2016). FAO (2021) revealed that, from January to March

2021, agriculture accounted for 22.35 percent of the overall GDP. More than 70 percent of Nigerians are employed within the agriculture sector, mainly at a subsistence level.

Nigeria's agricultural sector faces many challenges in spite of its many contributions to the nation's economy. This greatly impacts on its productivity in various ways, including poor land tenure system, low level of irrigation farming, climate change and land degradation. Others are low technology, high production cost and poor distribution of inputs, limited financing, high post-harvest losses and poor market access (FAO, 2021). These challenges have continuously suppressed agricultural productivity, affecting the sector's contribution to the country's GDP as well as increased food imports due to population increase, and thus results in food insufficiency. For instance, between 2016 and 2019, Nigeria's cumulative agricultural imports stood at N3.35 trillion, a figure four times higher than the agricultural export of N803 billion within the same period (FAO, 2021).

Climate change is a global phenomenon that results from human activities. It is an anomaly that occurs within the climate system. For instance, the earth's temperature is said to have moved from 0. Degrees to 0.8 degrees, which is indicative of global warming. If left unchecked, climate change may have great adverse effects on human lives, especially in terms of food security. More specifically, the mean annual temperature in Nigeria is projected to increase by 1.1 to 2.5°C by 2060, with an extreme increase expected in the north of Nigeria (Adedoyin et al, 2011

To address the climate change challenges, the Nigerian government put in place the "Climate Smart Agriculture (CSAP) Framework for Nigeria," which presents a comprehensive strategy that is designed to transform and improve the agricultural sector, making it more resilient and sustainable in the face of climate change (Nigeria Agribusiness Group (NABG), 2024). As Nigeria struggles with the problems of environmental unpredictability, this framework emphasizes the critical need for measures that protect food systems, increase agricultural output, and minimize greenhouse gas emissions. It seeks to enable farmers, agribusinesses, and legislators to collaborate and implement policies encouraging sustainable land use, effective water management, and strong climate adaptation methods. The framework also emphasizes the economic benefits of CSAP, focusing on how it may increase production and improve the livelihoods of smallholder farmers while protecting the environment (NABG), 2024).

While the framework may address the challenges of climate change and its impact on agricultural productivity, it is essential to consider the unique challenges women face, given their pivotal role in agricultural production, and ensure the framework benefits all stakeholders. Women are responsible for around half of the world's food production and are said to produce between sixty to eighty percent of the food in developing countries (Venkateswarlu, 2023). Climate change impacts particularly affects women who are significantly responsible for family farm production and are estimated to represent around 98 percent of the world's farm (Graeub, *et al,* 2016: Özçatalbaş, & Sogué, 2021). More recent research found that women's participation in agricultural activities are mostly influenced by their marital status, household size, level of education and farming experience. Also, some barriers such as financial access, lack of technical know-how among other things negatively impact their level of participation

in agricultural activities (Sallawu et al, 2022). Pan, Smith & Munshi. (2018) also found that the adoption of basic agricultural practices that require no financial implication by women improves food security within the households.

Answers were provided to the following research questions:

1) What are the socio-economic characteristics of the female farmers?
2) What are the climate smart agricultural practices engaged by the female farmers?
3) What are the barriers faced by female farmers to adopting smart agricultural practices?

Hypothesis:

H_0: There is no significant relationship between the educational level of the female farmers and their constraints to the adoption of CSAPs

Literature Review

For women, CSAP can provide numerous benefits, such as, boosting agricultural productivity to promote higher incomes, food security, and growth. CSAP may have a greater impact on family well-being and women's empowerment if women participate equally in such technologies and practices and take responsibility for the resulting benefits (Mohibbullah, 2024). Despite these benefits, women are often faced with varying barriers which hinders their adoption of CSAP, such as limited access to land, credit, and agricultural resources, as well as societal norms that restrict their participation in decision-making processes (Mohibbullah *et al*, 2024). Closing the agricultural gender gap through policy frameworks that eradicates the unique barriers of these women suggests a great opportunity for women's empowerment and adoption of CSAP to promote food security. The study therefore examined the barriers to the adoption of climate-smart agricultural practices among female farmers in Ondo State, Nigeria.

Research Method

The study was conducted in Ondo State, Nigeria. Ondo State is located in Southwest zone of Nigeria. With a population of about 5.3million, Ondo State is the 19th most populous state in the country, covering a land area of about 15,500 square kilometers. It lies within the of borders Ekiti State to the north, Kogi State to the northeast, Edo State to the east, Delta State to the southeast, Ogun State to the southwest, Osun State to the northwest, and the Atlantic Ocean to the south.

An interview schedule was used to collect data from the participants. The study engaged a multistage sampling procedure. The first stage involved a purposive selection of 8 out of the 18 local governments in the state based on their vulnerability to climate change impact. Secondly, 2 wards were purposively selected from each of the selected LGA to make 18wards. From each wards 2 villages were randomly selected to give a total of 32 villages. The fourth stage involved a systematic random sampling of every 5^{th} household to give 120 respondents as appropriated based on the number of households found in each of the selected villages.

Result and Discussion

The mean age of the participants as revealed on Table 1 was 46.68 ± 12.85 years and majority (90%) of them were married. This implies that most of the women are middle-aged adults who are relatively active for farming activities and its requirement. As a woman, being married, they rely on joint decision-making for their farming activities (Badstue *et al*, 2020) and may consider the economic impact of CSAP on their households which may influence their decision to adopt or reject CSAP.

The result on household size reveals that more than half (52.5%) of the women had between 1 – 5 household members, with a mean household size of around 6.0persons. This is in line with the findings of Mukaila, Abraham & Egwue. (2021). This implies that farm families tend to be relatively large, which may provide sufficient labor for farming activities. However, larger household sizes may also mean higher consumption needs and economic pressures because according to Kiran & Dhawan, (2015) as household size increases, savings decreases, which could deter farmers from adopting climate-smart farming practices due to economic requirements.

The distribution of respondents on educational level revealed that 41.5% had primary education, 37.5% had no formal education, 17.5% had secondary education, and 3.3% had tertiary education. This implies that there are potential challenges in understanding climate smart farming practices and framework which suggests a need for simplified and practical training programs that cater to different literacy levels among the respondents in the study area. The majority (93.3%) of participants were members of a social group, which indicates community networks strength, which could make it easier for extension agents or body of intervention to disseminate information and promote the adoption of CSAP. According to Quisumbing *et al.* (2018) found that women are more likely to learn about CSAP from their peers, whereas few women use traditional agricultural information sources.

Table 1: Distribution of the Socio-Economic Characteristics of the female farmers

Socio-economic variables	Frequency	Percentage	Mean ± SD
Age			
21 – 40	37	30.8	
41 – 60	68	56.7	46.68
>61	15	12.5	
Marital status			
Single	3	2.5	
Married	108	90.0	
Divorced	3	2.5	
Widowed	6	5.0	
Household size			
1 – 5	63	52.5	6.0
6 – 10	57	47.5	
Educational level			
No formal education	45	37.5	
Primary education	50	41.5	
Secondary education	21	17.5	
Tertiary education	4	3.3	
Member of a social group			

No	8	6.7
Yes	112	93.3

Source: Field Survey, 2024

The result on Table 2 revealed that 100.0% of the women avoid burning of farmland and leave leftover plants to improve the soil, this is a very impressive practice which can reduce greenhouse gas emission (GHG) 74.2% indicated that they collect rainwater or store water for your farming activities, and 81.7% plant tall trees or shrubs around your farm to stop strong winds from damaging your crops, while 92.5% plant improved seeds, like those that resist pests or survive poor rainfall. Surprisingly, only 20.8% of the women use weather information or advice from extension agents to decide when to plant or harvest your crops, and a ridiculously low proportion of the participant have used solar power or other clean energy solutions for activities like irrigation, processing, or cooking on their farm. More so, only 5.8% of the women plant grasses or build pavements to stop soil from washing away on your farm. Some areas need further education and training to fully optimize the adoption of CSAP, such as using nets or other coverings to protect your crops from too much sun or rain and working with other women in the community to maintain wells or ponds for farming. In tandem with Angara, (2021), a low level of adoption (34%) of CSAP was recorded among the women (Table 3) and this may be due to various factors related to their low level of education (Benoit, Pelenguei, & Gnedeka, 2022) as reported on Table 1 among other factors like finance.

Table 2: Distribution of respondents by their CSAP

S/N	Statements	Yes(%)	No(%)
1	Do you avoid burning your farmland and leave the leftover plants to improve the soil?	100.0	0.0
2	Do you work with other women in your community to maintain wells or ponds for farming?	15.8	84.2
3	Do you collect rainwater or use simple methods to store water for your farming activities?	74.2	25.8
4	Do you use weather information or advice from extension agents to decide when to plant or harvest your crops?	20.8	79.2
5	Do you make steps or ridges on hilly parts of your farm to stop soil from washing away?	8.3	91.7
6	Have you tried using solar power or other clean energy solutions for activities like irrigation, processing, or cooking on your farm?	1.7	98.3
7	Do you plant tall trees or shrubs around your farm to stop strong winds from damaging your crops?	81.7	18.3
8	Do you follow advice on the best time to plant or harvest your crops based on the weather?	23.5	76.5
9	Do you take steps like planting grasses or building pavements to stop soil from washing away on your farm?	5.8	94.2
10	Do you plant improved seeds, like those that resist pests or survive poor rainfall?	92.5	7.5
11	Do you use nets or other coverings to protect your crops from too much sun or rain?	14.2	85.8
12	Do you attend trainings on how to protect your farm from climate impacts?	20.8	79.2

Source: Field Survey, 2024

Table 3: Distribution of respondents by level of adoption of CSAP

Level of adoption	Frequency	Percentage
Low Adopters	79	66
High Adopters	41	34

Minimum = 3.00, **Maximum** = 12.00, **Mean** = 6.06

The result of Table 4 on barriers to adoption of CSAP, using the mean score to rank, the result revealed that lack of credit facilities to facilitate Climate-smart Agriculture ($\overline{X}$ = 2.93) ranked 1st, followed by limited decision-making power within households ($\overline{X}$ = 2.87) which ranked 2nd, and lack of support and guidance from extension agents ($\overline{X}$ = 2.82) ranked 3rd. In a study by Owoputi et al (2024), on gender differences in perception of joint decision-making on spending money in rural Tanzania, it was found that none of the male participants reported that the women take the financial decision for the household. In contrast, the men were reported to make financial decisions for the household. The findings of the current study show that while the women need financial assistance, the women in the study area do not have autonomy of decision on their farming activities and thus rely on their husbands' choices. If the husband decides to adopt CASP practices, the women are likely to adopt the same. According to a couple's joint decision is typically the husband's preferences (Carlsson, *et al.*, 2012.). Also, Rising cost of production inputs ($\overline{X}$ = 2.80) and Limited access to timely warnings on climate change($\overline{X}$ = 2.80) ranked 4th respectively. The findings revealed that women's constraints hinges on finance and the need to be financially empowered. It was however intriguing that there is lack of sufficient information on Climate-smart practices ($\overline{X}$ = 2.56) ranked 10th. This implies that the women participants do not consider access to information on CSAP as a major barrier, although a non-negligible proportion of the participants still consider it as a barrier and this could suggest a relative success of orientation and information dissemination of various agencies in the study area.

Table 4: Distribution of Respondents Barriers to the Adoption of CSAP

S/N	Items	Major Constraint	Minor Constraint	Not a Constraint	Mean	Rank
1	Rising cost of production inputs	96 (80.0)	24 (20.0)	0 (0.0)	2.80	4th
2	Lack of sufficient information on CSAP	67 (55.8)	53 (44.2)	0 (0.0)	2.56	10th
3	Lack of credit/finance facilities to facilitate CSAP	112 (93.3)	8 (6.7)	0 (0.0)	2.93	1st
4	Limited access to timely warnings on climate change	96 (80.0)	24 (20.0)	0 (0.0)	2.80	4th
5	Policies and programs for climate-smart agriculture often fail to consider the specific needs of women farmers	82 (68.3)	38 (31.7)	0 (0.0)	2.68	8th
6	Lack technical know-how on some CSAP	95 (79.2)	25 (20.8)	0 (0.0)	2.79	6th
7	Unequal access to land	82 (68.3)	38 (31.7)	0 (0.0)	2.68	8th
8	Limited decision-making power within households	110 (91.7)	4 (3.3)	6 (5.0)	2.87	2nd

9	Lack of support and guidance from extension agents	106 (88.3)	7 (5.8)	7 (5.8)	2.82	3rd
10	Balancing household responsibilities and farming activities leaves insufficient time to learn new practices.	90 (75.0)	30 (25.0)	0 (0.0)	2.75	7th

Source: Field Survey, 2024

The result of the Table 4 shows the summary of chi -square analysis between some selected socio-economic characteristics of the respondents and the barriers to adoption of CSAP. The result revealed that some socio-economic characteristics variable such as sex, religion, educational level, and member of a social group had no significant relationship with barriers to adoption of CSAP practices. Meanwhile, marital status ($X^2 = 57.242^a$, P = 0.006) had a significant relationship to barriers to adoption of CSAP practices, implying that married respondents may face greater responsibilities and financial commitments that influence their ability to adopt new practices. A study by Yohana (2007) found that socio-economic characteristics of women like their marital status influenced their decision-making in farm practices. Again, in a study, Peralta (2022) found that married women have less influence in the household's decision-making.

Table 5: Chi-square analysis result of selected socio-economic characteristics of the respondents and the barriers to CSAP

S/N	Socio -economic variables	Chi – square value (X^2)	P – value	Remark
1	Marital status	57.242^a	0.006	Significant
2	Religion	26.658^a	0.225	Not significant
3	Educational level	19.069^a	0.975	Not significant
4	Member of a social group	9.876^a	0.542	Not significant

Source: Computed Data, 2024

Conclusion

The study revealed that most participants were married and within their active age for farming. It was also revealed that CSAP like following advice on the best time to plant or harvest your crops based on the weather, making steps or ridges on hilly parts of the farm to stop soil from washing away, planting grasses or building pavements to stop soil from washing away on the farm amongst others were not adopted by the farmers. The study findings also indicated that the adoption level of CSAP was generally low. This can, however, be linked to some of the major constraints faced by the women in adopting CSAP, which included a lack of credit facilities to facilitate CSAP, limited decision-making power within households, lack of support and guidance from extension agents, rising cost of production inputs and limited access to timely warnings on climate change. The study also revealed that marriage significantly impacted some of the barriers faced by the women farmers. This is possible because marriage can reduce their autonomy and amplify financial constraints due to responsibilities. Therefore, it is imperative to engage in holistic interventions that will capture gender-sensitive trainings that target married and unmarried women, challenge societal norms, and promote equitable access to resources.

Collaboration between spouses should be advocated, especially regarding their farming practices. This will encourage the adoption of CSAP among men and women generally in the study area. Also, regarding the major constraints of women, the government should provide an adequate framework to facilitate easy access to financial aid through agricultural financial institutions like Bank of Agriculture, etc. Emphasis was also placed on timely warnings of climate change; it is, therefore, important for extension personnel to improve their training and sensitization on climate change via media outlets and all possible means. Through the National Orientation Agency, CSAP should be encouraged by government and relevant agencies like the National Council on Climate Change (NCCC) and the Ministry of Agriculture. Addressing these challenges would help achieve SDG goal 5, encouraging women to contribute to agricultural development and promote food security gainfully.

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