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Barriers Faced By Cassava Farmers in Adapting To Climate Change in Oron Agricultural Zone of Akwa Ibom State

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***Abstract**: This study examined barriers faced by cassava farmers in adapting to climate change in Oron agricultural zone of AkwaIbom State. Multi-stage sampling was used to select eighty respondents for the study. Data was collected with the use of interview schedule. Barriers to adaptation were captured using a 4 point Likert-type scale, while the data was analyzed using descriptive statistics namely; mean, percentage, frequency count. Varimax rotated factor analysis was used to analyse the barriers faced by the cassava farmers in adapting to climate change . The findings show that 30% of the respondents were between the ages of 31 and 40 years. Majority of the respondents were male (67.5%), married (86.3%), literate (90%) with an average farming experience of 25 years. The result of the factor analysis identified eight major barriers faced by the cassava farmers in adapting to climate change namely; Land and labour constraints, non-accessibility/availability of farm inputs, non-availability/high cost of farm facilities, farming practices and traditional belief, information constraints, poor agricultural extension service delivery, income constraint and government non chalant attitude towards climate change issues. The study recommended that Agricultural development programme should make room for extension agents to visit farmer and disseminate proven measures to overcome barriers faced by these farmers in adapting to climate change.*
***Keywords:** Climate change, cassava, cassava farmers, Barriers*

I. Introduction

In the views of Intergovernmental panel on climate change (IPCC) (2007), climate change is a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period typically decades longer.

Climate change is a phenomenon induced by global warming. It is a topical issue affecting every facet of the world's economy. Developing countries such as Nigeria are vulnerable to the catastrophic effects of climate change. Climate change and agriculture have tremendous effects on each other. Agriculture affects climate change through the emission of Greenhouse Gas (GHG) from different farming practices while climate change in form of higher temperature, reduced rainfall and increased rainfall variability reduces crop yield and threatens food security in low income and agricultural-based economies. Therefore climate change is expected to have serious impacts on the environment, economy and social life of people, especially on the rural farmers whose livelihoods depend largely on agricultural activities. It was reported by Mahendra (2010) that climate change will result in ecological degradation and further threaten the fragility of dry soil and, with serious consequences for crop and livestock production and food security. Agriculture is the most assured engine of growth and development, and a reliable key to industrialization in Nigeria. This sector has been fallen short of expectations due to many factors in which climate-related disasters like drought and floods are one of the major ones.

Out of the major staple foods produce in Nigeria, cassava (M*anihot* spp) plays an important role in household food security. Cassava is a popular energy food in most of the tropics where its production and yield are prolific and has several advantages compared with other carbohydrate sources, especially other root crops; it has a high productivity under marginal climatic and soil fertility conditions, which result in a low cost raw material (Henry *et al*., 2001). Nigeria is the largest producer of cassava in the world (Ogbe *et al.,1999; Ogbe & Olojede, 2003*), but unfortunately the product is not readily available for consumption. In times of war, drought or low national incomes, cassava consumption increases relative to alternative food staples such as yam, maize, rice and wheat (Mendelsohn *et al.,* 2006).

Cassava in certain forms is a low income consumer's staple. Although an individual may not increase the quantity of cassava consumed. In a year, as national income declines, annual average cassava consumption per person increases because more people begin to substitute cassava for more expensive alternative food staples. (United State Department of Agriculture (USDA) 2001).

Cassava is affected by various diseases and insect pests. These pests and diseases include the African cassava mosaic disease, bacterial blight, and mealy bug. Green spider mite and larger grain borer also attack dry chips of cassava in storage. White ants sometimes have deleterious effects on cassava production by destroying

the stems that were planted before they sprout. Climate change and its associated temperature increase will increase the incidence of pest and diseases. Temperature increases has been said to encourage the evolvement of new diseases that will be able to thrive in specific temperature and humidity (Fatuase *et al.,* 2011).

Adaptation is one of the policy options for reducing the negative impact of climate change (Adger *et al.,* 2003; Kurukulasuriya & Mendelsohn, 2006). Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderate harm or exploits beneficial opportunities (IPCC, 2001). Common adaptation methods in agriculture include use of new crop varieties and livestock species that are better suited to drier conditions, irrigation, crop diversification, adoption of mixed crop and livestock farming systems, and changing planting dates (Bradshaw *et al.,* 2004; Kurukulasuriya & Mendelsohn, 2006; Nhemachera & Hassan 2007; Onyeneke, 2010).

It is evident that the climate is changing and at the same time exerting effect on man and his activities. Studies indicate that Africa's agriculture is negatively affected by climate change (Grigg, 1995; Pearce *et al.,* 1996; McCarthy *et al.,* 2001; Onyeneke, 2010; Ifeanyi-obi, *et. al.,* 2011). This may be said to be mostly as a result of dependence on rain fed agriculture and poor infrastructure capacity. Unfortunately, the climate change phenomenon may not be stopped as a result of man's continuous involvement in activities that causes emission of Greenhouse gas (GHG). Eboh (2009) stated that even if efforts to reduce greenhouse gas (GHG) emissions are successful, it is no longer possible to avoid some degree of global warming and climate change. Bearing this in mind, adaptation to the effects of climate change becomes very important if the goal of staple food security and better life for rural people will be ever achieved. Many countries are already making appreciable efforts to adapt to climate change but unfortunately a lot of constraints have and are still militating against this effort thereby bringing all efforts to zero.

Research has also proved that cassava as a crop is not left out in the menace of climate change. Despite advances in agricultural technology, cassava production remains uncertain and average crop yield is still low (Henry and Westby, 2001). Climate is claimed to be a factor in yield variations (Hershey *et al*., 2001).

Considering the above, there is need to examine the barriers faced by cassava farmers in adapting to climate change, as this will better equip the government and other agencies to tackle these hindrances thereby making adaptation to climate change more effective. It is against this background that this study seeks to identify the barriers faced by cassava farmers in adapting to climate change in Oron Agricultural Zone of Akwa Ibom State. Specifically the study described the socio-economic characteristics of cassava farmers in the study area and identified the barriers faced by cassava farmers in adapting to climate change in the study area.

II. Methodology

The study was carried out in Oron Agricultural Zone of Akwa Ibom State. It is one of the six Agricultural Zones in Akwa Ibom State. The zone is found in the flood plain of South Nigeria with the land mainly intersected by numerous streams and tributaries flowing into Cross River State. The study population consists of all registered cassava farmers with Agricultural Development Programme (ADP) in the Oron Zone.

Multi-stage sampling was used to select the sample for the study. In the first stage, out of the four blocks that made up the zone, two agricultural blocks were randomly selected namely Oron and Mbo blocks. Secondly, two circles were randomly selected from each of the selected blocks. These were Eyo-Abasi and Uya-Oro in Oron block; Udessi and Okobo in Mbo block. From the selected four circles 80 cassava famers were randomly selected based on equal proportion.

Data was collected with the aid of interview schedule. Descriptive statistics were employed in the analysis of data namely frequency, mean, percentage. Factor analysis was also used to analysis the barriers faced by cassava farmers in adapting to climate change.

III. Results And Discussion

Table 1 shows majority (30%) of the cassava farmers were between the ages of 41 and 50 years. . The mean age of the cassava farmers was 48years with the oldest being 72 years and the youngest being 29 years.

This could possibly imply that the cassava farmers used for the study were old enough to have been able to experience the change in climate and as such be able to give reasonable responses to the questions in this research.

The Table also shows that 67.5% were female. This reveals that majority of the respondents were females. In line with this finding, IFAD (1994) reported that women play a central role in cassava production, contributing about 58 percent of the total agricultural labour in the southwest, 67 percent in the southeast and 58 percent in the central zones, with involvement in virtually all activities, hoeing, weeding, harvesting, transporting, storing, processing, marketing and domestic chores.

The Table further shows that majority (about 89%) of the cassava farmers had above ten years of farming experience. On the average the cassava farmers had 25years farming experience. This could imply that the respondents had long time farming experience and could have over the years acquired wealth of knowledge

on climate change and corresponding adaptation measures for cushioning the effects of climate change as well as been able to identify barriers against effective adaptation. Mapuno *et al.,* (2008) earlier noted that farmers who have sufficient farming experience could be in better position to identify challenges and opportunities on climate change.

It was also shown that more than 90 percent of the cassava farmers were literate enough to read and write with at least primary education. This could serve as a facilitating factor in respondent's adoption of new adaptation measures. Agwu and Anyanwu (1996) in line with the above statement noted that increase in educational status of farmers positively influence adoption of improved technologies and practices

It further shows that majority (86.8%) of the cassava farmers were married and could be said to be responsible and matured enough to give reasonable answers to research questions.

The average household size was found to be 6 persons. The result reveals that their household size is fairly large and this strongly suggests the practice of the extended family system, which Ekong (2005) noted is common in rural areas. It could imply that more family labour will be readily available. Igben (1988) noted that relatively large household size is an obvious advantage in terms of farm labour supply.

The Table shows that 76.3% of the respondents had access to land below 5 hectares for their farming activities, while 2% had between 20 hectares of land and above. The result reveals that majority of respondents had access to land below5 hectares for their farming activities. This could be a reflection of the increasing pressure on available land as more people depend on a fewer portion of land for farming. Also it was gathered from the respondents that land in these communities is also used for other activities like building of both residential and industrial houses rather than only farming activities. These land-use changes could add to the deforestation of the area which is one of the likely causes of climate change.

It was also shows that approximately 21% of the cassava farmers had sale of product as their major aim of production, 49% had consumption as their major aim production while only 30% had both sale and consumption as their major aim of production.

Furthermore, it shows that only 28.8% of the respondents had been visited by agricultural extension officer. It could be implied that poor coverage of extension agents is one of the factors contributing to reduced productivity of farmers especially now that climate change is adversely affecting farming activities**.**

TABLE 4.1: Socio Economic characteristics of cassava farmers in the study area (n=80)

Characteristics	Variables	Frequency	Percentage	Mean
Age (Years)	30 & below	6	7.5	48
	31 – 40	21	26.3	
	41 – 50	24	30	
	51 – 60	15	18.8	
	61 – 70	11	13.8	
	Above 70	3	3.8	
Gender	Male	26	32.5	
	Female	54	67.5	
Farming experience	10 & below	9	11.3	25
	11 – 20	24	30	
	21 – 30	20	25	
	31 – 40	14	17.5	
	41 – 50	9	11.4	
	Above 51	4	5	
Level of education	No formal education	6	7.5	7
	Primary education	13	16.3	
	Secondary education	43	53.8	
	Tertiary education	18	22.5	
Marital Status	Single	7	8.8	
	Married	69	86.3	
	Divorced	1	1.3	
	Widowed	3	3.8	
Household Size	5 & below	14	17.5	6 persons
	6 – 10	53	66.25	
	11 – 15	12	15	
	16 and above	1	1.25	

Farm Size (hectares)	5 & below	61	76.3
	6 – 10	10	12.5
	11 – 15	7	8.8
	16 – 20	2	2.5
	21 and above	-	-
Aim of Production	Sale	17	21.25
	Consumption	39	48.75
	Both	24	30
Contact with Agricultural Extension Officer	Yes	23	28.75
	No	57	71.25

Source; Field data survey, 2012

IV. Barriers to climate change adaptation

Table 2 shows the barriers to effective climate change adaptation by cassava farmers in the study area. The results of the factor analysis revealed that eight major factors amplified the constraint experienced by cassava farmers in adaptation to climate change. These factors include; Land and labour constraints (Factor 1), non-accessibility/availability of farm inputs (Factor 2), non-availability/high cost of farm facilities (Factor 3), farming practices and traditional belief (Factor 4), information constraints (Factor 5), poor agricultural extension service delivery (Factor 6), income constraint (Factor 7) and government non chalant attitude towards climate change issues (Factor 8)

The specific issues that amplified land and labour constraints (factor 1) include Limited availability of farm land for farming (0.79), High cost of farm land (0.81), Inherited system of land ownership (0.64), Communal system of land ownership (0.87), Non availability of farm labour (0.76), and High cost of farm labour (0.65). In traditional societies, individual farmers do not usually have title to farmland but enjoy user rights, which could be withdrawn at any time by the custodian of the communal land. Benhin (2006) noted that farm size and land tenure status are some of the major determinants of speed of adoption of adaptation measures to climate change. Deressa (2008) noted that shortage of farm labour is one of the major constraints to climate change adaptation by farmers.

Under factor 2 (non- accessibility / availability of farm inputs) the factors that loaded high were; Poor access to improved varieties of cassava (0.81), Poor access to disease and pest resistant varieties of cassava (0.64), Lack of cassava varieties that are adaptable to low rainfall (0.76), Lack of cassava varieties that are resistant to drought (0.73), Untimely supply of essential inputs for farming. (e.g. fertilizers, cassava stem)(0.69) and inadequate organic manure for improving the soil fertilities (0.55).All these variables suggest scarcity of farm inputs particularly improved and resistant varieties, which raise their prices beyond the reach of the farmers. This could pose as a possible threat to the climate change adaptation by farmers. As noted by Reilly (1996), climate change might constitute significant addition to the stresses already borne by farmers such that adapting to it might be beyond their resource capabilities.

Regarding factor 3 (non- availability / high cost of farm facilities) the variables that loaded high under this factor include; Lack of access to weather forecast technologies (0.65), Non availability of processing facilities (0.58), Non availability of storage facilities (0.71), High cost of irrigation facilities (0.72), and Lack of functional irrigation scheme (0.63). Most African farmers are resource poor and cannot afford to invest on these facilities for climate change adaptation so as to sustain their livelihood during harsh climate extremes such as flooding and drought.

Factor 4 (farming practices and traditional belief) the variables that loaded include; Intense weed growth due to minimum tillage (0.66), Poor yield from crop due to minimum tillage operation (0.69), and Pest and disease infestation due to minimum tillage operation (0.79).

Under factor 5 (information constraint) the variables that loaded high under this factor include; Poor access to information sources (0.82), Inadequate knowledge of how to cope or build resilience to climate change (0.51), and Illiteracy of farmers and lack of knowledge on adaptation options (0.74). In the present information age, information problems could pose serious challenges to farmers' coping strategies as they may not be aware of recent developments regarding climate change adaptations and the necessary readjustments needed.

Under factor 6 (poor agricultural extension service delivery) the variables that loaded high under this factor include; Poor agricultural extension service delivery (0.58) and Inability of extension personnel to build resilience capacity of farmers on climate change (0.73).

In factor 7 (income constraint) only one variable loaded high under this factor and that is inadequate finance to cope with the changing climate (0.65). It could refer to lack of money by the farmers as a constraint to adaptation. Lack of money hinders farmers from getting the necessary resources and technologies which

facilitates adaptation to climate change. Adaptation to climate change is may be costly. In line with this Deressa (2008) reported that most of the problems or constraints encountered by farmers in adaptation to climate change are associated with poverty.

In Factor 8 (government non chalant attitude towards climate change issues) only one variable loaded high under this factor; Government non-chalant attitude towards climate change issues (0.68). Government institutions responsible for climate change issues in Nigeria, like every other government institutions in most developing countries are still weak and often irresponsive to the yearnings of the people.

TABLE 2: Factor analysis showing the barriers faced by cassava farmers in adaptation to climate change

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Communalities
Poor access to improved varieties of cassava.		0.815							**.737**
Poor access to disease and pest resistant varieties of cassava	0.378	0.644							**.631**
Lack of cassava varieties that are adaptable to low rainfall.		0.767	0.467						**.824**
Lack of cassava varieties that are resistant to drought.		0.735	0.335						**.647**
Intense weed growth due to minimum tillage.				0.667				0.367	**.515**
Poor yield due to minimum tillage operation.	0.347			0.697				0.349	**.747**
Pest and disease infestation due to minimum tillage operation.				0.796					**.688**
Limited availability of farm land for farming.	0.796						0.443		**.646**
High cost of farm land.	0.811	0.434							**.531**
Inherited system of land ownership.	0.648			0.386			0.327	0.322	**.731**
Communal system of land ownership.	0.876	0.343						0.472	**.592**
Poor access to information sources.	0.327	0.337			0.852		0.401		**.545**
Non availability of credit facilities.	0.476				0.335	0.332			**.548**
Lack of access to weather forecast technologies.	0.408		0.657			0.442	0.429		**.681**
Government non-chalant attitude towards climate change issues	0.462	0.328					0.346	0.689	**.537**

Non availability of processing facilities.	0.319		0.588						**.595**
Non availability of storage facilities.	0.419		0.711						**.706**
Inadequate finance to cope with the changing climate.	0.457	0.383					0.651		**.628**
High cost of irrigation facilities.	0.457		0.722	0.301		0.305			**.504**
Lack of functional irrigation scheme.			0.638			0.382		0.438	**.646**
Inadequate knowledge of how to cope or build resilience to climate change.					0.512		0.344		**.586**
Non availability of farm labour	0.761				0.436			0.383	**.592**
High cost of farm labour.	0.651	0.422				0.337	0.321		**.697**
Traditional belief/practices e.g. on commencement of farming season		0.379		0.679					**.507**
Poor agricultural extension service delivery.		0.416	0.360			0.581			**.680**
Inability of extension personnel to build resilience capacity of farmers on climate change.						0.731			**.578**
Illiteracy of farmers and lack of knowledge on adaptation options.				0.341	0.741	0.345			**.526**
Untimely supply of essential inputs for farming. (e.g. fertilizers, cassava stem)		0.698			0.441				**.614**
Poor water harvesting technology.					0.382				**.681**
Inadequate organic manure for improving the soil fertilities		0.553	0.353		0.356				**.508**
Eigen value	**4.572**	**2.638**	**2.229**	**2.109**	**1.926**	**1.723**	**1.436**	**1.350**	

Percentage variance	**15.239**	**8.792**	**7.429**	**7.031**	**6.421**	**5.744**	**4.788**	**4.499**
Cumulative percentage	**15.239**	**24.031**	**31.491**	**38.491**	**44.913**	**50.657**	**55.445**	**59.944**

Source: Field Survey Data, 2012

Factor 1 = Land and labour constraint, Factor 2 = Non accessibility / availability of farm inputs, Factor 3 = Non availability / High cost of farm facilities, Factor 4 = Farming practices and traditional belief, Factor 5 = information constraint, Factor 6 = Poor agricultural extension service delivery, Factor 7 = Income constraint, and Factor 8 = Government non chalant attitude towards climate change issues

V. Conclusion And Recommendation

Climate change is perhaps the most serious environmental threat to the fight against hunger, malnutrition, disease and poverty in Africa, essentially because of its impact on agricultural productivity. The study identified barriers faced by cassava farmers in adapting to climate change in Oron Agricultural zone of AkwaIbom State. Based on the results of the study, it was concluded that the cassava farmers are facing varieties of constrains in their effort to adapt to climate change with Land and labour difficulties being the major constraints.

Based on the findings of the study, it was recommended that the Agricultural development programme should make room for extension agents to visit farmers more regularly, create awareness, and disseminate proven measures to boost farmer's knowledge in adapting to climate change. The Government should also make more available information on climate change and possible ways to overcome barriers to adaptation. Also, this study calls for re-visitation of the land ownership system as well land policies by the government and agencies concerned in the study area in order to come out with better policies that can reduce the land constraint faced by the cassava farmers in trying to adapt to climate change

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