Moor Journal of Agricultural Research 19, 151 - 161, 2018

Gender and climate change adaptation strategies among farming communities in Oke-Ogun, Oyo State, Nigeria

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Abstract
This study examined gender and climate change adaptation strategies among farming communities in Oke-Ogun, Oyo State. A multistage sampling procedure was employed for the study. Overall, 70 and 50 respondents were sampled in Saki and Kajola respectively; making a total of 120 respondents comprising 83 males (69.2%) and 37 females (30.8%). The results show that more males than females had access to resources, services and technology such as extension services, credit facilities, market, training, technology and climate information. Women also had less of land ownerships and participated less in decision-making on climate change adaptation measures. Most of the respondents perceived increased rainfall amounts, sunshine duration and temperatures in the last 10 - 15 years. There were commonalities in the most widely used climate change adaptation strategies by male and female farmers; notably crop diversification and crop rotation while investing in water infrastructure and planting of trees were among the least used climate change adaptation methods. Similarly, the most widely experienced impact of climate change by the male and female gender were loss of income and investments and less access to nutrition.

Keywords: Adaptation strategies, Climate change, Gender, Oyo state

Introduction
Livelihood vulnerability is intimately connected to the environment. In relation to men, women shoulder a huge responsibility for providing livelihood support for their households and therefore depend heavily on the environment (AfDB, 2011). The increasing feminisation of agriculture ensures that women are the mainstay of agricultural sectors and farm labour force (Viatte *et al*., 2009). Women constitute approximately 43% of the global agricultural workforce (FAO, 2014) and produce about 90% of food supply in Africa (Karla and Wolfenson, 2013). They are involved in a wide range of activities including farming, small-scale animal husbandry and marketing. In contrast, men are engaged mostly in producing cash crops and the keeping of large livestock (CIDA, 2002).

Farming activities in sub-Saharan Africa are especially susceptible to climate change effects and women often have to shoulder the additional burden of implementing adaptation strategies (Brody *et al*., 2008; Mitchell *et al.,* 2007). Clearly, climate change hazards such as irregular rainfall, flooding and extended dry spells wreak the most havoc on those with the weakest adaptive capacities (Lambrou and Piana 2006). Unfortunately, women's capacity to achieve food security for their homes and communities through sustainable agriculture is undermined by cultural norms and patriarchal practices that restrict their rights to own property including land, access to credit facilities, extension services, education and incomes (UNDP, 2009). Moreover, women face

stereotypical biases and discrimination in accessing new technologies such as improved seeds and disease/drought-resistant crop varieties (Lambrou and Piana 2006).

The discourse on the nexus between gender and climate change in the context of agriculture has evolved along a number of thematic lines (Carr and Thompson, 2013). One scenario is where men and women grow different crops and face the prospects and challenges associated with different agroecologies or ecosystems (Carr, 2008; Kevane, 2011). This theme draws on the perspective that crops nurtured by women are more resilient to climate change than those raised by men. This underlines the need for policy and programmatic sensitivity to climate change vulnerabilities associated with crops cultivated by either gender (Carr and Thompson, 2013). Another line of inquiry considers adaptation strategies that are unique to women - a product of their inventiveness in fashioning practical approaches for dealing with climate change stressors (Djoudiand Brockhaus, 2011; Swai *et al*., 2012). This focus potentially enables a deeper and more penetrative engagement of the gender variable beyond the cursory and generic construction of women as the vulnerable gender.

Nigeria has a National Adaptation Strategy and Plan of Action on Climate Change (NASPA-CCN) produced in 2011 and subsequently developed a National Policy on Climate Change in 2013. NASPA-CCN made random reference to gender roles, awareness and dimensions in relation to climate change but called for conduct of "gender-sensitive research to deepen our understanding of communities' awareness and vulnerabilities and status of community adaptation to climate change".

Researchers have substantially explored the impacts of climate change and adaptation responses (Nhemachena and Hassan, 2007; Ajetomobi, *et al*., 2010; Obayelu, *et al*., 2014; Olutegbe and Fadairo, 2016). However, there is scarcity of empirical works on socially differentiated context-specific responses such as gender. Specifically, it is argued that perceived relative vulnerability of women and inequities in access and control of resources affect their adaptation responses to climate change developments compared to men (FAO 2011; Fletschner and Kenney, 2014).

In light of the foregoing, there is compelling need for gender-differentiated analyses of climate change concerns in agrarian communities.

The broad objective of this study was to analyse gender and climate change adaptation strategies among farming communities of Oke-Ogun, Oyo State. The specific objectives of the study were to:

i) Examine farm household characteristics of the respondents by gender
ii) Determine perceptions of respondents to changes in climatic conditions by gender
iii) Assess climate change adaptation strategies used by the respondents by gender

Materials and Methods

The study area was Oke-Ogun in Oyo state, Nigeria. It is widely regarded as the food basket of the state due to extensive agricultural activities in the area. The area has also experienced some climate change developments such as delayed, erratic and excessive rainfall as well as sporadic,

extended dry season, intense temperatures or scorching heat and drought.

A multistage sampling procedure was employed for the study. The first stage involved purposive selection of Oke-Ogun because of the agricultural resourcefulness of people in the area. In the second stage, out of the ten blocks in Oke-Ogun, simple random sampling was used to select 20% of the blocks. The selected blocks were Saki East Local Government and Kajola Local Government. The number of cells in the selected blocks were 7 and 6 respectively. In the third stage, 50% of extension cells were sampled using simple random sampling, 4 in Saki and 3 in Kajola. The number of respondents in the sampled extension cells were 176 in Saki and 127 in Kajola; 40% of which were sampled. Thus, 70 and 50 respondents were selected in Saki and Kajola respectively making a total of 120 respondents comprising 83 males (69.2%) and 37 females (30.8%).

Results and Discussion

Table 1 presents the farm household characteristics of the respondents for this study. The highest cluster of both male and female respondents was in the working age groups (from 21 - 60 years). With age, farmers are more cognisant and discerning of the reality and impact of climate change and therefore more willing to adapt. By contrast, aging can foster a conservative mindset and averseness to innovations including those embodied in adaptation measures (Yong, 2014). Majority (over 75%) of both male and female respondents had household sizes of 6 - 10 persons. Similarly, Onubuogu and Esiobu (2014) reported mean household size of 6 in their study while Falola and Achem (2017) revealed that about 71% of the farmers surveyed in their study indicated a household size of between 6 and 10 persons**.** Scholars differ on the implication of household size for climate change adaptation. One perspective is that larger households avail the farmer with a pool of labour which could be channelled to farm activities including adaptation schemes (Deressa *et al.*, 2009). Another perspective is that in trying to cater to large households' obligations, farmers may be left with little or no resources to commit to climate change adaptation measures (Anyoha *et al*., 2013).

There was disparity in educational levels between male and female respondents with more female respondents (65.47%) having no formal education compared to male respondents (60.97%). Arimi (2014) found that 74% of his study respondents had formal education while Ayanlade *et al.* (2017) discovered that 30.9% of farmers interviewed in their study had tertiary education and 30.4% had primary education. By imbuing the farmer with intellectual acumen, education enables them to evaluate adaptation options and make rational choices (Allison *et al.,* 2009). Majority of the male and female respondents had considerable farming experience of between 11 and 20 years which may be associated with greater proficiency at analysing climate variabilities and consequent awareness of a range of adaptation mechanisms (Nhemachena and Hassan, 2007). Obayelu *et al*. (2014) also found that majority of farmers sampled in their study had between 11 and 20 years' farming experience while Onubuogu and Esiobu (2014) reported a mean farming experience of 21.27 years for their study of climate change adaptation strategies of farmers in Imo State.

An inspection of access to resources, services and technologies reported in Table 1 shows that the female gender is largely

Table 1: Household and farm characteristics of the respondents

		Male	Female
Variable	**Category**	**(%)**	**(%)**
Age (years)	21-30	18.76	14.83
	31-40	24.02	25.73
	41-50	29.15	30.7
	51-60	18.39	18.42
	above 60	12.69	10.32
Household size	1-5	18.87	14.4
	6-10	75.52	75.23
	11-15	8.61	10.41
Education	No formal	60.97	65.47
	primary	19.94	22.37
	secondary	19.37	10.96
	tertiary	2.72	1.2
Farming experience	1-10	29.52	37.87
	11-20	48.04	38.96
	21-30	12.75	11.32
	above 30	12.69	11.85
Access to extension services	Yes	35.02	25.7
	No	67.98	74.3
Access to credit	Yes	13.32	9.71
	No	86.68	90.29
Access to market and trader networks	Yes	13.32	11.6
	No	86.68	88.4
Access to climate information	Yes	13.32	10.38
	No	86.68	89.62
Access to training	Yes	13.32	12.54
	No	86.68	87.46
Access to technology	Yes	15.3	10.27
	No	84.7	89.73
Ownership of land and farm assets	Yes	86.37	37.85
	No	13.63	62.15
Participation in decision making	Yes	97.78	89.74
	No	2.22	10.26

Source: Field Survey, 2017.

disadvantaged relative to the male. For instance, more males had access to extension services, credit, market, training, technology, and climate information than females. Indeed, access to extension services and climate information improves farmers' awareness of climate change developments and subsequent adaptation responses; while access to a range of services including credit, training and technology empowers and capacitates the farmers to respond effectively. This finding suggests that male farmers are better placed to adapt to climate change developments.

Perez (2015) confirmed men's superior access to cash for purchase of agricultural inputs in his study of a cross section of African countries. However, Fischer and Carr (2015) found comparable access to credit by male and female-headed households under a similar locale. Women's credit access is usually hampered by their inability to fulfil land tenure conditions as collateral (Antwi-Agyei, 2015). Cash and credit crunch consequently impede them from access to small agricultural implements to use in adapting their farming practices to climate change (Doss *et al.*, 2012)

Table 2 shows perception of respondents of changes in climate conditions in the last 10 to 15 years. Majority of the respondents perceived rainfall amount (82.4%), sunshine duration (83.5%) and temperature (68%) as increasing over the last 10-15 years; while almost 65% perceive humidity as declining in the same period. This suggest changes in climate in the period which stimulated the use of adaptation strategies by farmers in the communities. Corroboratively, Oluwatusin (2014) reported that 81.25 percent of their study respondents indicated an increase in rainfall, 33.75 percent perceived a decrease in temperature and about 93.75 percent affirmed change in the timing of the rain. Ajetomobi, et. al. (2010) who computedthe mean value*s for*temperature and precipitation in selected months of the year, found that irrigated rice farms were largely warmer than dry land rice farms. In Zumba community of Niger State, respondents indicated increase in temperature and shorter or delayed onset of the rainy season over the past forty years (Agwu andOkhimamhe, 2009). Similarly, 35 per cent of respondents confirmed increased temperature and 48.2 per centacknowledged recent drought and lengthy dry season in a study by Ayandele, *et, al.*, (2017),

Table 3 presents climate change adaptation strategies employed by farming communities in Oke-Ogun, Oyo State. The most widely used strategies bymale farmers were crop diversification ($\bar{x}$ =2.87), crop rotation ($\bar{x}$ = 2.80), cultivation of flood- and drought-resistant crops, e.g.,drought tolerant cultivars of sweet potatoes, cassava and cocoyam ($\bar{x}$ = 2.67), and water conservation practices such as conservation tillage, composting and mulching ($\bar{x}$ = 2.27). In contrast, the least used adaptation strategies by males were investing in water infrastructure, such as constructing ponds for capturing and storing rain water as well as shallow wells ($\bar{x}$ = 1.59) and planting trees ($\bar{x}$ = 1.54).

Comparatively, the most widely used strategies by females included crop diversification ($\bar{x}$ =2.48), crop rotation ($\bar{x}$ = 2.40), pest management ($\bar{x}$ = 2.31), altering the timing of irrigation and chemical use ($\bar{x}$ = 1.96) and water conservation ($\bar{x}$ = 1.77). The implication of these findings is that both males and females find it easier and

Table 2: Perception of respondents of changes in climatic condition

Climate variable	Percentage
Rainfall Amount (mm)	
Rising	82.4
Declining	8.3
No change	1.8
Not sure	7.6
Total	**100.0**
Sunshine Duration (Hours)	
Rising	83.5
Declining	4.5
No change	3.4
Not sure	8.5
Total	**100.0**
Temperature (^oC)	
Rising	68.0
Declining	12.1
No change	11.1
Not sure	8.8
Total	**100.0**
Relative Humidity (mm)	
Rising	14.5
Declining	64.9
No change	12.1
Not sure	8.5
Total	**100.0**

Source: Field Survey, 2017.

cheaper to adjust cropping systems (diversification and rotation) as climate change adaptation measures, rather than use the relatively more arduous and expensive strategies such as planting trees and installing water systems. The least used strategies by women were harvesting crops before the flood season ($\bar{x} = 1.41$) and investing in water infrastructure = 1.33). Obayelu, *et. al*. (2014) found that farmers covered in their study preferred soil and water conservation adaptation methods to mixed farming and branching off into non-farm activities. Fisher and Carr (2015) concluded that women are disinclined to adopting drought-tolerant maize as a climate change adaptation strategy relative to male farmers due to less knowledge and asset deficits. Deressa, *et. al*., (2009) submitted that men are more disposed to planting new crop varieties and tree and conserving the soil in response to climate variability than women, while women are more likely to conserve water, intercrop or rotate crops (Ndiritu, *et. al*., 2014; Nhemachena and Hassan (2007).

Table 3: Climate change adaptation strategies used by farming communities inOke-Ogun, Oyo State by gender

	Male		Female	
Adaptation strategies	**Mean**	**Std dev.**	**Mean**	**Std dev.**
Changing to cultivation of flood and drought resistant crops	2.67	1.04	1.43	0.85
Harvesting crops before the flood or dry seasons	1.64	1.07	1.41	0.92
Changing timing of irrigation and chemical (fertilizer, pesticides and herbicides) use	2.03	1.20	1.96	0.88
Growing a number of different crops (crop diversification)	2.87	0.92	2.48	0.79
Using crop rotation	2.80	0.96	2.42	0.83
Investing in water infrastructure	1.59	1.28	1.33	1.03
Adopting water conservation practices	2.27	1.01	1.75	1.04
Changing from farming to non-farming occupations (income diversification)	1.87	1.10	1.43	0.92
Keeping crops and livestock (mixed farming)	1.66	0.99	1.61	0.95
Planting trees	1.54	1.19	1.37	1.10
Adopting pest management system	1.66	1.07	2.31	0.89

Source: Field Survey, 2017

Table 4 shows that the most impactof climate change suffered by males were loss of income or investments ($\bar{x}$ = 2.72), loss of nutrition ($\bar{x}$ = 2.63), increased workload ($\bar{x}$ = 2.42), and migration to cities in search of jobs ($\bar{x}$ = 2.19). For the female gender, the most recordedimpactwere loss of income or investments ($\bar{x}$ = 2.44), increased workload (family/household care or extra agricultural work) ($\bar{x}$ = 2.37), less access to nutrition ($\bar{x}$ = 2.17), and poor health ($\bar{x}$ = 1.97). Evidently, there are similarities in climate change effects on both gender in terms of income loss and poorer nutrition. However, while men may migrate in search of better livelihood opportunities, women are constrained to remain in the communities to attend to home care and children responsibilities. Ajibade *et. al.,* (2013) revealed that flooding incidence in Lagos had a more devastating impact on women who run small businesses, as their husbands had migrated elsewhere for work. Unfortunately, inadequate social capital precluded the women from building a more diversified livelihood portfolio to insulate them from the adverse impact of flooding (Ajibade and McBean, 2014).

Table 4: Impact of climate change on farming communities in Oke-Ogun, Oyo State by gender

	Male		Female	
Impact	**Mean**	**Std dev.**	**Mean**	**Std dev.**
Loss of income or investments	2.72	1.08	2.44	0.97
Selling off of property	2.04	1.04	1.83	0.93
Less access to nutrition	2.63	0.88	2.17	0.93
Poor health	1.60	0.99	1.97	0.96
Migration to cities in search of jobs	2.19	1.06	1.34	1.02
Increased workload (family/household care or extra agricultural work)	2.42	1.03	2.37	0.79
Sharing household chores between men and women	1.51	0.94	1.36	0.84
Providing support in form of food and shelter to affected households	1.48	1.13	1.44	0.89

Source: Field Survey, 2017

Conclusion

The gender analysis of climate change adaptation strategies used by farming communities in Oke-Ogun, Oyo state shows that women are disadvantaged in terms of access to resources, services and technol. Women also had less land ownerships and participated less in decision-making about climate change adaptation measures. The analysis of climate change adaptation strategies in the study area showed that both male and female gender widely used crop diversification and crop rotation methods, while investing in water infrastructure was less used by both gender apparently because of cost and unaffordability. In light of differences in access to assets and adaptation choices between male and female farmers, gender-responsive actions and policies should be put in place to enhance women's access to credit, extension services, climate information, market, training and technology to improve their capacities to adapt to climate change and minimize the impact of the phenomenon on them.

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