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Gender analysis of climate change adaptation of food crop farming households in Saki-Agricultural zone of Oyo state, Nigeria

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ABSTRACT

The study assessed gender analysis of climate change adaptation of food crop farmers in Saki-Agricultural zones of Oyo state, Nigeria. A total of 104 males and 72 females) food crop farmers were sampled. Frequency counts, percentages, weighted mean and ANOVA were used in analyzing data. Fewer males (31.7%) than females (61.1%) had no formal education. Average farm size was 2.8 and 2.4 hectares for male and females, respectively. Respective average ages were 52 and 51 years. Most important constraints to climate change adaptation of both men and women were high cost of farm inputs, destructive activities of the herdsmen and inadequate early warning information. Male and female farmers did not differ in the level of constraints to climate adaptation. Men employed ridges across the slope (F = 8.828) and fallow system (F=8.828) more significantly than women. There is however no significant difference between male and female level of climate change adaptation. Agricultural inputs should be made available by the government to both male and female farmers at subsidized rates, while women should have better access to land.

Keywords: climate change, adaptation, constraints to adaptation, food crop, gender

1. INTRODUCTION

Climate change is one of the most serious environmental threats facing mankind worldwide. According to Zoellick (2009), as the planet warms, rainfall patterns shift, and extreme events such as droughts, floods, and forest fires become more frequent and severe, which results in poor and unpredictable yields, thereby making farmers more vulnerable, particularly in Africa (UNFCC, 2007). Climate change affects agriculture in several ways, as it reduces productivity of common food crops. Therefore, climate change has direct negative consequences on food security. Ziervogel *et al.,* (2006) posit that Climate change, which is attributable to the natural climate cycle and human activities, has adversely affected agricultural productivity in Africa. Available evidence shows that climate change is global, likewise its impacts; but the most adverse effects will be felt mainly by developing countries, especially those in Africa, due to their low level of coping capabilities (Nwafor 2007; Jagtap 2007). Nigeria is one of these developing countries (Odjugo, 2010).

Therefore, farmers (who constitute the bulk of the poor in Africa) face prospects of tragic crop failures, reduced agricultural productivity, increased hunger, malnutrition and diseases (Zoellick, 2009). It is projected that crop yield in Africa may fall by 10-20% by 2050 or even up to 50% due to climate change (Jones and Thornton, 2003), particularly because African agriculture is predominantly rain-fed and hence fundamentally dependent on the vagaries of weather. There is also a significant proportion of the world's people who are unable or barely able to meet their needs for survival, especially in the rural areas, who are predominantly farmers. Climate change threatens to make the Millennium Development Goals unattainable. It will result in greater poverty, wider discrepancy between rich and poor, sea level rises, and more precarious livelihoods challenging survival (Brown Gwambene, 2019; Gichangi & Gatheru, 2018; Onwuemele Andrew, 2018).

Although, climate change affects both men and women, women are particularly affected because they constitute larger percentage, on the overall average, of the farming population in the rural areas. Peasant women are the most vulnerable to climate change because it has direct bearing with their livelihood. Women, especially the peasant farmers dwelling in the rural areas, and who rely on rain activities for livelihood and their children are therefore vulnerable to the effect of climate change. Life is generally not easy for women and their family when their crop yield is poor due to effect of dwindling weather condition.

Different social roles and status globally is accountable for the vulnerability of women to climate change. Previous studies in developing countries have shown that women suffer disproportionately from the effect of weather condition. According to Women's Manifesto on Climate Change (WEN/NFWI, May 2007) about 70% of world's poor who are far more vulnerable to environmental damage are women corroborating this, Mirza (2003) reported that 85% of people who are from climate induced disasters are women, while 75% of environmental refugees are also women. Therefore, since effects of climate change is more, women should be provided with equal if not more access to land and other productive resources, as this will enable them to effectively adapt to the vagaries of climatic parameters. However, women are often denied access to basic productive resources as a result of patriarchal customs and traditions, thus, making them more vulnerable. Men, on the other hand, are conceived to have more access and control over productive resources, such as land, even when such are not being put to active productive activities. Also, being the head of the house, men often traditionally control all the productive resources at household levels, including the ones possessed by wives. For example, men have access to the most fertile land, sources of agro-chemicals, agricultural extension services, and credit facilities. This gender disparity in access to and control of productive resources among farming households have been noted to have the tendency to impair the capability and efforts of the female gender in adapting to climate change effects. Obviously, one key solution to this problem in an attempt to alleviating food insecurity is to bridge this obvious gap. FAO (2011) projected that the number of hungry people in the world could be reduced by more than 100 million people if women in rural areas were given equal access to the same resources and opportunities as men (FAO, 2011). It is therefore imperative to develop for farmers' gender-friendly and sustainable adaptation strategies to the effects of climate change. A dearth of information on the extent to which gender reported gender disparity has affected climate change adaptive capacity and hence adaptation strategies of women food crop farmers, compared to their men folks has necessitated this study.

Climate change adaptation has been defined in a number of ways by different Authors. According to the Intergovernmental Panel on Climate Change (IPCC), adaptation to climate change is a set of actions put together by an individual or organizations with the aim of moderating climate impacts, taking advantage of new opportunities as well as cope with the consequences. The IPCC (2001)'s definition shares similarity with a number of other definitions of climate change adaptation (Parry *et al.,* 2005; Olutegbe, 2016; Lambrou and Piana, 2006). For the purpose of this study, adaptation strategies to climate change involves every set of actions put up by an individual food crop farmer in order to reduce the adverse effects that change in the climate has brought, exploring local opportunities. This is similar to what Farauta, Egbule, Agwu, Idrisa and Onyekuru (2013) referred to climate change adaptation initiative.

The study provided answers to the following research questions:

1. What are the socioeconomic characteristics of male and female food crop farmers in Saki Agricultural zone of Oyo state?
2. Do male and female food crop farmers differ in constraints to climate change adaptation in Saki Agricultural zone of Oyo state?
3. Do male and female food crop farmers differ in their adaptive strength and strategies to climate change effects in Saki Agricultural zone of Oyo state?

2. METHODOLOGY

The study was conducted in Oyo State which is located in southwest geopolitical zone of Nigeria. Oyo State consists of 33 Local Government Areas. The State covers a total of 27,249 square kilometres of land mass and it is bounded in the south by Ogun State, in the north by Kwara State, in the west by Ogun State and partly by the Republic of Benin, while in the East by Osun State. The state has an equatorial climate with dry and wet seasons and relatively high humidity. The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges between 25°C (77°F) and 35°C (95°F), almost throughout the year. The vegetation pattern of Oyo State is that of rain forest in the south and guinea savannah in the north. Thick forest in the south gives way to grassland interspersed with trees in the north. The climate in the state favours the cultivation of crops such as Maize, Yam, Cassava, Millet, Rice, Plantain, Cocoa tree, Palm tree and Cashew.

Meanwhile, the research was carried out in Saki agricultural zone of Oyo State in 2011. The zone is one of the four agricultural zones of the Oyo State Agricultural Development Programme (OYSADEP), and located in the guinea savanna zone of the state. Other agricultural zones are Ogbomosho, Ibadan-Ibarapa as well as Oyo Agricultural zones. The study adopts a multi stage sampling approach. In stage 1, two (2) of about 10 Local Government Authorities were randomly selected. These were Saki-West and Kajola Local Governments Areas. Food crop farmers were purposively selected in the sampled LGAs. Two wards were selected from each of the ten wards in each LGA, and 20% of each of the communities was selected across each ward. A total of 16 farming communities were therefore selected across the four wards. The list of the_food crop farmers was then generated and stratified into male and female food crop farmers from which samples were drawn proportionately. A total of 72 female and 104 male food crop farmers were selected respectively. This gave a total of 176 food crop farmers.

The study measures socio-economic variables, constraints to climate change adaptation as well as the climate change adaptation strategies of food crop farmers in the study area. Respondents indicated their sex, marital status and level of education. Respondents' age was measured in actual number of years.res. For respondents' level of adaptation strategies used, a list of adaptation strategies (for level of adaptation strategies) was presented to the respondents from which they indicated frequency of use of each, as always (3) occasionally (2) rarely (1) and never (0). For constraints to climate change adaptation strategies, a list of constraints was measured in terms of severity as Very severe = 3, severe = 2, not severe = 1 and not a constraint = 0. An index of each of these variables was obtained by summing up the score for each of adaptation strategies and constraints to climate change adaptation. These scores were therefore obtained at interval levels and the mean scores of male (for adaptation and constraints to adaptation) were compared with that of females. Also, for adaptation strategies to climate change effects, each adaptation strategies by both genders were compared in terms of frequency. Independent sample t-test was used to establish significant difference between male and female farmers, at 5% level of significance. Independent sample t-test was also used to ascertain significant difference between the overall levels of adaptation strategies as well as constraints to climate change adaptation strategies between male and female food crop farmers of the area.

3. RESULTS AND DISCUSSION

Personal characteristics of respondents

The result of the socio-economic characteristics as shown in Table 1 revealed that 10.6% of male respondents were 30 years and below, 61.5% were found within the age bracket of 31 to 60 years while 27.9% were 61 years and above. In the female category, 8.3% of the respondents were 30 years and below, 61.0% were within the age group of 31 to 60 years while 30.7% of the respondents were 60 years and above. The findings revealed that majority (56.3 and 63.8%) of respondents were in their middle active ages, an indication that they will still be active in carrying out farming activities. Education determines the human capital worth of an individual. According to World Bank, (2007), the level of human capital available in a household (usually measured as the education of the head of household or the average education of working-age adults in the household) is strongly correlated with measures such as agricultural productivity. The study reveals that 31.7% of male respondents had no formal education, 36.5% had only primary education, while in the female group, and 61.1% had no formal education 8.3% had primary education. This implies that male food crop farmers were more educated than their female counterparts in the study area. This finding is in consonance with Ikeoji (2002) and Akinbile, Adejumo & Oyewole (2012) who in their findings discovered that the literacy rate were significantly high

for men than women. World Bank (2007) also posited that education gender gap – both in levels of enrolment and attainment – remains widest in Southern Asia and sub-Saharan Africa. It however disagrees with Sangotegbe, Tella and Oluwasusi (2013) who reported that that the female rice farmers in Ogun state farmers were more educated than their male counterparts. For religion, large proportions (55.8% and 50.0% respectively) of male and female respondents were Christians. This suggests that Christianity is the predominant religion in the study area. Religious leaders can create awareness with their followers, and this could alert them towards developing adaptation strategies to climate change effects.

Table1 Distribution according to the personal characteristics of respondents

Variable	Male (N = 104)		Female (N = 72)	
Age	Freq	%	Freq	%
≤ 30 years	11	10.6	06	8.3
31-40	15	14.4	16	22.2
41-50	26	25.0	14	19.4
51-60	23	22.1	14	19.4
61-70	14	13.5	18	25.0
71-80	12	11.5	04	5.7
>80	03	2.4	0	0
	Mean = 52±16.6		Mean = 51.36±14.2	
Marital status				
Single	17	16.3	14	19.4
Married	81	77.9	50	69.4
Divorced	06	5.8	08	11.2
Level of education				
Non formal	33	31.7	44	61.1
Primary	38	36.5	06	8.3
Secondary	10	9.6	12	16.7
Tertiary	23	22.2	10	13.9
Religion				
Christianity	58	55.8	36	50.0
Islam	42	40.4	34	47.2
Traditional	04	3.8	02	2.8

Constraints to climate change adaptation strategies of male and female food crop farmers

Results in table 2 shows that cattle invasion (Mean = 2.45) was the major constraint faced by male farmers as it was ranked first. This could have negative influence on the effectiveness of any adaptation strategy to climate change if appropriate measures are not put in place to curtail the activities of the pastoralist. This could be because men commonly have farms in distant locations from their homes, as against the practice among their female counterparts. This may be due to the fact women are often given access to less fertile land close-by and partly because of their domestic responsibilities. Houses close-by are often less vulnerable to invasion of cattle. High cost of inputs (Mean = 2.44) and lack of credit facilities (Mean = 2.38) were also identified by male farmers as constraints militating against adaptation to climate change. However, lack of adaptation knowledge was the least ranked constraint faced by the male respondents. This could be traced to the higher level of education attainment by men than their women counterparts. It therefore suggests that the male food crop farmers in the study area may be able to make decisions that will help them avert some of the likely undesirable effects of unfavorable climatic variables. Also, women, in many of the developing nations are often considered of lesser priority in terms of access to agricultural information. This has been reported among the countries of the West Africa sub-region, with limited access to not only assets, but also formal education, agricultural extension and advisory services through which farmers adaptation strategies can be enhanced (FAO, 1993; Doss and Morris, 2001). This may have contributed to the low knowledge level of climate change adaptation strategies in the study area. More so, high cost of input was ranked first as a major constraint faced by the female respondents. This situation could limit them from investing in agricultural production, and when they do often find it difficult to achieve the same success level as their male folks. The female farmers also indicated that cattle and herdsmen invasion on farms (Mean = 2.53) and inadequate credit facilities (Mean = 2.39) constituted constraints limiting their adaptation to climate change.

Table 2 Gender distribution of constraints to climate change adaptation of food crop farmers

Constraints	Male		Female	
	Mean	Rank	Mean	Rank
Water storage	2.06	4th	1.94	7th
Lack of credit facilities	2.38	3rd	2.39	3rd
High cost of inputs	2.44	2nd	2.56	1st
Lack of adaptation knowledge	1.78	8th	2.03	6th
Lack of information	2.00	5th	2.11	4th
Lack of improved seeds	1.81	7th	1.89	8th
Lack of access to organic fertilizer	1.92	6th	2.06	5th
Cattle invasion of farms	2.45	1st	2.53	2nd

Overall, Table 3 shows that there is no significant difference between male and female food crop farmers' level of constraints to climate change adaptation, (t = 0.930, P > 0.05). This further suggests that both male and female crop farmers were faced with similar constraints to climate change adaptation

Table 3 Gender differences on constraints to climate change adaptation strategies

Variable	Gender	Mean	Standard error mean	t-value	Sig value
Constraint	Male	16.84	0.38	0.930	0.354
	Female	17.50	0.52		

Adaptation strategies employed by male and female food crop farmers

The study reveals that the most used adaptation strategies for male farmers included shifting cultivation (Mean = 2.83), mulching (Mean = 2.81) and changing planting dates (Mean = 2.70). In contrast, the most frequently adopted adaptation strategies for female food crop farmers in the study area include mulching (Mean = 2.78), planting different crops (Mean = 2.72) and changing planting dates (Mean = 2.67). The use of shifting cultivation was significantly higher for men than their women counterparts (F = 4.799). The rationale behind this could be as a result of higher level of access to arable land by male farmer. This position is informed by earlier assertions of Akinbile *et al.,* (2012) and Tanko (1994) that male farmers have more access to farm land in Oke-Ogun area of Oyo state. Aluko and Amidu (2006) had also reported that although women represent between 60% and 79% of Nigeria's rural labour force, men are five times more likely to own land than women. The use of mulching and changing planting dates may have become necessary as a result of extended days of dryness which now characterizes southern Nigeria, as a result of the changing climate. According to Nnaji (2001) available meteorological data across Nigeria indicates evidences of increasing surface air temperature since the 1920s. There are also evidences that other climatic variables are changing in terms of frequency, calendar and quantity. The study also showed significant difference between male and female farmers' frequency of use of construction of ridges across the slope (F = 8.828). This may equally be attributable to inadequate access to extension information in which male crop farmers are better served than female folks.

The least used adaptation strategies among male farmers included use of agricultural insurance (Mean = 0.16), zero tillage (Mean = 0.98) and mounding (Mean = 0.21). For female farmers, the least used adaptation strategies were mounding (Mean = 0.39), use of agricultural insurance (Mean = 0.16) and zero tillage (Mean = 0.78) table 4.

Table 4 Distribution of adaptation strategies to climate change by male and female food crop farmers

Adaptation strategies	Male	Rank	Female	Rank	t-value	Sig-value
Cereal/legume intercropping	2.34	8	2.47	6	-0.808	0.421
Ridge across slope	2.53	6	2.08	9	2.971	0.004
Planting different crops	2.68	4	2.72	2	--0.334	0.739
Use of organic fertilizer	1.69	10	1.12	12	-1.278	0.204
Fadama/irrigation	1.55	11	1.20	10	-0.505	0.615
Mixed farming	2.60	5	2.61	5	-0.102	0.919
Changing planting dates	2.70	3	2.67	3	0.304	0.762
Planting trees on the farm	1.52	12	1.17	11	-0.887	0.376
Zero tillage	0.98	14	0.78	13	1.257	0.278

Mulching	2.81	2	2.78	1	0.089	0.764
Use of agric insurance	0.16	15	0.46	14	1.712	0.089
Fallow system	2.83	1	2.64	4	1.014	0.030
Multiple cropping under dry land	2.22	9	2.28	7	-0.392	0.696
Crop rotation	2.36	7	2.19	8	2.191	0.313
Mounding	0.21	13	0.39	15	-1.260	0.210

Table 5 shows that there was no significant difference in the level of adaptation strategies employed to reduce the effects of climate change by male (Mean =32.51) and female (Mean = 31.61) food crop farmers in the study area (t = 0.0758, p = 0.450). This suggests male and female food crop farmers have similar characteristics in terms of access to basic productive resources, agricultural extension and other sources of agricultural information. This negates the reports that male are often given greater priorities than female in terms of their access to credit facilities, land tenure system and training of farmers FAO (2001). It also agrees with Olutegbe and Fadairo (2016) and Apata *et al.,* (2009) which established no significant relationship between sex and farmers' adaptation strategies.

Table 5 Gender differences by levels of climate change adaptation strategies employed

Variable	Gender	Mean	Standard error mean	t-value	Sig value
Adaptation strategies	Male	32.51	0.64	0.758	0.450
	Female	31.61	0.82		

4. CONCLUSION

It can be concluded from the outcome of the study that both male and female farmers were faced with similar constraints to climate change adaptation. Male and female respondents' rating of the level of severity of each of these constraints also did not show any significant difference. The study also concludes that male and female employed similar adaptation measures to combat climate change effects on food crop production. However, men employed ridges across the slope and shifting cultivation more than their female counterpart. The tedious nature of ridge making and more access to arable farm land among male farmers could be attributed to the differences in these adaptation strategies.

Recommendations

1. Policy aimed at improving female access to and control over land should be formulated so as to improve their capacity at combating climate change effects and associated shocks in the study area. This is expected to improve food production.
2. Agricultural extension activities of the Oyo State Agricultural Development Programme should ensure that while disseminating agricultural related information to farmers, female farming folks are not left behind. This will avail both genders equal opportunities and thereby enhance their human capital worth.
3. New adaptation strategies that are locality specific as recommended by climate and agronomy experts with the help of extension agents should be developed and disseminated to male and female food crop farmers in the study area. This should be done with the use of various media such as posters, radio, television and other means which can suit the low educational status of male and female food crop farmers in the study area.

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