J Bangladesh Agril Univ 18(4): 1054–1064, 2020 https://doi.org/10.5455/JBAU.129653

ISSN 1810-3030 (Print) 2408-8684 (Online)

Journal of Bangladesh Agricultural University

Journal home page: http://baures.bau.edu.bd/jbau

Gender Perceived Effects of Climate Change in Farming Communities of Ekiti and Ogun States Southwest Nigeria

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ARTICLE INFO

Article history
Received: 31 Aug 2020
Accepted: 19 Dec 2020
Published: 30 Dec 2020

Keywords
Agriculture, Development, Environment, Impacts, Vulnerable

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ABSTRACT

Climate change effects are threats to the attainment of sustainable development goals, therefore its perception by men and women farmers is crucial for adaptation purpose. This study investigated gender perceived effects of climate change in Ogun and Ekiti State southwest Nigeria. The multi-stage sampling procedure was employed to randomly select 358 men and 222 women farmers. A semi-structured questionnaire was used to obtain data and analysed with frequency counts, means, percentages, Chi-square, Pearson's Product Moment Correlation, t-test, regression and Principal Component Analysis (PCA). Increased pest and disease outbreak, and decreased agricultural yield were perceived as the most significant effects of climate changes. The study reveals that significant differences ($p<0.01$) existed in men and women farmers' perceived effects of climate change. Regression analysis indicated that the strongest predictors of men and women farmers' perceived effects of climate change were farming experience ($t= 6.02$, $p<0.01$) and membership of other associations ($t=6.69$, $p<0.01$) respectively. The study, therefore, recommended that all climate change interventions should be gender-responsive to generate appropriate adaptation measures for farmers to cope with climate change effects.

Introduction

Agriculture remains the primary source of human survival throughout the world. With reliable and consistent climate condition, the contribution of smallholder farmers could lead to the economic stability of agriculture-dependent countries that include most African countries (Kalungu *et al*., 2013). Agriculture as a livelihood activity is associated with immense risks and uncertainties which exposes the farming households to a low standard of living, poverty and thereby decreasing their food security status (Afodu *et al*., 2019). It is a highly climate-sensitive sector which supports the livelihood of 70-80% of farmers in Nigeria (Ifeanyi-Obi *et al*., 2017; Onwutuebe, 2018). Climate change and variability is no more issue of scientific thoughts, it is a reality (Deb and Haque, 2016). It has been described to be a more serious threat than global terrorism (Osasogie and Omorogbe 2012). Climate change is a global problem and its impacts are made visible especially in the agricultural sector where it has significantly affected production in most developing countries (Elum and Momodu, 2017).

Africa, like the rest of the world, is experiencing increasing risk from climate change including rising temperatures, and heatwaves, shortfalls in water supply/ increasing flood arising from shortage/ excessive rainfalls, sea-level rise, increasing the likelihood of conflict and induced environmental and vector-borne diseases (Issa *et al*., 2015). Africa is one of the most vulnerable continents to the current climate variability with the strongest economic impacts (Adegnandjou *et al*., 2018). Climate change is a threat and poses serious environmental challenges in climate-dependent countries like Nigeria (Oluwasusi and Tijani, 2013). The country's climate has been changing, evident include an increase in temperature, variable, rise in sea level, flooding, drought and desertification, land degradation, more frequent extreme weather events, affected forest

Cite This Article

Ogunjinmi, K.O., Fakoya, E.O., Banmeke, T.O.A., Fapojuwo, O.E., Ogunjinmi, A.A. 2020. Gender Perceived Effects of Climate Change in Farming Communities of Ekiti and Ogun States Southwest Nigeria. *Journal of Bangladesh Agricultural University*, 18(4): 1054–1064. https://doi.org/10.5455/JBAU.129653

water resources and loss of biodiversity (Elisha *et al*., 2017). In the report of Agwu *et al*. (2018), across Nigeria, millions of people are already experiencing changing season patterns of rainfall and increased heat. For instance, the southern area of Nigeria largely known for high rainfall is currently confronted by irregularity in the rainfall and temperature is gradually increasing in the guinea savannah zone of the country (Osasogie and Omorogbe 2012). An increase in temperature could increase evaporation and potential evapotranspiration; there would be a tendency towards drought in parts of humid areas of Nigeria (Adejumobi *et al*., 2013).

According to Issa *et al*. (2015), climate change is not only a challenge to agricultural development but food security and the general livelihoods condition of any population. Agriculture has its effects on climate change just as climate change has on agriculture (Ayinde *et al*., 2013), despite that climate is the primary determinant of agricultural production (Thompson and Oparinde, 2015), its effects on agriculture could be devastating, discouraging, traumatic and pose significantly negative consequences on human endeavours. In the report of Below *et al*. (2010), risks are higher in agriculture, fisheries and others that constitute the livelihoods of rural populations in developing countries. Climate change affects almost all stages of the farming systems with rural farmers more vulnerable to its effects as a result of their low infrastructural capacity as well as high dependence on weather signals for their farming activity (Ifeanyi-Obi *et al*., 2017). According to Amusa *et al*. (2015), Nigeria is already experiencing low crop yield and altered animal compositions as a result of extreme weather and climate change. Anhoya *et al*. (2013) also asserted that incidence of climate change includes changes in soil moisture, soil quality, crop resilience, the timing of growing seasons, yield of crops, animal production, atmosphere temperatures, weed insurgence, flood, unprecedented droughts, sea level rises, reduced length of the growing season and many more.

Relations between men and women socially constructed by society is referred to as gender. The mainstream concepts of gender and development have been theorised for the most part under a secular logic, and have been disproportionately more attuned to western feminist gender metaphysics, as these evolved to influence gender and development discourse (Istratii, 2018). According to UNICEF (2017), it is a social and cultural construct, which distinguishes differences in the attributes of men and women, girls and boys, and accordingly refers to the roles and responsibilities of men and women. Gender roles and unequal gender relations interact with other social and economic variables, resulting in different and sometimes inequitable patterns of exposure to risks (WHO, 2002). In the opinion of Bussey and Bandura (1999), human differentiation based on gender is a fundamental phenomenon that affects virtually every aspect of people's daily lives. It has been observed that the ongoing gender inequality continues to hamper momentum on all MDGs (FAO-IFAD, 2010).

Gender analysis of the perception of climate change effect and coping strategies is expected to promote an understanding of the ways men and women are differently impacted by climate-related hazard (Issa *et al*., 2015). Gender according to Issa *et al*. (2015) is a very critical aspect of all development initiatives such as agriculture and climate change in particular. Men, women (especially), the elderly youth and children will experience the impacts of climate change differently (Egbule, 2014). Most studies on climate change in Nigeria (e.g. Falaki *et al*., 2013) did not assess climate change effect in gender lens with few studies highlighting climate change disaggregated impact on men and women (Agwu and Okhimamhe, 2009, Mohammed and Abdulquadri, 2012). Research and knowledge on understanding and perceived effects of climate change therefore need to be advanced from a gender perspective.

The study focused on examining the perceived effects of climate change in farming communities of Ekiti and Ogun State. The study sought to (a) determine the men and women farmers' socio-economic and production characteristics, (b) ascertain farmers' understanding of climate change, and (c) examine the perceived effects of climate change by men and women farmers. The study hypothesised that i) there is no significant difference in men and women farmers socio-economic and production characteristics, ii) there is no significant difference in men and women perceived effects of climate change, iii) there is no significant relationship between men and women socio-economic and production characteristics and their perceived effect of climate change, and iv) socio-economic and production characteristics of men and women farmers are not the determinants of their perceived effects of climate change.

Materials and Methods

Study area

The study was conducted in Ekiti and Ogun States in Southwest Nigeria. Geographically, Ekiti is located between latitudes 7.6656^{o}N and longitudes 5.3103^{o}E. The State is bounded to the north by Kwara and Kogi States while it is bounded by Osun State to the west. To the east of Ekiti State is Edo State while it is bounded in the south by Ondo State. The temperature range is between 21^{o}C – 28^{o}C with high humidity of 70%.

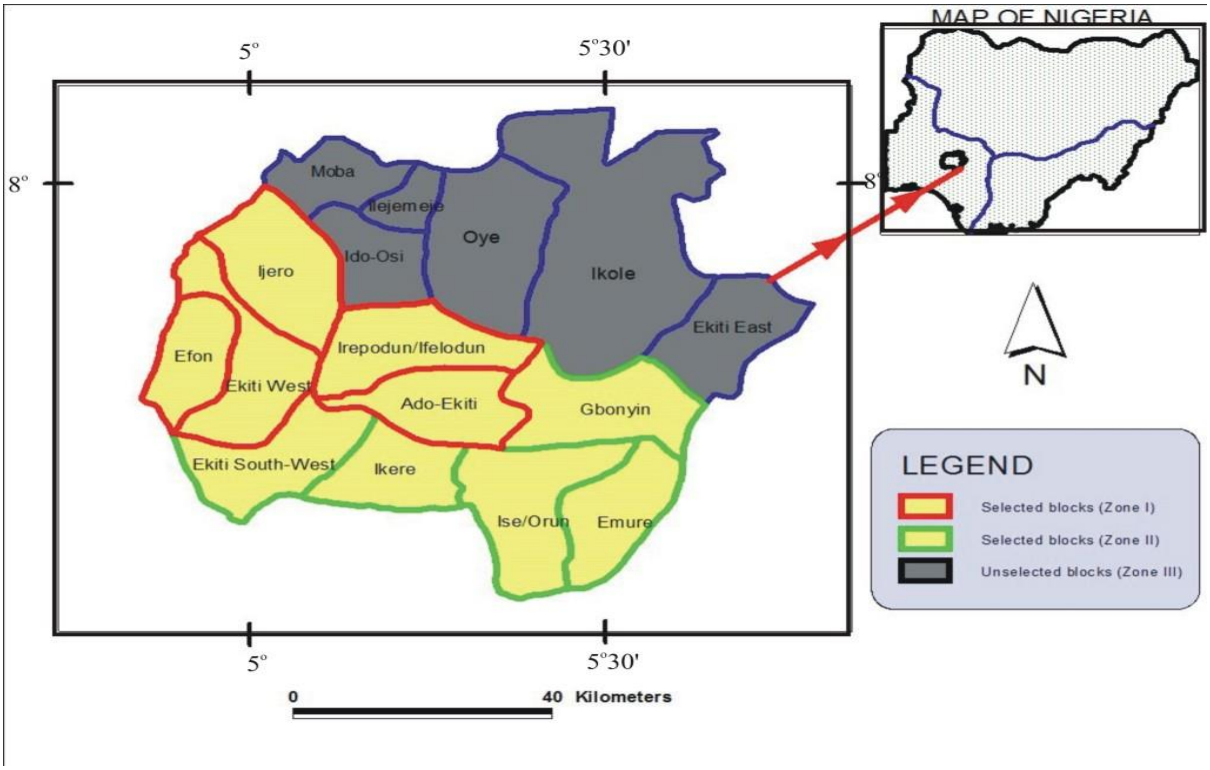

Figure 1. Map of Ekiti State, Nigeria

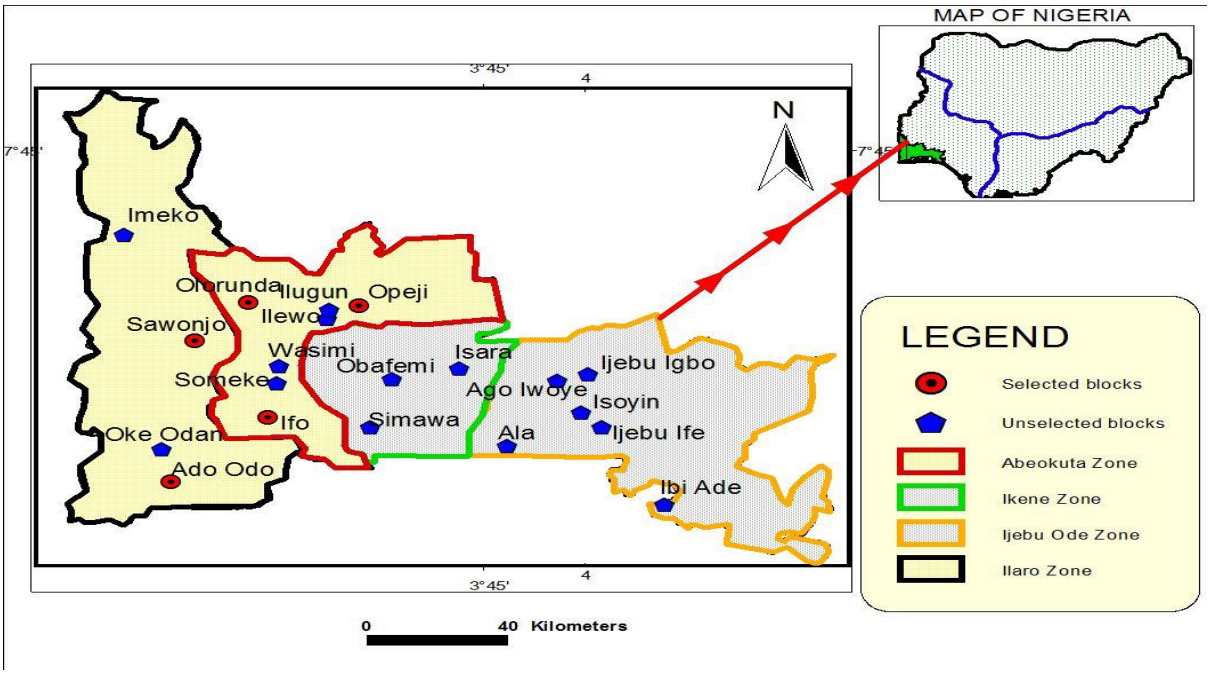

Figure 2. Map of Ogun State

The vegetation is varied and attractive, the major vegetation being rain forest, deciduous forest and semi-grasslands. A substantial part of Ekiti land is wooded with economic trees, which encourages lumbering, sawmilling and furniture making. The tropical forest exists in the south of the State while guinea savannah occupies the northern peripheries of the State. Geographically, Ogun State lies within latitudes 6.9075oN and longitudes 3.5813oE. Ogun State 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. Ogun State has two main vegetation, namely, tropical rain forest and guinea savannah. The climate of Ogun State follows a tropical pattern with the raining season starting about March and ending in November followed by the dry season. The mean annual rainfall varies from 128cm in the southern parts of the State to 105cm in the northern areas. The average monthly temperature ranges from 23oC in February.

Sampling design, data collection and analysis

This study is a cross-sectional survey design and was executed in three basic stages: sampling, data collection and analysis. Sampling design and sample size are significant subjects to statistically represent the population and to be able to suggest implications of both theory and practice (Akter and Bennett 2011). At stage one, two-third of the six States (6) in southwest Nigeria were randomly selected (Ekiti and the Ogun States). At stage two, two (2) out of the three zones in Ekiti State Agricultural Development Programme 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 size 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). The survey was carried out from January 2013 to October 2015.

The study employed a quantitative method (questionnaire) 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' personal and production characteristics, understanding of climate change and perceived effects of climate change. The instrument for data collection was pre-tested using the test-retest method at two weeks' interval to measure the degree of its consistency and obtained reliability coefficients of 0.79 and 0.92 for respondents' understanding of climate change and perceived effects of climate change respectively. Farmers' understanding of climate change was measured with agreements of farmers with a list of options provided and aggregate scores determined. We measured farmers' perceived effects of climate change on a 4 point- Semantic Differential Scale (Osgood, 1952) of Significant Effect (SE) =4, Medium Effect (ME) =3, Low Effect (LE) =2 and No Effect (NE) =1. The semantic differential is among psychosemantic methods, which strive to understand the individual meanings of words, and thus penetrate deeper layers of thinking and the feelings of the respondent, especially where the communication has an emotional as well as factual aspect (Divilová, 2016). Understanding the meaning which the respondent assigns to certain words means understanding the respondent's world (Pelikán, 2011).

The data obtained were analysed by using Statistical Package for Social Sciences (SPSS) for window version 23 (IBM SPSS, 2015). The obtained data were subjected to descriptive and inferential statistics. To test the stated hypotheses, t-test, Chi-square, Pearson's Correlation, and multiple linear regression were conducted. Principal Component Analysis (PCA) was performed to identify the dimensions of the constructs.

Results

Farmers' socio-economic and production characteristics

Results of descriptive analysis in Table 2 show the mean age of 49 years for men and 45 years for women farmers. There were more men (61.7%) than women farmers (38.2%) interviewed in the study. Likewise, more men farmers (86.5%) had formal education than the women farmers (75.8%). Also, 73.5% of men and women farmers (52.3%) had a mean of six persons per family. Furthermore, results show that 43.5% and 42.8% of women farmers earned less than N20, 000 per annum. The study reveals that men (43.3%) and women farmers (38.7%) respectively had more than 20 years of farming experience. The majority of men and women farmers cultivate 4.2 and 1.7 hectares of land respectively. T-test conducted to compare the means of men and women socio-economic characteristics reveals that age ($t=4.05$, $p<0.01$), family size ($t=3.40$, $p<0.01$), farming experience ($t=2.93$, $p<0.01$), and average annual income ($t=2.42$, $p<0.05$) are significantly different between men and women farmers. However, farm size is not significantly different ($p>0.05$).

Table 1. Selection Procedure for Sample Size in Ekiti and Ogun State

State/ADP Zones	Blocks	Selected blocks	NACOP Members	Men farmers selected	Women farmers selected	Total
Ekiti State						
Aramoko	5	3	500	57	31	88
Ikere	5	3	900	118	97	215
Total	10	6	1400	174	128	303
%				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	

Table 2. Socioeconomic and production characteristics of respondents

Variables	Men farmers		Women farmers		t-value
	Freq.	%	Freq.	%	
Age (years)- mean	x̄ =49		x̄ =45		4.05**
Below 20	1	0.03	1	0.05	
21-30	48	13.4	33	14.9	
31-40	54	15.1	45	20.3	
41-50	106	29.5	93	41.9	
51-60	64	19.8	29	13.1	
Above 60	86	24.9	21	9.5	
Marital status					
Single	42	11.5	14	6.3	
Married	304	85.0	182	82.0	
Widow (er)	10	2.8	19	8.6	
Divorced/ separated	3	0.8	7	3.2	
Family size (mean)	x̄ =6.33		x̄ =5.63		3.40**
0-5	63	17.6	102	45.9	
6-10	263	73.5	116	52.3	
11-15	27	7.5	4	1.8	
16-20	5	1.4	0	0.0	
>20	0	0.0	0	0.0	
Education					
No- formal education	48	13.5	87	24.2	
Formal Education	311	86.5	135	75.8	
Farming experience (years)-mean	x̄ =23		x̄ =19		2.93**
0-5	47	13.1	44	19.8	
6-10	65	18.2	41	18.5	
11-15	49	13.7	20	9.0	
16-20	42	11.7	31	14.0	
Above 20	155	43.3	86	38.7	
Farm size (hectares)- mean	x̄=4.2		x̄ =1.7		-0.41
0-2	61	17.0	167	75.2	
3-5	241	67.1	21	9.5	
6-8	30	8.4	16	7.2	
Above 8	25	7.0	18	0.1	
Average annual income(N)					2.42*
Less than 21,000	155	43.3	95	42.8	
21,000-40,000	45	12.5	32	14.4	
41,000-60,000	78	21.7	50	22.5	
61,000-80,000	16	4.5	9	4.1	
81,000-100,000	14	3.9	12	5.4	
101,000-120,000	4	1.1	1	0.5	
121,000-140,000	6	1.7	0	0	
Greater than 140,000	40	11.1	23	10.4	

*P<0.05, **P<0.01

Farmers' understanding of climate change

Results in Figure 3 show that the majority of men (94.7%) and women farmers (94.6%) understood climate change as extreme storm, extreme floods (92.5% and 90.1%), extreme droughts (80.8% and 53.1%), temperature increase (78.3% and 61.7%), rapidly changing season (69.1% and 59.9%), varying rainfall pattern (62.4% and 50.9%) and occurrence of hails (57.9% and 41.9%).

Results of PCA

PCA was conducted to assess item-total correlation and reliability and to identify dimensions. The principal component analytical procedure shows Bartlett's test of sphericity with a value of 13276.46 ($p<0.05$) and Kaiser – Meyer-Olkin (KMO) statistics of 0.87 which can be qualified as very good, pointed out that the data seemed to be suitable for factor analysis. Eigenvalues of one or greater were rotated by the varimax analysis, 29 items from the factor analysis resulted in four-factor groupings and explained 68.49% of the total variance in the perceived effects of climate change (Table 3). Most of the factor loadings in factor one were greater than 0.80, greater than 0.60 in factor two, three, and four respectively, indicating a good correlation between the items and the factor grouping they represent. Values of Cronbach alpha obtained varied from 0.82 to 0.89 for the four factors and thus confirms a high level of consistency among factor groupings. Also, means of 0.89, 0.87, 0.82 and 0.85 were obtained respectively for factor 1 (crop production effects), factor 2 (health and environment effects), factor 3 (socio-economic effects) and factor 4 (other effects).

Men and women farmers' perceived effects of climate change

Results in Table 4 reveal that the means of farmers' perceived effects of climate change ranged from 2.17 to 3.52 for men and 2.42 to 3.69 for women. Out of 29 perceptual statements, men farmers had higher means of perception in 13 statements while women farmers had higher means in 16 statements. Furthermore, T-test was conducted to compare the means of men and women perceived effects of climate change and the results show there were significant differences in 12 perceptual items, with men farmers having higher mean scores in 3 statements while women farmers had higher mean scores in 9 statements. Thus, there were significant differences in the way men and women farmers respectively perceived pest and disease outbreak ($\bar{x}$) 3.45 and 3.68, decreased yield ($\bar{x}$) 3.52 and 3.69, undernutrition ($\bar{x}$) 3.14 and 2.89, the incidence of bush fire ($\bar{x}$) 2.96 and 2.42, unemployment ($\bar{x}$) 3.32 and 3.09, change in the agricultural calendar ($\bar{x}$) 3.14 and 3.48, premature crop ripening ($\bar{x}$) 2.35 and 2.93, shortening of crop cycle ($\bar{x}$) 2.46 and 2.77, change in taste of fruits ($\bar{x}$) 2.39 and 2.60, loss of farmlands to erosion ($\bar{x}$) 2.25 and 2.50 and rapid weed growth ($\bar{x}$) 2.24 and 2.60.

Chi square test of relationships between perceived effect of climate change and socio-economic variables

A chi-square test was conducted to see if there is a relationship between the categorical variables and the perceived effect of climate change. Results in Table 5 show that significant ($p<0.00$) associations existed between perceived effects of climate change and respondents' marital status ($\chi2$= men-465.52, women-435.92) religion ($\chi2$= men-336.19, women-226.43), Education ($\chi2$= men-1001.96, women-588.64), and membership of other associations ($\chi2$= men-175.91, women-168.26).

Relationships between farmers' perceived effects of climate change and socioeconomic variables

A correlation test was conducted to determine the relationship between variables measured at the interval level and the perceived effect of climate change. Results in Table 6 shows that significant relationship ($p<0.01$) exists between men farmers' perceived effects of climate change and family size ($r=0.001$), and farming experience ($r=0.128$) while no significant relationship ($p>0.05$) exists between age ($r=0.093$), average income ($r=0.066$), farm size ($r=0.063$) and perceived effects of climate change by men farmers. Furthermore, significant relationship ($p<0.01$) exists between women farmers' family size ($r=0.091$) and perceived effects of climate change while no significant relationship ($p>0.05$) exists between age ($r=0.091$), average income ($r=0.045$), farming experience ($r=-0.110$), farm size ($r=0.013$), and perceived effects of climate change by women farmers.

Determinants of men and women Farmers perceived effects of climate change

To identify the determinants of men and women farmers' perceived effect of climate change, regression analysis was conducted. Results of each process of regression analysis are reported in Table 7 with standardized regression coefficients, t- statistical values, values of constant, R square and, adjusted R2 values. The coefficients of determination (Adjusted R2 and R2) for men farmers were 0.38 and 0.41 respectively and, 0.56 and 0.60 for women farmers respectively. It was observed that two (2) independent variables had statistic significant beta coefficients for men farmers, these include farming experience ($t=6.02$, $p<0.01$) and average annual income ($t= -3.86$, $p<0.01$). The result further shows that four (4) independent variables had statistic significant beta coefficients for women farmers, these include farming experience ($t= 2.17$, $p<0.05$), average annual income ($t=4.13$, $p<0.05$), farm size ($t=3.39$, $p<0.00$), and membership of other associations ($t= 6.69$, $p<0.01$).

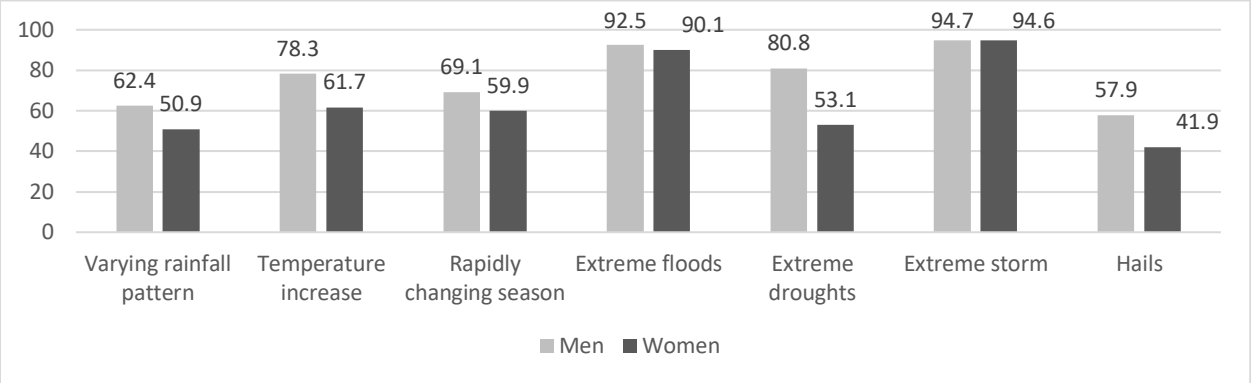

Figure 3. Farmers' understanding of climate change (%).

Table 3. Results of PCA

Dimensions of farmers' perceived effects of climate change	Factor 1	Factor2	Factor 3	Factor 4
Factor 1: Crop production effects				
Premature crop ripening	0.83			
Shortening of crop cycle	0.82			
Change in quality of fruits and vegetables	0.85			
Change in taste of fruits	0.81			
Flooding	0.81			
Loss of farm lands to erosion	0.91			
Loss of vegetation	0.91			
Rapid weed growth	0.87			
Incidence of bush fire	0.73			
Unemployment	0.61			
Mean (x̄)	**0.89**			
Health and environmental effects				
Increased pest and disease outbreak		0.81		
Decreased yield		0.70		
Increased water pollution		0.69		
Air pollution		0.71		
Injury and death		0.65		
Destruction of crops and trees		0.56		
Change in agricultural calendar		0.48		
Soil erosion		0.62		
Mean (x̄)		**0.87**		
Economic effects				
Decreased income generating activities			0.78	
Food shortage			0.67	
Damage to infrastructures			0.74	
Crop extinction			0.61	
Crop failure			0.57	
Under nutrition			0.47	
Mean (x̄)			**0.82**	
Other effects				
Shortage of water				0.49
Post-harvest losses				0.68
Heat stress				0.61
Drought				0.77
Reduced soil fertility				0.77
Mean (x̄)				**0.66**
Eigen values	10.56	6.09	1.71	1.50
% of Variance	36.41	21.03	5.89	5.16
KMO	0.87			
Bartlett's test of Sphericity	13276.46			
Df	406			
P value	0.00			
Cronbach alpha	0.89	0.87	0.82	0.85

Table 4. Farmers' perceived effects of climate change

Perceived effects of climate change	Men ($\bar{x}$)	Women ($\bar{x}$)	t value
Pest and disease outbreak	3.45	3.68	-3.52**
Decreased yield	3.52	3.69	-2.68**
Shortage of water	3.00	2.92	0.85
Increased water pollution	3.11	3.06	0.62
Decreased income generating activities	3.21	3.36	-1.96
Food shortage	3.19	3.35	-1.86
Damage of infrastructure	3.24	3.32	-0.93
Crop extinction	2.95	2.94	0.08
Crop failure	3.14	3.01	1.71
Under nutrition	3.14	2.89	3.60**
Incidence of bush fire	2.96	2.42	5.50**
Unemployment	3.32	3.09	3.32**
Air pollution	3.18	3.05	1.86
Injury and death	3.08	3.03	0.62
Destruction of crops and trees	3.11	3.00	1.39
Change in agricultural calendar	3.14	3.48	-4.12**
Soil erosion	3.05	2.96	1.10
Post-harvest losses	2.91	3.08	-2.04
Heat stress	3.12	3.07	0.57
Drought	2.93	3.06	1.64
Decreased soil fertility	3.07	2.98	1.10
Premature crop ripening	2.35	2.93	-5.47**
Shortening of crop cycle	2.46	2.77	-2.91**
Change in quality of fruits and vegetables	2.39	2.60	-2.21**
Change in taste of fruits	2.17	2.42	-2.54**
Flooding	3.06	3.20	-0.85
Loss of farm lands to eroson	2.25	2.50	-2.54**
Loss of vegetation	2.29	2.42	-1.38
Rapid weed growth	2.24	2.60	-3.72**

Table 5. Results of Chi-square analysis

Variables	Men farmers		Women farmers	
	χ^2 value	P value	χ^2 value	P value
Marital status	465.53	0.000**	435.92	0.000**
Religion	336.19	0.000**	226.43	0.000**
Education	1001.96	0.000**	588.64	0.000**
Membership of farmers' association	175.91	0.000**	168.26	0.000**

**P<0.01

Table 6. Results of correlation analysis between respondents' perceived effects of climate change and socio-economic variables

Variables	Men farmers		Women farmers	
	r value	P value	r value	P value
Age	0.093	0.080	0.091	0.178
Family size	0.00	0.001**	0.981	0.003**
Average annual income	0.066	0.212	0.045	0.501
Farming experience	0.128	0.015*	-0.110	0.103
Farm size	-0.063	0.237	0.013	0.843

*P<0.05, **P<0.01

Table 7. Determinants of respondents' perceived effects of climate change

Independent variables	Men farmers		Women farmers	
	B	t value	B	t value
Age	-0.14	-1.98	-0.06	-0.56
Education	1.04	1.48	-1.04	-1.32
Farming Experience	0.41	6.02**	0.22	2.17*
Family size	-0.07	-0.22	0.43	0.94
Marital status	1.10	0.03	-3.10	-1.57
Average annual income	-9.47	-3.86**	5.41	4.13**
Farm size	-0.06	0.02	-0.38	-3.39**
Membership of other farmers' association	1.57	0.83	15.43	6.69**
Constant	37.07	4.92**	46.23	4.35
R		0.64		0.78
R^2		0.41		0.60
Adjusted R^2		0.38		0.56
Standard Error		12.67		10.60
F change		11.73		15.22
Significant change		0.00		0.00

*P<0.05, **P<0.01

Discussion

Descriptive analysis showed that men farmers in this study were fairly older than the women farmers and thus were assumed to have a better understanding of climate change. The result is similar to the reports of Owombo *et al*. (2014). The majority of respondents surveyed were married with a mean family size of six persons, this could suggest assistance from household members for enlightenment on the concept of climate change and recognition of its effects. This result is in line with Ayanade *et al*. (2017). More men farmers had formal education. Education is assumed to have a positive influence on enhancing men farmers' understanding of climate change and a better perception of the effects of climate change. This result is in tandem with the report of Fakoya *et al*. (2010). Also, the majority of respondents had more than 20years of farming experience. This may suggest farmers' ability to perceive climate change easily as a result of the accumulation of experience on climate change over time. The result is consistent with the report of Nwaiwu *et al*. (2013). Furthermore, more men respondents had access to land for farming and could suggest large scale farming and the practise of different agricultural enterprises which may be vulnerable to the effects of climate change. This report is consistent with Owombo *et al*. (2014). Significant differences were observed in men and women farmers' age, family size, farming experience and average annual income with men having higher means in age, family size, farming experience, and income. This is an indication of higher socioeconomic status by men than women. The higher economic status of men over women could serve as the enhanced adaptive capacity and men's ability to cope better than women with the effects of climate change.

The result further shows that men and women farmers understood the concept of climate change except that men farmers had more understanding. This result is an indication of gender disparity in understanding of climate change and could impact on gender responses and actions towards ameliorating the effect of climate change and this may suggest that men farmers' accessibility to formal education could have enhanced their understanding of climate change. The result is in agreement with Odewumi *et al*. (2013), Adebisi-Adelani *et al*. (2014), and Uddin (2016).

The study further reveals that there are significant differences in men and women farmers' perceived effects of climate change with the women farmers having a higher perception of the effects of climate change. This result is consistent with the reports of Gutu *et al*. (2012) and Issa *et al*. (2015). Overall, change in the agricultural calendar, reduced yield and, pest and disease outbreak were effects of climate change significantly perceived more by the women farmers. These results agree with the observations of Apata and Adekunmi (2013), IPCC (2015); Ebele and Amodi (2016). The findings from this study thus suggest that women perceived that their agricultural activities are more impacted by climate change than men, and thus shows that climate change effects are not gender-neutral.

Furthermore, the determinants of men farmers' perceived effect of climate change were farming experience and average annual income. With higher farming experience and income, men are much less to be impacted negatively by climate change and have higher propensity to adjust to changes in climate and its impact on their agricultural activities. Farming experience, average annual income, farm size, and membership of other associations were women farmers' determinants of perceived effects of climate change with the membership of other farmers' organisation the strongest. This could be because farmers' association can protect women rights when interfacing with agencies of government that are responsible for the government response to climate change issues. The more

experienced the women folks have in farming, the higher they will perceive the climate change variability and its impacts on their livelihood and agricultural production. Women being availed with higher income and larger farm size tend to lessen the impacts of climate on their agricultural production because income would enable them to cultivate a large area of land and acquire production facilities and materials that can protect their crops and ensure higher yields. This result is in agreement with Odewumi *et al*. (2013) and Antwi-Agyei *et al*. (2013).

Conclusion and Recommendations

This paper focused on men and women farmers' perception of the effects of climate change. This study is limited by the use of the only questionnaire. The use of other methods of data collection such as interview would have provided a more robust outcome on the perception of men and women farmers on the effects of climate change on their agricultural production and productivity. However, the findings provide insight into the gender perspective of climate change effects as they relate to rural men and women peasant farmers. This study observed that the majority of the respondents had more than 21-year farming experience, this depicts their involvement in agricultural enterprises and experience of climate changes. Men farmers had more understanding of the concepts of climate change than women farmers. This is an implication that men farmers would be better able to recognise the effects of climate change and assumed to decide to take up timely actions towards adaptation Also, women farmers could perceive the effects of climate change than the men farmers. This is an implication that climate change could have exerted a great effect on women farmers' agricultural enterprises more than that of men farmers and consequently affected their productions. Pest and disease outbreak, decreased yield, change in agricultural calendar and unemployment were the most significantly perceived effects of climate change by men and women farmers. These were observed as the major effects of climate change that impeded on agricultural production and could result in food insecurity. The implication of these effects on the respondents could be low farm income as a result of the increased cost of production incurred on adaptation measures. PCA results showed that the respondents had the highest perception of crop production effects, this could imply that the respondents were more involved in crop production. This, therefore, calls for policies to combat the effects of climate change on crop production as a means of ensuring food security. The determinants of men farmers' perceived effects of climate change were farming experience and average annual income while farming experience, average annual income, farm size, and membership of other associations were women farmers' determinants of perceived effects of climate change. This could be an implication that the aforementioned variables increase the likelihood of improving respondents' perception of the effects of climate change. Findings from this study could assist policymakers and agriculture extension agents and other government agencies to implement policies on associated climate change impacts recognising the gender perspectives of climate change effects on farming. Policymakers thus need to acknowledge the gender-disaggregated impacts of climate change and how this can impact on men and women agricultural production and productivity and in the provision of support aimed at reducing the effects of climate change on farmers. It is also pertinent that greater attention is given by policymakers to factors determining men and women's perceived effects of climate change on agricultural activities to enhance appropriate response to climate change issues as they affect them.

Acknowledgement

The authors are grateful to the coordinators of agricultural cooperative in Southwest Nigeria, particularly the regional chairman Pastor Abogunrin.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

References

Adebisi-Adelani O., Adeogun, M.O. Zaka, K.O. 2014. Farmers' perception of the effects of climate change on plantain and banana production in Ekiti State. Nigeria. Journal of Rural Sociology, 15(1): 127-134.

Adegnandjou, M.R., Fadina, A.M., Barjolle, D. 2018. Farmers' adaptation strategies to climate change and their implications in the Zou Department of South Benin.*Environment*, 5, 15 https://doi.org/10.3390/environments5010015

Adejumobi, C. A., Ojebiyi, O.G., Adesina-Adebayo, F. O. 2013. Climate change impacts on women gender in Nigeria. Research Journal of Agricultural and Environmental Management, 2(5): 115-120.

Afodu, O.K., Afolami, C.A., Akinloye, O.E., Ndubuisi-Ogbonna, L.C., Ayo-Bello, T.A., Shobo, B.A., Ogunnowo, D.M. 2019. Livelihood diversification and its determinants in rice farming households in Ogun State Nigeria. African Journal of Agricultural Research, 14(35): 2104-2111.

Agwu, J., Okhimamhe, A.A. 2009. Gender and climate change in Nigeria. A study of four communities in North-Central and South-Eastern Nigeria. Heinrich Boll Stiftung, 71pp.

Agwu, O.P., Bakayoko, A., Jimoh, S.O., Stefan, P. 2018. Farmers' perceptions on cultivation and the impacts of climate change of goods and services provided by Garcinia Kola in Nigeria. Ecological Processes, 7:37. https://doi.org/10.1186/313717-018-0147-3

Akter, S., Bennett, J. 2011. Household perceptions of climate change and preference for mitigation action: The case of the carbon pollution reduction scheme in Australia. Climate Change, 109(3): 417-436.

Amusa, T.A., Okoye, C.U., Enete, A.A. 2015. Gender-Based vulnerability and contributions to climate change adaptation decisions among farm household in southwest, Nigeria. American-

Eurasian Journal of Agricultural and Environmental Science, 15(9): 1779-1789.

Antwi-Agyei, P., Dougill, A.J., Fraser, E.D.G, Stringer, L.C. 2013. Characterising the nature of household vulnerability of climate variability:nempirical evidence from two regions of Ghana. Environ, Development and Sustainability, 15: 903-926.

Apata, O.M., Adekunmi, A.O. 2013. Assessment of knowledge level and adaptation strategies to effect of climate change by arable crop farmers in South western Nigeria. Global Journal of Biology, Agriculture and Health Sciences, 2(1): 61-66.

Ayanade, A., Radeny M., Morton, J.F. 2017. Comparing smallholder farmers' perception of climate change with meteorological data: A case study from Southwest Nigeria. Journal of Weather and Climate Change, 15: 24-33.

Ayinde, O.E, Ojemomon, V.E.T., Daramola, F.S., Falaki, A.A. 2013. Evaluation of the effects of climate change on rice production in Niger State, Nigeria. *Ethiopia* Journal of Environmental Studies and Management, 6: 763-773.

Below, T., Artner, A., Siebert, R., Sieber, S. 2010. Micro-level Practices to Adapt to Climate Change for African Small-scale Farmers: A Review of Selected Literature, International Food Policy Research Institute- IFPRI Discussion Paper 00953, 21pp.

Bhattacherjee. A. 2012. Social science research: principles, method, and practices Textbook Collection 3. University of South Florida, 183p.

Bussey, K., & Bandura, A. 1999. Social cognitive theory of gender development and differentiation. Psychological Review, 106(4): 676–713.

Deb, A.K., Haque, C.E. 2016. Livelihood diversification as a coping strategy adopted by small-scale fishers of Bangladesh. Climate Change Management, 21: 345-368.

Divilová, S. 2016. Semantic Differential as One of the Research Tools Suitable for Establishing the Attitudes of Pupils to Old Age and Seniors. Universal Journal of Educational Research, 4(8): 1858-1862.

Ebele, N. E., Emodi, N.V. 2016. Climate change and its impact in Nigerian Economy. Journal of Scientific Research and Reports, 10(6): 1-13.

Egbule, C. L. 2014. Gender vulnerability and adaptation strategies to climate change impacts on agriculture in the Niger Delta Region of Nigeria. Ph.D Thesis, University of Nigeria, Nsukka, 163p.

Elisha, I., Sawa, B.A., Ejeh, U.L. 2017. Evidence of climate change and adaptation strategies among grain farmers in Sokoto State, Nigeria. Journal of Environmental Science, Toxicology and Food Technology, 11(3): 1-7.

Elum, Z.A., Momodu, A.S. 2017. Climate change mitigation and renewable energy for sustainable development in Nigeria: A discourse approach. Renewable and sustainable energy. Reviews, 78: 72-80.

Fakoya, E.O., Ajayi, M.T., Oloruntoba, A.A., Bolarinwa, K.K. 2010. Gender involvement in Fadama farming for sustainable food security in Ogun State. International Journal of Sustainable Development, 2(1): 89-95.

Falaki, A., Akangbe, J.A., Ayinde, O.E. 2013. Analysis of Climate Change and Rural Farmers' Perception in North Central Nigeria. Journal of Human Ecology, 43(2): 133-140.

FAO-IFAD. 2010. Gender mainstreaming training for agriculture and rural development programmes. Joint FAO-IFAD learning event, 2010. FAO, Rome, 99pp.

Gutu, T, Bezebih E, Mengistu. 2012. Econometric analysis of local level perception, adaptation and coping strategies of climate change induced shocks in north Shewa, Ethiopia. International Research Journal of Agricultural Extension and Soil Science, 2(8): 347-363.

IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.

Ifeanyi-Obi, C.C., Togun, A. O. Lamboll, R., Arokoyu, S. 2017. Socio-Economic determinants of cocoyam farmers' strategies for climate change adaptation in southeast Nigeria. Journal of Agricultural Extension, 21(2):91-104.

Intergovernmental Panel on Climate Change (IPCC) 2015. Meeting Report of the Intergovernmental Panel on Climate Change Expert Meeting on Climate Change, Food and Agriculture. – In: Mastrandrea, M. D., Mach, K. J., Barros, V. R., Bilir, T.E.,Dokken, D. J., Edenhofer, O., Field, C. B., Hiraishi, T., Kadner, S., Krug, T., Minx,J.C., PichsMadruga, R., Plattner, G.-K., Qin, D., Sokona, Y., Stocker, T. F., Tignor,M.(eds.) World Meteorological Organization, Geneva, Switzerland. https://www.ipcc.ch/pdf/supporting-material/Food-EM_MeetingReport_ FINAL.pdf

Issa, F.O., Tologbose, B.T., Olaleye, R., Tologbose, O.M., Kagbu, J.A. 2015. Farmers' perception of climate change and coping strategies across gender in two agro-ecological zone of Nigeria. Journal of Agricultural Extension, 19(1):35-48.

Istratii, R. 2018. Sensitising gender to local cosmology: A participatory ethnographic gender and development approach from a Muslim community in Senegal. Journal of Development Practice, 4: 1-23.

Kalungu, J.W., Filho, W. L., Harris, D. 2013. Smallholder farmers' perception of the impacts of climate change and variability on rain-fed agricultural practices in semi-arid and sub-humid regions of Kenya. Journal of Environment and Earth Science, 3(7): 127-140.

Krejcie, R.V., Morgan, D.W. 1970. Determining sample size for research activities. *Educational and Psychological Measurements,* 30: 607-610.

Mohammed, B.T., Abdulquadri, A.F. 2012. Comparative analysis of gender involvement in agricultural production in Nigeria. Journal of Development and Agricultural Economics, 4(8): 240-244.

Nwaiwu, I.O.U., Ohajianyu, D.O., Orebiyi, J.S., Eze, C.C., Ibekwe, U.O. 2013. Determinants of agricultural sustainability in South East Nigeria- The climate change debacle. Global Journal of Agricultural Research, 1(2):1-13.

Odewumi, S.G., Awoyemi, O.K., Iwara, A.I., Ogundele, F.O. 2013. Farmer's perception on the effect of climate change and variation on urban agriculture in Ibadan, metropolis, southwest. *Nigeria.* Journal of Geography and Regional Planning, 6(6): 209-219.

Oluwasusi, O.J., Tijani S. A. 2013. Farmers' adaptation strategies to the effects of climate change variation on yam production. A case study in Ekiti State, Nigeria. Agrosearch, 13(2): 20-31.

Onwutuebe, C. J. 2019. Patriarchy and Women Vulnerability to Adverse Climate Change Nigeria. https://doi.org/10.1177/2158244019825914SAGE

Osasogie, D.I., Omorogbe, J. 2012. Socio-economic determinants of farmers' adaptation strategies to climate change hazards in Benue State, Nigeria. Journal of Bioprospecting and Development, 5: 169-175.

Osgood, C. E. 1952. The nature and measurement of meaning. Psychological Bulletin, 49: 197–237.

Owombo, P. T., Koledoye, G. F., Ogunjimi, S.I., Akinola, A.A., Deji, O. F., Bolarinwa, O. 2014. Farmers' adaptation to climate Change in Ondo State, Nigeria: A gender analysis. Journal of Geography and Regional Planning, 17 (2): 30-35.

Pelikán, J.Z. (2011). Empirického výzkumu pedagogických jevů. Praha : Karolinum.

Thompson, O.A., Oparinde, L.O. 2015. Farmers' perception of climate change in Ondo State, Nigeria. Nigeria Journal of Agricultural Economics, 6(1):22-30.

Uddin, I.O. 2016. Differences in knowledge of climate change between men and women livestock farmers in Nsukka agricultural zone of Enugu State, Nigeria. Journal of Agricultural Extension, 20(2): 234-247.

UNICEF 2017. Gender equality: Glossry of terms and concepts, UNICEF.

WHO 2002. WHO gender policy-integrating gender prespectives in the work of WHO. World Health Organisation.