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EFFECT OF GENDER ON FARMERS' OWNERSHIP, CONTROL AND ACCESSIBILITY TO CLIMATE CHANGE ADAPTATION RESOURCES IN SOUTHWEST NIGERIA

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ABSTRACT

The ability to access, control and own adaptation resources is a critical factor in determining rural farmers' adaptive potential and decision-making towards adaptation to climate change. This study investigated the effect of gender on farmers' accessibility, control and ownership of climate change adaptation resources in Ogun and Ekiti States respectively, Nigeria. Three hundred and fifty eighty men (358) and (222) women farmers were randomly selected through a multi-stage sampling procedure. A pre-tested questionnaire was used to obtain data and analysed with frequency counts, means, percentages, Chi-square. A positive and statistically significant association ($P<0.05$) existed between the gender of the respondents and their accessibility to adaptation resources, like hoe (χ^2= 10.137), wheelbarrow (χ^2=5.647), digger (χ^2=11.982), sprayers (χ^2=11.792), head pan (χ^2=9.5599), education (χ^2=22.359), grass plant (χ^2=9..912), health-care (χ^2=13.764), pesticides (χ^2=6.391) inorganic fertilizer (χ^2=7.876), transportation means (χ^2=10.897), average annual income (χ^2= 8.026), labour (χ^2=12 .557), information (χ^2=12.557), and medicinal plants (χ^2=11.296). There existed a positive and statistically significant association ($P<0.05$) between the gender of the farmers and their control of adaptation resources like digger (χ^2=14.630), sprayer (χ^2=6.631), head pan (χ^2=4.811), education (χ^2=11.657) transportation (χ^2=3.364) and average annual income (χ^2=33.013). Also, there existed a positive and significant association ($P<0.05$) between the gender of the farmers and their ownership of adaptation resources like land (χ^2=6.815), water (χ^2-4.491), health-care (χ^2= 2.088), labour (χ^2= 5.992) and sources of information of climate change (χ^2=3.595). As a result, gender-responsive intervention is necessary to strengthen men and women farmers' climate resilience and improve their adaptation capabilities through access to critical adaptation resources.

Keywords: Access, control, ownership, climate change, capacity

INTRODUCTION

The agricultural sector with its diverse dimensions stands out as one of the crucial sectors of the economy that has inbuilt capacity when harnessed to employ millions of people (Anabaraonye, 2018). Specifically, over 70% of Nigeria's population is engaged in agriculture as their occupation and means of livelihood (Shiru *et al.,* 2018; Onwutuebe, 2019). Despite the indispensable roles of agriculture in Nigeria's economic development, it is challenged and threatened by climate change, thereby making it difficult to achieve the climate-linked goals of sustainable development. In Nigeria, climate change is evident in the form of more frequent heavy rainfall events, unpredictable rainfall patterns, drought and increased temperature (Esan *et al*., 2018). Notably, the Southern Nigeria ecological zone is largely known for high rainfall and an irregular rainfall pattern, with guinea savannah experiencing gradually increasing temperature (Ebele and Emodi, 2016). Climate change is caused by two basic factors namely natural processes (biogeographically) and human activities (Elisha *et al.,* 2017). The evidence that climate change will adversely affect agriculture in Nigeria has become a crucial challenge (Solomon and Edet, 2018). Farmers can reduce the potential damage by making tactical responses to changes in climate (Ige *et al*., 2020) through the application of timely coping and/or adaptation strategies. Accessibility to support services for adapting to climate change is therefore essential to improve the adaptive capacity of rural farmers even when deprived of control and ownership of adaptation resources. In Africa, including Nigeria, literature on climate change adaptation has shown how smallholder farmers suffer a high level of vulnerability due to their low adaptive capacity (Ume, 2017; Assan, 2018). According to LazKano *et al.* (2016) adaptation is any activity that reduces climate change-induced damages. Farmers' ability to adapt to projected trends in rainfall and temperature partly depends on institutional support for adaptation (Assan *et al.,* 2018). The institutional support must be gender-sensitive and designed to accommodate farmers' preference (Jost *et al*., 2015). Increased access to agricultural support services improves the availability and the quality of relevant climate information which will further enhance a community's awareness of climate change and result in better management of climate-induced risk (Debela, 2015). According to Falaki (2012), access to information and input supply services are issues that need to be addressed adequately if farmers are going to adapt their farming operations to current and predicted changes in the climate system.

Farmers' access to extension service serves is a vital human capital that keeps them informed on change and modern agricultural practices in the farming system (Adeagbo *et al.,* 2021). Several studies had shown that rural farmers are constrained in the resources required for adaptation to climate change (Aturamu *et al*., 2012, Otitoju and Enete, 2016; Ojo and Bayegunhi, 2020), as a result, support services are therefore necessary to boost farmers' adaptive capacity. In that respect, support groups (institutional actors and stakeholders/ partners) are all required for productive development and execution of sustainable adaptation responses (Popoola *et al*., 2020). The supports could be provided by Government agencies, Non-Governmental Organisations and other

stakeholders in agriculture or environment related issues. Examples of such support include building the capacity of farmers, creating opportunities for stable income, and providing credit and extension services (Yaro, 2013). Accessibility of men and women farmers to support services needed to ameliorate the effects of climate change differs (Assan, 2018; Ume; Opata and Onyechuru, 2021), this could have emanated from their gender-related factors. Based on these premises, this study sought to (a) describe the socio-economic characteristics of the respondents (b) examine farmers' accessibility to support services and hypothesized that there is no significant associations between the gender of farmers and (i) accessibility (ii) control and (iii) ownership of adaptation resources.

MATERIALS AND METHODS

Study Area

The study was conducted in Ekiti and Ogun States Nigeria. Ekiti State was carved out from the old Ondo State on October 1st, 1996. Geographically, the State is located in the Southwest of Nigeria between latitudes 7º25` and 8º05`N and between longitudes 4º45` to 5º50` East of Greenwich meridian. Ekiti State is bounded to the north by Kwara and Kogi States, to the West by Osun State, to the East by Edo State and to the South by Ondo State. Topographically, the temperature range is between 21º – 28ºC with high humidity of 70%. The State is an upland zone and experiences a total annual rainfall of 1400mm. The major vegetation is rain forest, deciduous forest and semi-grasslands. Tropical forest exists in the South of the State while guinea savannah occupies the northern peripheries of the State. The State occupies an area of 6,353kmsq and enjoys generally tropical climate with two distinct seasons. .

Ogun State was created on February 3rd, 1976 from the old western region. Geographically, the State lies within latitudes 6º 8¹N and longitudes 2½º 5¹E. The State covers 16,409.26 kilometers and shares an international boundary with the Republic of Benin to the West and interstate boundaries with Oyo State to the North, Lagos and the Atlantic Ocean to the South and Ondo State to the East.

Topographically, the State is located in moderately hot, humid tropical climatic zone of Southwest, Nigeria. The climate of Ogun State follows a tropical pattern with two distinct seasons (the rainy season which lasts from March/ April to October/ November till March/ April), the mean annual rainfall varies from 128cm to 105cm with an average monthly temperature of 23ºC. Ogun State has two main vegetation, namely, tropical rain forest and guinea savannah.

Data Collection and Analysis

Two third of the six States (6) in southwest Nigeria were randomly selected (Ekiti and Ogun States). At stage two, two (2) out of the three zones in Ekiti State Agricultural Development Programme (ADP) were randomly selected while two zones were randomly selected from the four zones in Ogun State Agricultural Development Programme. At stage three, three (3) blocks were randomly chosen from the selected zones in Ekiti State (making six blocks) while eight (8) blocks were randomly selected in Ogun State. Finally, at stage four, using Krejcie and Morgan (1970) method for determination of sample size, a sample of 302 respondents (175 men and 128 women) was randomly selected for the study in Ekiti State while 278 respondents (184 men and 94 women) were randomly selected in Ogun State from the list obtained from National Agricultural Cooperative headquarters of the two States and interviewed (Table 1).

Table 1: Selection procedure for sample size in Ekiti and Ogun States

ADP Zones	Blocks	Selected blocks	NACOP Members	Selected men farmers	Selected women farmers	Total
Ekiti State						
Aramoko	5	3	500	57	31	88
Ikere	5	3	900	118	96	214
Total	10	6	1400	175	127	302
%				57.8	42.2	
Ogun State						
Abeokuta	12	6	574	86	44	130
Ilaro	4	2	428	98	50	148
Total	16	8	1002	184	94	278
%				66.2	33.8	

The study employed qualitative (Focus Group Discussions) and quantitative (questionnaire) methods of data collection. A questionnaire is a research instrument consisting of a set of questions (items) intended to capture responses from respondents in a standardized manner (Bhattacherjee, 2012). The questionnaire was designed in phases to capture questions on farmers' socio-economic characteristics and accessibility to support services. The Focus Group Discussions constitute 8-12 persons conducted in 12 cells separately for men and women farmers, discussions were recorded and later transcribed. The instrument for data collection was pre-tested using the test-retest method at two weeks intervals to measure the degree of its consistency and obtained reliability coefficients of 0.82 for accessibility to support service. Farmers' accessibility to support services was measured as agreements of farmers with a list of options provided and aggregate scores determined. The data obtained were analysed using Statistical Package for Social Sciences window version 23. The analytical tools employed in this study were descriptive (tables, percentages, frequency counts, and means) and inferential statistics (Chi-square).

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

Results in Table 2 show that the average age for men and women farmers were 45 and 49 years respectively. This suggests that the respondents were active in adapting to climate change. This result is similar to Anugwa *et al. (*2020) who reported 44years and 47 years for their men and women farmers respectively. The study further reveals that 86.5% of men and women farmers (76 %) had formal education. This could hint that the majority of the respondents possessed at least a form of formal education and thus could enhance their quest to access support services. This result corroborates the findings of Okunlola *et al.* (2019) who reported that over 70% of their respondents were literates in a study conducted on

climate change coping strategies in southwest Nigeria. The study also shows that 53.2% of men and women farmers (58.1%) were members of crop farmers' associations. This could imply that membership of the farmers' association could provide networks between other farmers and climate change support institutions for capacity building on adaptation to climate change. This result is similar to the report of Adetomiwa, Adebayo and Ologundudu (2022) who reported that 69.28% of men and women farmers (78.84%) were members of farmers' association in a study conducted in southwest Nigeria. The study further shows that men and women farmers respectively had an average of 23years and 19years of farming experience. It can suggest that the respondents had been adapting to climate change and might have had access to support services over the long years of farming experience. This result is consistent with the report of Oluwatayo and Ojo (2016) who reported an average of 23years for their respondents in a study on adaptation to climate change in Nigeria. Furthermore, the majority of women farmers (76.2%) cultivate between 0-2 hectares of land compared to men farmers (67.1%) who cultivate 3-5ha. This could suggest that men farmers had more access to land, involved in more agricultural enterprises, and received support services from stakeholders while the women farmers encountered inadequate rights to access land as evident in this study. This result aligned with Daudu *et al*. (2022) who observed 5.42ha for men and 2.86ha for women farmers. Greater percentages of men (43.3%) and women farmers (42.8%) earned less than 21,000 Naira per annum. This could hint that the respondents were small-scale farmers and could have been affected by the effects of climate change as a result of low adaptive capacity. Furthermore, the majority of the farmers were married and had 6 persons per household. This could depict the availability of family labour which is essential for the uptake of labour intensive-adaptation measures. This finding is in tandem with Adeagbo *et al*. (2021) who as well reported six persons per household in a study conducted on the determinants of adaptation strategies in southwest Nigeria.

Table 2: Socio-economic Characteristics of Respondents

Socioeconomic factors	**Men farmers (%)**	**Women farmers (%)**	**Mean ($\bar{x}$) Men/ Women**
Age (years)			49/45years
Below 21	0.03	0.05	
21-30	13.4	14.9	
31-40	15.1	20.3	
41-50	29.5	41.9	
51-60	19.8	13.1	
Above 60	24.9	9.5	
Marital status			
Single	11.5	6.3	
Married	85.0	82.0	
Widow (er)	2.8	8.6	
Divorced/ separated	0.8	3.2	
Family size			6
0-5	17.6	45.9	
6-10	73.5	52.3	
11-15	7.5	1.8	
16-20	1.4	0.0	
>20	0.0	0.0	
Education			
No- formal education	13.5	24.2	
Formal education	86.5	75.8	
Farming experience			23/ 19years
0-5	13.1	19.8	
6-10	18.2	18.5	
11-15	13.7	9.0	
16-20	11.7	14.0	
Above 20	43.3	38.7	
Farm size (hectares)-			
0-2	17.0	75.2	
3-5	67.1	9.5	
6-8	8.4	7.2	4.2/1.7ha
Above 8	7.0	0.1	
Average annual income (N)			
Less than 21,000	43.3	42.8	
21,000-40,000	12.5	14.4	
41,000-60,000	21.7	22.5	
61,000-80,000	4.5	4.1	
81,000-100,000	3.9	5.4	
Greater than 101,000	13.9	10.9	

Men and women Farmers' Accessibility to Support Services for Adaptation to Climate Change

Results in Table 3 show farmers' accessibility to Ekiti and Ogun States support services on adaptation to climate change. The study shows that more men farmers (50.9%) than women farmers (35.1%) had access to extension and agro services. The services rendered by extension and agro services are analysed as literacy program (men 10.7%, women 4.4%), provision of seedlings (men 10.4%, women 5.0%), polythene bag (men 11.7%, women 9.8%), improved seeds (men 8.6%, women 5.3%) and fertilizer (men 4%, women 2.3%). The women farmers could have had less access to extension and agro services probably as a result of socially constructed roles and responsibilities performed by female farmers. It was observed during FGDs that the women farmers present were not fully involved due to their engagements in household responsibilities. This result is similar to Kisauzi *et al*. (2012**)** who reported that 60% of male and female farmers (40%) had access to extension services in research conducted on climate change. Also, there were few extension agents compared to the population of the farmers in the study area, this could then render the efforts of the extension agents ineffective with the increase in extension agent-farmers' ratio. The results align with the findings of Olorunfemi *et al*. (2020) who reported that a wide gap ratio exists between the number of communities to be covered and the extension agents available.

Furthermore, more men farmers (50.5%) than women farmers (38.7%) had access to health-care support services such as paid health-care services (men 35.4%, women 9.0%), free medical checkups (men 1.9%, women 4.5%), mobile health-care (immunization) (men 0%, women 13.5%), free medical treatment (men 1.9%, women 0.0%) and mosquito nets (men 4.7%, women 9.0%), health talks (men 4.8%, women 2.7%) and free eyeglasses (men 1.8, women 0.0%). Farmers' ability to adapt to health-related effects of climate change is thought to be enhanced by proper access to health-care services. Despite this, due to women's gender role of reproduction, they were able to benefit more in the collection of mosquito nets and immunization vaccines from the State governments.

Furthermore, men (18.1%) and women (17.1%) farmers had access to vocational training, according to the findings. However, vocational training is required for the transfer of skills and knowledge in order to diversify into non-farm activities as a strategy to adapt to climate change adaptation. Cassava grater and borehole, wells, and a reservoir for water storage were among the other amenities supplied by the Ogun State government. In addition, more women farmers (17.6%) than men farmers (13.1%) benefitted from veterinary services. Veterinary service was provided in the form of subsidy on animal treatment for men and women farmers. The focus groups revealed that there were very few veterinary centres in the study areas, there was no free treatment for livestock or free drugs, and that farmers had to pay for the service.

The respondents also had access to various support services through the Federal Government's Growth Empowerment Scheme (GES), which was managed through the State Agricultural Development Programme, According to the focus groups, 'OLAM,' a Non-Governmental Organization (NGO), also provided support services to farmers in Ekiti State, in the form of loans, free rice seed, cocoa rehabilitation, free fertilizer, free crop seedlings, and polythene bags.

Table 3: Men and women farmers' accessibility to support services (n= men 358, women 222)

Climate change support services	Men farmers (%)	Women farmers (%)
Extension and Agro-services	50.9	35
Literacy program	10.7	4.4
Input subsidies	10.4	5.0
Information about climate change	5.4	3.3
Seedling	11.7	9.8
Polythene bag	3.3	1.8
Improved seeds	8.6	5.3
Fertilizer	4.0	2.3
Health-care	50.5	38.7
Paid health-care services	35.4	9.0
Check-up	1.9	4.5
Mobile health-care (immunization)	0.0	13.5
Free medical treatment)	1.9	0.0
Free mosquito net	4.7	9.0
Health talk	4.8	2.7
Eyeglasses	1.8	0.0
Vocational Training	18.1	17.1
Crop production	9.1	10.0
Animal breeding	0.0	0.0
Handicraft	2.0	1.1
Others (beekeeping &bead making)	7.0	6.0
Veterinary Services	13.1	17.6
Free animal treatment	0	0
Free drug (livestock)	0	0
Subsidized animal drug	0	0
Subsidized animal treatment	10.1	11.5

Associations between Gender and Access, Control, and Ownership of Adaptation Resources

Table 4 shows that out of the twenty (20) adaptation resources examined in this study, fifteen items had a positive and statistically significant associations ($P<0.05$) with the gender of the respondents and their accessibility to adaptation resources, like hoe (χ^2= 10.137), wheelbarrow (χ^2=5.647), digger (χ^2=11.982), sprayer (χ^2=11.792), head pan

(χ^2=9.5599), education (χ^2=22.359), grass plant (χ^2=9..912), health-care (χ^2=13.764), pesticides (χ^2=6.391) inorganic fertilizer (χ^2=7.876), transportation means ($\chi^{2=}$10.897), average annual income (χ^2= 8.026), labour (χ^2=12 .557), information (χ^2=12.557), medicinal plants (χ^2=11.296). This could imply that a farmer's gender has a clear connection with his or her ability to access these adaptation resources. This suggests that access to these items is determined by a farmer's gender. However, the findings show that no significant association (P>0.05) existed between gender of respondents and accessibility to land (χ^2=2.279), water (χ^2=0.211), cutlass (χ^2=3.595), spade (χ^2=0.102) and Non-Timber Forest Products- NTFPs (χ^2=1.414). This implies that a farmer, regardless of gender, might have access to these resources.

Furthermore, there was a positive and statistically significant association (P<0.05) between the gender of the respondents and their control of adaptation resources such as digger (2=14.630), sprayer (2=6.631), head pan (2=4.811), education (2=11.657) transportation (2=3.364), and average annual income (2=33.013) out of the twenty (20) adaptation resources examined in this study. This implies that the farmers' gender a man or woman) has a direct influence on the control of these resources. On the other hand, there was no significant association between farmers' gender and adaptation resources like land (χ^2= 0.991), water (χ^2=0.894), cutlass (χ^2=0.296), wheelbarrow (χ^2=0.907), spade (χ^2= 2.245), grass plant (χ^2=2.908), healthcare (χ^2=0.730), pesticides (χ^2= 3.096), fertilizer (χ^2=1.132), transport (χ^2=3.364), information source on climate change (χ^2=0.737), medicinal plants (χ^2=0.066) and NTFPs (χ^2= 3.044). This is an indication that control over these resources is independent of the gender of a farmer.

Furthermore, the findings show that there was a positive and significant association (P<0.05) between the gender of the farmers and their ownership of adaptation items like land (χ^2=6.815), water (χ^{2-}4.491), health-care (χ^2= 2.088), labour (χ^2= 5.992) and sources of information on climate change (χ^2=3.595). This depicts that ownership of these adaptation items is influenced by the gender of the respondents. However, no significant association (P>0.05) existed between sex of the respondents and ownership of adaptation resources like cutlass ($\chi^{2=}$2026), hoe (χ^2=0.817), wheelbarrow (χ^2= 0.020), spade($\chi^{2=}$0.637) , digger (χ^2= 0.372), sprayer (χ^2= 3.802), head pan (χ^2= 0.007), education (χ^2= 2.088), grass plants (χ^2=0.352), pesticides (χ^2= 2.837), fertilizer (χ^2= 0.103), transportation (χ^2=0.883), average annual income (χ^2= 0.071), medicinal plants ($\chi^{2=}$3.595), and NTFPs (χ^2= 1.851). This suggest that the ownership of these items is independent of the gender of a farmer.

Table 4: Test of associations between gender and accessibility, control and ownership of agricultural support services

	Accessibility			Control			Ownership		
Adaptation resources	**χ^2**	**Df**	**P-value**	**χ^2**	**Df**	**P-value**	**χ^2**	**Df**	**P-value**
Land	2.279	1	0.131	0.991	1	0.320	6.815	1	0.009*
Water	0.211	1	0.646	0.894	1	0.344	4.491	1	0.034*
Cutlass	3.595	2	0.166	2.968	1	0.085	2.026	1	0.155
Hoe	10.137	2	0.006*	0.296	1	0.586	0.817	1	0.366
Wheelbarrow	5.647	1	0.017*	0.907	1	0.341	0.020	1	0.887
Spade	0.162	1	0.687	2.245	1	0.134	0.637	1	0.425
Digger	11.982	1	0.001*	14.630	1	0.000**	0.372	1	0.542
Sprayer	11.792	1	0.001*	6.631	1	0.010*	3.802	1	0.051
Head pan	9.559	1	0.002*	4.871	1	0.028*	0.007	1	0.935
Education	22.359	1	0.000**	11.657	1	0.001**	2.088	1	0.148
Grass plant	9.913	1	0.002**	2.908	1	0.088	0.352	1	0.553
Health-care	13.764	1	0.000**	0.730	1	0.393	11.890	1	0.001**
Pesticides	6.391	1	0.011*	3.096	1	0.079	2.837	1	0.092
Fertilizer	7.876	1	0.005*	1.132	1	0.287	0.103	1	0.748
Transport	10.897	1	0.001**	3.364	1	0.067	0.883	1	0.347
Average annual income	8.026	1	0.005*	33.013	2	0.000**	0.071	1	0.790
Labour	12.557	1	0.000**	12.147	2	0.002**	5.992	1	0.014*
Information	12.557	1	0.000*	0.737	1	0.391	6.153	1	0.013*
Medicinal plants	11.296	1	0.001**	0.066	1	0.797	3.595	2	0.168
NTFPs	1.414	2	0.493	3.044	2	0.218	1.851	2	0.396

*P<0.05 **P<0.01

CONCLUSIONS AND RECOMMENDATIONS

The effect of gender on men and women farmers' access to climate change adaptation assistance services was explored in this study. The findings show that men and women farmers had different access to climate change adaptation assistance services, this disparity could make them vulnerable to the effects of climate change. The findings reveal that respondents' gender could influence their access to, control over, and ownership of critical adaptation resources. The consequence is that farmers' adaptive capacity may be influenced by gender, which in turn influences how they respond to the effects of climate change in terms of taking decisions timely to adapt. This means that increasing access to, control over, and ownership of adaptation resources by men and women farmers will translate to increased adaptive ability for prompt adaptation and improved production even as the climate changes. All stakeholder, particularly government, through extension agents, should promote fairness and equitable access to support services for both groups of farmers. Also, the government and NGOs should strengthened farmers' adaptive capacity with more assistance while improving on the existing ones like veterinary services.

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