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Gender Role Analysis in Extent of Climate Change Adaptation among Arable Crop Farmers in Abak Agricultural Zone, Akwa Ibom State, Nigeria

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ABSTRACT
The study analysed gender roles in climate change adaptation among arable crop farmers in Abak agricultural zone of Akwa Ibom State. Simple random sampling technique was used to select 120 respondents for the study. Percentages, cross tabulation with Chi-square were used to specifically analyse the level of involvement of male and female arable crop farmers in farming activities; examined the male and female farmers' perception of climate variation, as well as analyse the extent of adoption of adaptation strategies by the arable crop farmers to mitigate the effect of climate change according to gender. Findings revealed that female farmers were involved in planting, weeding, application of fertilizer, harvesting, pest management, soil management and conservation, processing procedure and marketing while the male farmers were found to be more proficient in land clearing, land tilling, land stumping and land ridging. The study also showed that climate is changing and has caused increased erosion, excessive flooding and delay in planting time due to fluctuations in rainfall pattern in the study area. Again, female farmers slightly applied adaptation strategies more than the male farmers during crop production. In conclusion, therefore, both men and women farmers had roles in climate change adaptation during crop production. Implications for climate change mitigation and adaptation planning is that, in designing gender-responsive programmes, these roles should be streamlined. Obviously, female arable crop farmers demonstrated greater advocacy for climate change adaptation strategies implying that making gender-responsive programmes more effective towards female farmers and community members in sustainable use of resources could enhance adaptation among households.

Keywords: Gender, Roles, Climate Change, Adaptation, Farmers, Agricultural Zone

INTRODUCTION

It is no longer news that climate is changing. What should raise more concern to a reasonable extent is the level of awareness, access and capacity building for adaptation and or mitigation of the adverse impact of climate change by the vulnerable population across the globe especially in developing countries like Nigeria. Climate change is still one of the biggest threats to the world today (Chukwuji, Aliyu, Sule, Yusuf, Zakariya, 2019). Nigeria is classified as one of the 10 most vulnerable countries in the world, according to a 2015 climate change index by the global risk analytics company Verisk Maplecroft, (Ibrahim, 2017).

The Nigerian Ministry of Environment created a department of Climate Change with the mandate of driving the Federal Government's vision for mitigating and adapting to the impacts of climate change. Their mandate among other things include providing leadership in promoting the right adaptation culture, supporting research, education and awareness (Chukwuji, et al, 2019). Again, Nigeria, under this present leadership, has been making demonstrable efforts to diversify the economy with agriculture as the major focus, but agriculture is vulnerable to climate change. Sudden change in weather, shortage of rainfall, land degradation, desertification, and flooding, excess heat amongst others are some of the outcomes of climate change, which affects food production (Chukwuji, et al, 2019). Levels of arable crop production are controlled largely by natural environmental conditions, especially the climate and soil fertility status (edaphic factors). The interdependence between crop, human and edaphic factors makes it mandatory for arable crop farmers to have in-depth knowledge of the factors that affect crop production (Udoh, et al, 2005). Also, because of how agricultural activities are very sensitive to climate and weather conditions, an agricultural decision maker can either be at the mercy of these natural factors or try to benefit from them. The only way to benefit from natural factors is to take them into account and learn to know them as well as possible. Davidson et al in Enete and Amusa (2010) rightly noted that the food security threat posed by climate change is greatest for Africa, where agricultural yields and per capita food production have been steadily declining while population growth doubles the demand for food, water and forage in the next 30 years. This is an indication that our agricultural sector is still operating at a subsistent level when put along our population and its growth rate of 3.3 percent (Chukwuji, et al, 2019). Therefore, climate change adaptation practices of farmers in vulnerable regions must be increased to boost crop production if the global food supply is to keep pace with population growth.

In Akwa Ibom state of Nigeria for instance, Nkeme (2016) observed that farmers' rate of adoption of climate change mitigation technologies in Uyo agricultural zone was quite low. Out of 23 climate change mitigation technologies identified in the study, only 5 recorded very high adoption. Arable crop farmers may practice adaptation in several ways. One of them is by changing the planting time through adjustment of the time at the beginning of the rainy season (Ofuoku, 2011). The change of planting time, by itself, means change their cropping pattern in the face of climate change. The cropping pattern in a particular region is subject to changes depending on a large number of factors like climate, rainfall, agricultural technology, availability of irrigation facilities, relative price and profitability of various crops (Sugihardjo et al 2018). However, the type of adaptation practices and strategies to be undertaken is to some extent first determined by famers' perceptions of climate change (Roncoli et al., 2001; Thomas et al., 2007)

Perception of farmers on climate variability and how these perceptions determine the choice of coping or adaptation strategies have been investigated by previous studies in West African Sahel (Akponikpe, et al., 2010; Kyekyeku, 2012; Zampaligré, et al., 2013; Sanfo, et al., 2014; Traore, et al., 2014, Kima et al., 2015). Climate change confirmed by most of the farmers up to 98 % of respondents was dependent on the geographical area and prevailing climate across five countries of West Africa (Akponikpè et al., 2010). In the Sahel, more proportion of farmers perceived the change to have started between 20-30 years ago or more while the majority of them perceived it to be less than 10 years ago in the Guinean areas. Farmers in Burkina Faso understood climate change variability primarily based on weather-crop interactions and on events that are associated with climatic fluctuations. However, the perceptions were additionally shaped by their cultural frame. According

to Touré Halimatou, Traoré and Kyei-Baffour, (2016), farmers perceived a decrease in annual rainfall variability and an increase of temperature as main factors of climate change and climate variability. Adaptive capacity of individuals, households and communities is shaped by their access to and control over natural, human, social, physical and financial resources as well as the promotion of gender equality (Care, 2010).

Gender mainstreaming in climate change adaptation intervention planning is critical, given the gendered nature of climate change vulnerabilities (Assan et al, 2018). Studies have been conducted in Nigeria to explore the linkages between gender and climate change in agriculture. These have focused on the gender dimensions of climate change vulnerabilities (Yaro, 2013), the adaptation strategies adopted by farm households (Ahmed, et al, 2016) to counter the adverse impacts of climate change, and the importance of adaptation strategies (Antwi-Agyei, et al 2013). Mostly overlooked, especially in the South-south region of the country, is whether gender influences the perceived effectiveness of adaptation practices, or influences the observed effect of climate change on crop farming and what are gender-based perception of climate change. There is discussion on the need for provision of gender-sensitive institutional support to improve farmers' resilience to current variability in precipitation and temperature and to enable the farmers to effectively adapt to future climatic changes. The success of such intervention partly depends on understanding the gender perspectives of farm households on the effectiveness of current adaptation measures and perception of climate change. The knowledge of these gender differences could help in the development of gender-sensitive policy and adaptation practices to build farmers' resilience to adverse climate change impacts. The study sought to specifically examine the level of involvement of male and female arable crop farmers in farming activities, examine the male and female farmers' perception on climate variation in the study area, assess the gender-based observed effect of climate change on arable crop farming and analysed the extent of adoption of adaptation strategies by the arable crop farmers to mitigate the effect of climate change according to gender.

METHODOLOGY

The study was conducted in Abak agricultural zone of Akwa Ibom State, Nigeria. The main economic activities of the people are farming, trading, fishing for riverine and coastal dwellers and white-collar services. The state lies between latitudes 4^{o} 32^{I} and 5^{o} 53^{I} *N* and longitudes 7^{o} 25^{I} and 8^{o} $25^{I}E$ and its 2016 projected population stood at 5.45 million people. (akwaibomstate.gov.ng/about-akwa-ibom/). Akwa Ibom State is made up of 31 local government areas (LGAs) with six (6) agricultural zones namely: Uyo, Oron, Ikot Ekpene, Eket, Abak and Etinan. Abak Agricultural Zone consists of five (5) LGAs, which are: Abak, Oruk Anam, Etim Ekpo, Ukanafun, and Ika. Most of the inhabitants of the study area are farmers dwelling especially in the peri-urban and rural communities and the most commonly cultivated crops grown in the area include: Yam, Cassava, Cocoyam, Plantain, Maize, Oil Palm, Banana, Coconut, Citrus and vegetables. In addition, some micro-livestock are usually raised at backyard of most homesteads. A Two-stage sampling procedure was deployed in the selection of the respondents. At first stage, simple random sampling (by balloting) was used to select five (5) and two (2) cells from each of 5 blocks selected in the zone. The rationale here was to ensure that all the blocks were represented. In the second stage, systematic sampling technique was deployed in the selection of twelve (12) farming households, with particular focus on the household heads, in each of the selected cells. This summed up to 24 farming household heads from each block. Therefore, a total of 10 cells and 120 respondents were selected for the study.

Questionnaire consisting of subsections to reflect the specific objectives of the study were used for data collection. To examine the level of involvement of male and female arable crop farmers in farming activities, a 4-point rating scale of Always=4, Occasionally=3, Rarely=2, Never=1, cross-classified by gender, was used. To examine the male and female farmers' perception on climate variation in the study area, A 3-point check list of don't know=0, No = 1 and Yes =2, was used. To examine the gender-based observed effect of climate change on arable crop farming among the respondents, A 4-point Likert-type scale of strongly disagree=1, disagree =2, agree = 3, strongly agree = 4, cross-classified by gender, was used. To analyse the extent of adoption of adaptation strategies

by the arable crop farmers to mitigate the effect of climate change according to gender, the 4-point Likert scale of Always=4, occasionally=3, Rarely=2, Never=1 cross-classified by gender was also used. Data collected were analyzed using descriptive statistics such as simple percentages, frequencies, as well as inferential statistics such as Chi-square with cross tabulation.

RESULTS AND DISCUSSION

Demographic Profile of the Respondents

Item 1 in Table 1 shows that 61.7% of the study respondents were female as there were more female respondents in almost all the age categories. This corroborates earlier studies of Assan et al, 2018; Okwu and Acheneje (2011), Olukosi and Erhabor, (2008) and Olukunle (2004), who noted that the dominance of females in farming enterprise conforms to the fact that farming, is highly laborious, technically demanding and needs a lot of patience thus, attracted to more female farmers. Findings presented in item 2 on marital status of the respondents indicate that 20.8% of the farmers were single, 63.3% were married, and 3.3% were divorced/separated while 12.5% were widows. The high percentage of married respondents invariably means that more married people are involved in farming because of the necessity to augment income source and also to utilize family labour. This agrees with Ekong (2013), who noted that getting married is a highly cherished value among farmers in Nigeria because in some areas, marriage facilitates a vital source of family labour. In item 3, a greater percentage of the farmers (40.0%) read up to HND/B.Sc degree. This implies that the respondents were not likely to have much difficulty in understanding and adopting climate smart production technologies and innovation.

Table 1: Demographic Distribution of the Respondents

Variables	Frequency	Percentage (%)
Gender		
Male	46	38.3
Female	74	61.7
Total	**120**	**100.0**
Marital status		
Single	25	20.8
Married	76	63.3
Divorced	4	3.3
Widowed	15	12.5
Total	**120**	**100.0**
Level of education		
No formal Education	6	5.0
Primary 1	4	3.3
Primary 2	1	.8
Primary 4	1	.8
Primary 6	3	2.5
JSS1	7	5.8
SS2	2	1.7
HND/BSC	48	40.0
M.Sc	20	16.7
PhD	28	23.3
Total	**120**	**100.0**

Source: Field survey, 2019

Analysis on Men and Women Farmers' Perception of Climate Variation

The rationale for this analysis was to examine if the farmers in the study area were conscious or do take cognizance of the climatic situations in their environment and if such observations vary based on their gender. Results in Table 2 shows that, respondents were quite aware of the climatic realities (variability) in their villages. Majority of the respondents (84.8% Male, 71.6% Female) were confident in confirming that, they have noticed that climate has generally changed in the study

area. Majority agreed that temperature has increased (Male 84.8%, Female 87.5%), Length of season has changed (Male 84.8%, Female 79.7%), flood is more frequent (73.9% Male, 68.9% Female) and that droughts are more frequent (54.3% Male, 39.2% Female). The findings agree with the submission of Ekpoh and Ekpoh, (2011) who reported that every year in a specific time period, the climate of a location is different. Some years have below average rainfall, some have average or above average rainfall. It also confirms the findings of Mukoya and Mulinya (2018), who observed that the actual rainfall varying from the mean may represent drought and flood conditions.

However, there were some observable variations in response agreement of female and male farmers to these climatic situations (i.e. '% of Yes'). In particular, female farmers significantly observed that flood is more severe (X^2=8.135, P<0.05) and that droughts are more severe (X^2=4.814, P<0.05) than male farmers while male farmers particularly and significantly observed that Climate change is generally noticed (X^2=6.232, P<0.05) and that drought is more frequent (X^2=14.208, P<0.05) more than the female farmers. For other parameters, male and female farmers were not significantly different in their observations.

Table 2: Distribution of Respondents Based on Men and Women Farmers' Perception of Climate Variation

S/n	Climate Change Parameters	Gender	Yes	No	Don't know	Chi-square (X^2)	P-value
1	Climate change generally noticed	Male	84.8	0	15.2	6.235	0.04*
		Female	71.6	12.2	16.2		
2	Temperature increased	Male	84.8	10.9	4.3	3.280	0.19
		Female	87.5	10.8	0		
3	Temperature decreased	Male	28.3	67.4	4.3	1.164	0.55
		Female	37.8	58.1	4.1		
4	Rainfall decreased	Male	63.0	32.6	4.3	0.852	0.65
		Female	67.6	25.7	6.8		
5	Length of season changed	Male	80.4	8.7	10.9	0.303	0.86
		Female	79.7	6.8	13.5		
6	Floods more frequent	Male	73.9	21.7	4.3	0.814	0.66
		Female	68.9	28.4	2.7		
7	Floods more severe	Male	43.5	47.8	8.7	8.135	0.01*
		Female	68.9	28.4	2.7		
8	Droughts more frequent	Male	54.3	28.3	17.4	14.208	0.00*
		Female	39.2	58.1	2.7		
9	Droughts more severe	Male	43.5	39.1	17.4	4.814	0.02*
		Female	44.6	50.0	5.4		
10	Strong winds more frequent	Male	34.8	52.2	13.0	2.497	0.28
		Female	43.2	51.4	5.4		
11	Strong winds more severe	Male	23.9	63.0	13.0	2.039	0.36
		Female	35.1	56.8	8.1		

Source: Field Survey, 2019. Note: Values represents the percentages

Analysis on Gender-based Observed Effect of Climate Change on Arable Crop Farming and Other Farming Related Activities

Analysis was done to identify the observed effects of climate change on farming activities by the respondents in the study area. Effort was also made to diagnose these observations according to gender. Table 3 reveals that there was increase of pests and diseases as a result of climate change. This was the observation of the respondents and attracted an effect incidence of 0.74 for male farmers and 0.87 for female farmers. The closer the incidence is to 1, the more severe the observed effect, implying that the effect was observed by larger proportion of the respondents. Evidently, it was observed from the table that climate is changing in the study area and has caused increased

erosion (male =0.87, female =0.88), excessive flooding (male =0.91, female =0.83), frequent outbreaks of diseases like cholera, typhoid, malaria and dysentery (male =0.72, female =0.83),death of livestock due to severe drought (male =0.67, female =0.65), death of plants due to severe drought (male =0.78, female =0.70) and of course planting time is delayed due to fluctuation in rainfall pattern (male =0.91, female =0.84). This findings agree with Ibrahim et al, (2015) who found that reasonable population of the respondents, about 68% were aware of the effects of climate change on their production activities and livelihood in general, as shown by the index of increase in temperature, increase in drought, and reduced rainfall duration and intensity.

Table 3: Distribution of Respondents Based on Effect of Climate Change on Arable Farming

Effect of Climate Change on Arable Farming	Gender	SA	A	D	SD	Incidence of effect
Increase of paste and diseases	Male	34.8	39.1	26.1	0	0.74
	Female	23.0	63.5	10.8	2.7	0.87
Increased erosion	Male	45.7	41.3	13.0	0	0.87
	Female	24.3	63.5	12.2	0	0.88
Excessive flooding	Male	21.7	69.6	4.3	4.3	0.91
	Female	31.1	51.4	9.5	8.1	0.83
Frequent outbreaks of diseases like cholera, typhoid, malaria and dysentery	Male	26.1	45.7	21.7	6.5	0.72
	Female	33.8	56.8	5.4	4.1	0.91
Death of livestock due to severe drought	Male	21.7	45.7	21.7	10.9	0.67
	Female	12.2	52.7	28.4	6.8	0.65
Death of plants due to severe drought	Male	32.6	45.7	17.4	4.3	0.78
	Female	20.3	50.0	24.3	5.4	0.70
Drying up of our local streams	Male	6.5	37.0	28.3	28.3	0.44
	Female	8.1	50.0	23.0	18.9	0.58
Soils become more hardened than usual for tilling	Male	23.9	37.0	26.1	13.0	0.61
	Female	8.1	60.8	23.0	8.1	0.69
Poor and unpredicted yield of crops	Male	34.8	50.0	10.9	4.3	0.85
	Female	37.8	40.5	17.6	4.1	0.78
Planting time are delayed this days due to fluctuation in rainfall pattern	Male	47.8	43.5	8.7	0	0.91
	Female	51.4	32.4	16.2	0	0.84

Source: Field Survey, 2019. Note: Values in parentheses represents the percentages.
Key: SA=Strongly Agree; A=Agree; D = Disagree; SD =Strongly Disagree

Extent of Practice of Adaptation Strategies by Arable Crop Farmers to Mitigate the Effect of Climate Change According to Gender.

The respondents were cross-classified by their gender (male or female) and their responses (Always, Sometimes, Rarely, Never) to the statements on family advocacy on climate change. Table 4 shows that gender-wise comparison revealed a significant association between gender and adaptation to farming practices on climate change. However, there were statements where female farmers seemed to advocate more than the male farmers. This is shown in the increased frequencies of response of female farmers to these statements as level of advocacy of adaptation increased (i.e 'Sometimes and Always' advocacy level). In particular, female farmers were more likely to suggest that appropriate seed-bed be used for the planting of various crops in their family farm(s) ($x^2_{(3)}$ = 10.315, P< 0.05); recommend/ensure that the seed-beds be made perpendicular to the wind direction ($x^2_{(3)}$ = 8.635, P< 0.05); ensure the application of cover crops to our family farm(s) ($x^2_{(3)}$ = 8.324, P< 0.05); recommend/ensure the planting of different types of crops in a plots for diversity purpose ($x^2_{(3)}$ = 4.036, P>0.05) and always check to ensure that healthy/disease-free seeds/livestock are selected for our family farm(s) ($x^2_{(3)}$ = 5.359, P< 0.05). There were also positive relationship between these items and their gender.

The findings of the study with respect to contributions to climate change adaptation during household farming practices among the farmers by gender indicated that, female farmers advocated more than the male farmers.

The findings is supported by recent evidence which demonstrated that women who are already experiencing the effects of weather-related hazards such as flooding and extended periods of drought are developing effective coping strategies which include; changing crop planting and harvesting dates, water and soil moisture conservation practices, soil fertility conservation practices, use of improved crop varieties, and crop diversification (Assan et al, 2018). On the contrary, Assan et al, (2018) reported that male heads of farm households were generally more engaged in adaptation practices than females, except for diversification into non-farm activities.

Table 4: Adaptation Strategies Used by Arable Crop Farmers to Mitigate Climate Change Effect

Statement	Gender	AL	ST	RL	NV	Chi-square (χ^2)	df	P.value
I recommend/ensure the planting of different types of crops in a plot for diversity purpose	Male	19	20	6	1			
	Female	44	22	6	2	4.036	3	0.258
I plant short season crops when the temperature of our area is high	Male	13	24	6	3			
	Female	21	29	19	5	3.258	3	0.354
I carry out mulching on seedbeds in our family farm(s)	Male	16	17	7	6	0.371	3	0.946
	Female	26	26	14	8			
I ensure the use of drought-resistant crops/livestock on our family farms when the season is drier	Male	12	20	7	7			
	Female	20	31	15	8	0.862	3	0.835
I do suggest that appropriate seed-bed be used for the planting of various crops in our family farm(s)	Male	9	25	2	10			
	Female	28	27	11	8	10.315	3	0.016*
I recommend/ensure that the seed-beds be made perpendicular to the wind direction	Male	16	16	5	9	8.635	3	0.035*
	Female	11	28	20	15			
I always check to ensure that healthy/disease-free seeds/livestock are selected for our family farm(s)	Male	19	18	4	5			
	Female	28	24	18	4	5.359	3	0.147
I strongly ensure the making of water ways to channel runoff water when there is prolonged rain	Male	22	17	6	1			
	Female	30	28	16	0	3.101	3	0.376
I ensure the application of cover crops to our family farm(s)	Male	19	9	11	7			
	Female	29	26	17	2	8.324	3	0.040*
I ensure the making of bunds to halt soil erosion and runoff when there is prolonged rain	Male	19	15	5	7			
	Female	23	27	11	13	1.403	3	0.705

Source: field survey, 2019 *Significant at P<0.05. AL = Always, ST = Sometimes, RL = Rarely, NV = Never.

CONCLUSION AND RECOMMENDATION

This study assessed gender roles in climate change adaptation on agricultural practices among arable crop farmers in Abak agricultural zone. Analysis on the level of involvement of the respondents in farming activities showed that female farmers were involved in planting, weeding, application of fertilizer, harvesting, pest management, soil management and conservation (manuring, mulching, flood control, crop rotation, liming, drainage, irrigation etc.), processing procedure and marketing while the male farmers were found to be more proficient in land clearing, land tilling, land stumping and land ridging. It was evident in the study that climate is changing and has caused increased erosion, excessive flooding, frequent outbreaks of diseases like cholera, typhoid, malaria and dysentery, death of livestock and plants due to severe drought, and delay in planting time due to fluctuation in rainfall pattern. Findings have shown that female farmers slightly applied adaptation strategies more than the male farmers. They recommend and ensured that the seed-beds be made perpendicular to the wind direction and short season crops should be planted when the area temperature is high among others. In conclusion, therefore, both men and women farmers have roles in climate change adaptation during crop production. So implications for climate change mitigation and adaptation planning is that in designing gender-responsive programmes, these roles should be streamlined. From the study, female arable crop farmers demonstrated greater advocacy for climate change adaptation strategies implying that making gender-responsive programmes more effective towards female farmers and community members in sustainable use of resources could enhance adaptation among households.

REFERENCES

Ahmed, A. Lawson, E.T. Mensah, A., Gordon, C. and Padgham, J. (2016). Adaptation to climate change or non-climatic stressors in semi-arid regions? Evidence of gender differentiation in three agrarian districts of Ghana. Environ. Dev. 20, 45–58.

Akponikpè, P. B. I., Peter, J., & Agbossou, E. K. (2010). Farmers' Perception of Climate Change and Adaptation Strategies in Sub-Saharan West-Africa. 2nd International Conference: Climate, Sustainability and Development in Semi-Arid Regions, Fortaleza - Ceará, Brazil.

Antwi-Agyei, P.; Stringer, A.J.; Dougill, A.J.; Stringer, L.C.; Dougill, A.J. (2014). Livelihood adaptations to climate variability: Insights from farming households in Ghana. Reg. Environ. Chang. 14,1615–1626.

Assan, E.1, Murari Suvedi, I.D, Olabisi, L.S and Allen, A. (2018). Coping with and Adapting to Climate Change: A Gender Perspective from Smallholder Farming in Ghana.

CARE International, with technical input by the International Institute for Sustainable Development (IISD) (2010), Toolkit for Integrating Climate Change Adaptation.

Chukwuji, C. N.; Tsafe, A. G.; Sayudi, S.,; Yusuf, Z.; and Zakariya, J.(2019). "Awareness, Access and Utilization of Information on Climate Change by Farmers in Zamfara State, Nigeria". Library Philosophy and Practice (e-journal). 2106. https://digitalcommons.unl.edu/libphilprac/1771 Ekong, E.E. (2013).An Introduction to Rural Sociology. Uyo: Dove Educational Publishers.

Ekpoh, U.I. and Ekpoh, I.J. 2011. Assessing the Level of Climate Change Awareness among Secondary School Teachers in Calabar municipality, Nigeria: Implication for Management Effectiveness. *International Journal of Humanities and Social Science Vol No3*

Enete, A. A. and Amusa, T. A. (2010). Challenges of Agricultural Adaptation to Climate Change in Nigeria: a Synthesis from the Literature, Field Actions Science Reports [Online], Vol. 4. Available online @ http://journals.openedition.org/factsreports/678

Ibrahim, M. (2017). Climate Change? What Climate Change? Nigerian Farmers not being reached on Awareness. Part of a special project that explores the impact of climate change on the food security and livelihoods of small-scale farmers in Kenya, Nigeria, Senegal and Zimbabwe GODAI/NIGERIA, 5 July. Available online @ http://www.CLIMATE%20%20CHANGE%20 INFO/IRIN%20_%20Climate%20change%20

Kima, S. A., Okhimamhe, A. A; Kiema, A. Zampaligré, N., & Sule, I., 2015. Adapting to the impacts of climate change in the sub-humid zone of Burkina Faso, West Africa, perception of agro-pastoralists. Pastoralism: Research, Policy and Practice http://dx.doi.org/10.1186/s13570-015-0034-9

Kyekyeku, N.F. (2012). Climate Change Vulnerability & Coping Mechanisms Among Farming Communities in Ghana, Khansas State University, Manhattan, Kansas. Krex.k-state.edu/dspace/handle/2097/1516

Mukoya W, 1 and Mulinya C.1 (2018). Gender Roles in Climate Change Adaptation of Crop Production in Vihiga Sub-County, Kenya. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) Volume 12, Issue 9 Ver. III*

Nkeme, k k. (2016). Assessment of Farmers' Adoption of Climate Change Mitigation Technologies in Uyo Agricultural Zone of Akwa Ibom State, Nigeria. Journal of Agricultural and Ecology Research International. 7(3): 1 – 9. ISSN: 2394 – 1073

Ofuoku A U (2011). Rural farmers' perception of climate change in central agricultural zone of Delta state, Nigeria Indonesian Journal of Agricultural Science 12(2) 63-8

Okwu, O. J. and Acheneje, S. (2011). Socioeconomic analysis of fish farming in Makurdi LGA, Benue State, Nigeria. European Journal of Social Sciences. 23/4.

Olukosi, J.O. and Erhabor, P.O. (2008). Introduction to Farm Management Economics Agitab publication Zaria.

Olukunle Oyin (2004): Homestead Pond Management John Archers (Publishers) Ltd. lbadan, Nigeria. ISBN: 978-36421-89.

Roncoli, C., Ingram, K., & Kirshen, P. (2001). The Costs and Risks of Coping with Drought: Livelihood Impacts and Farmers [1]Responses in Burkina Faso. Climate Research, 19(2), 119-132.

Sanfo, S., Lamber, J. P. A., Mueller, M., & Fonta, W. (2014). Farmers' ′Perceptions of Climate Change and Climate Variability Versus Climatic Evidence in Burkina Faso, West Africa. Conference: Climate Change in Africa. Negotiations, Translations, and Socio-Political Implications. 10th – 12th September 2014, Center for Development Research (ZEF), Bonn, Germany, at Bonn, Germany.

Sugihardjo I, Sutrisno J, Setyono P. and Suntoro I. (2018). Climate change and farmers' cropping patterns in Cemoro watershed area, Central Java, Indonesia. *IOP Conference Series: Earth and Environmental Science; Earth Environ. Sci*. 129 012033.

Thomas, D. G., Twyman, C., Osbahr, H., & Hewitson, B. (2007). Adaptation to Climate Change and Variability: Farmer Responses to Intra-Seasonal Precipitation Trends in South Africa. Climatic Change, 83(3), 301-322.

Touré Halimatou A, Traoré K and Kyei-Baffour N. (2016). Farmers‟ Perceptions on Climate Variability and Adaptation Strategies to Climate Change in Cinzana, Mali. *Journal of Agricultural Studies*. Vol. 4, No. 3

Traore, B., Vanwijk, M. T., Descheemaeker, K., Corbeels, M., Rufino, M. C., & Giller, K.E., (2014). Farmer's Perceptions on Climate Change and on Agricultural Adaptation Strategies in Southern Mali. Under Review in Experimental Agriculture

Udoh, D.J, Ndon, B.A, Asuquo, P.E., Ndaeyo, N.U. (2005). *Crop Production Technique for the Tropics*. Concept Publication Limited, Mushin, Lagos, Nigeria.

Yaro, J.A. (2013). The perception of and adaptation to climate variability/change in Ghana by small-scale and commercial farmers. *Reg. Environ. Change*, 13, 1259–1272.

Zampaligré, N., Dossa, H.L.G. & Schlecht, E., (2013). Climate change and variability: Perception and adaptation strategies of pastoralists and agro-pastoralists across different zones of Burkina Faso. Regional Environmental Change, 14, 769-783.