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Full length Research

Climate Change and Agriculture in Nigeria: Crop Farmers Perceptions and Adaptation to Climate Change and Variability in Benue State.

[1]Biam, C.K., [1]Akande, R.O. and [2]Demenongnu T.S.

[1]Department of Agricultural Economics, University of Agriculture, Makurdi, Nigeria.
[2]Department of Agricultural Extension and Communication, University of Agriculture. Makurdi, Nigeria.
Corresponding Author's Email: ckbiam@gmail.com

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Climate change phenomenon is currently receiving attention worldwide with the aim of ameliorating its devastating consequences on environment and people whose livelihoods are affected. The study investigated how crop farmers in Benue State of Nigeria perceive climate change and adapt to variations in climate factors. Primary data were collected from a sample of 345 crop farmers and analyzed using descriptive statistics and inferential statistics using the multinomial logit regression model. The results showed that farmers perceived climate changes in rainfall (100%), temperature (91.4%), hot day (98.6%), sunshine hours (88.7%) and wind speed (52.2%). The major effects of these variations were found to be increased farm labour (85.6%), uncontrolled weeds (82.3%) and the effects of these variations as reduced loss crop yield, loss of farm land and increased cost of production (81.7%). Important adaptation measures found to be used by farmers to mitigate the effects of climate change were planting of improved varieties (89.4%), planting different crops (94.4%), changing farm size (80.7%), use of fertilizers (73.7%) and changing planting dates (82.3%). Results of the multinomial logit regression model indicated that farmers social economic characteristics, such as age, access to credit, income, education, household size and farming experience significantly influenced the probability of farmers choice of adaptation measures. The study recommends that government policies should ensure that farmers have access to affordable credit, education, proactive extension services and larger farm size as these variables positively and significantly influenced the likelihood of farmers adaptation in order to increase their ability and flexibility to change production strategies in response to perceived climate change and improve their productivity.

Keywords: Climate change and variability, crop farmers' perceptions and adaptation, adaptation measures, adaptive capability

INTRODUCTION

Climate change is an environmental social and economic challenge on a global scale. It refers to the variation in the global or regional climates overtime by both natural and human induced changes. Climate change has been defined by IPCC (2001) as statistically climate change average temperature of the earth's atmospheric, oceans and land masses often referred to as global warming (Reddy, 2005). It may also be qualified as anthropogenic, that is caused by human factors or environmental externalities like chemicals, biological wastes and by products (Ibrahim et al., 2010). It includes shifts in the frequency and magnitude of sporadic weather evens as well as the slow continuous rise in global mean surface temperature (Ozor et al., 2010).

Climate change and agriculture are interrelated processes, both of which take place on a global scale. Agriculture is one of the sectors most sensitive to global warming and climate change. It is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation and glacial run-off. These conditions determine the carrying capacity of the biosphere to produce enough food for the human population (Lewandrowski et al., 1999). It effects agriculture in several ways, for instance, its impact on food production. Besides almost all sectors in agriculture (crop, livestock, forestry, fishery, etc.) depend on whether whose variability has meant that rural farmers who implement their regular annual farm business plans risk total failure due to climate (Ozor et al.,2010). Despite technological advances in agriculture, climate change is still a key factor to limitations in agricultural production in which two- thirds of the working population in Sub-saharan Africa still make their living (ILO, 2007). For countries, such as Nigeria, where over 70% of the population depends on agriculture, additional

uncertainties due to climate change further pose a challenge to the already precarious state of agriculture in the country. A rapid change in weather patterns creates added uncertainties to activities that are directly or indirectly affected by the weather, especially agriculture (Stein et al., 2001). Increases in mean temperatures have some effect on climate which alters factors limiting plant growth such as temperature, precipitation and nutrients supply. Changes in climate also engender increase in climate extremes and reduced soil and water availability. In Nigeria, crop production is dependent on rainfall. Even where irrigation facilities exist irrigation water supply is directly related to even rainfall distribution pattern. Other ways climate change affects agriculture include extreme weather events such as thunder storms, heavy winds and floods. Furthermore, pests and crop diseases migrate in response to climate change (Obinne, 2010).

Agricultural productivity in general could decline between 10 to 25 percent by 2080 in Nigeria. For some parts of the country, the decline in yield in rainfed agriculture could be as much as 50 percent (Ozor et al.,2010). Such trends clearly portend serious threats to Nigeria's quest to improve her food security, achieve the Millennium Development Goals (MDGs) and vision 2020. Rural households engaged in subsistent smallholder farmers are most vulnerable to the impacts of climate change on agriculture. They may be affected in the following ways: increased likelihood of crop failure, increase in diseases and mortality of livestock and forced sales of livestock at disadvantages prices increased livelihood insecurity resulting in assets sale, indebtedness out-migration and dependency on food aid and downward spiral in human development indicators such as health and education. Such impacts will further aggravate the stresses already associated with subsistence production, such as isolated location, small farm size, informal land tenure, low levels of technology and narrow employment options addition to unpredictable and uneven exposure to world markets that smallholder farmers, particularly risk prone in the face of climate change (Adejuwon, 2006). In general the various impacts of climate change on crop production in the country could have tremendous impact on income, employment and food production (Oladipo, 2010). Of labour employment and population processes and their characteristics (Oladipo, 2008). Therefore, understanding farmers perceptions of climate change as well as mitigation and adaptation measures adopted to cope with the risk posed by climate change and variability is critical to making improvements in the farmers productivity and agricultural production.

Adaptation is one of the policy options for reducing the negative impact of climate change and is widely recognized as a vital component of any policy response to climate change. Adaptation to climate change refers to adjustment in natural or human system in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities (IPCC, 2001). It is adjustment or intervention which takes place in order to manage the losses or take advantage of the opportunity presented by changing climate. Adaptation to climate change, according to Maddison (2001), requires that farmers first notice that climate has changed and then identify useful adaptation and implement them. Many agricultural adaptation options have been suggested in the literature, which include: crop diversification and altering the timing of operations, adoption of mixed crop farming system, market response, income diversification and credit schemes, institutional changes mainly subsidies and improvement in agricultural market, technological development of new crop varieties and advances in water management techniques. Most of these adaptation measures will only be possible when the farmers have complete or accurate knowledge of the climate and future climatic conditions.

The degree to which an agricultural system is affected by climate change depends on its adaptive capability. Adaptive capability is the ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damage, to take advantage of opportunities or to cope with the consequences (IPCC, 2001). Thus, the adaptive capability of the farmers describes their ability to modify their characteristics or behavior so as to cope better with changes in external conditions. Studies have shown that without adaptation climate change is generally detrimental to agricultural sector but with adaptation vulnerability can largely be reduced. Adaptation occurs at two main scales, the farm level macro-level that is concerned about agricultural production at the national and regional scales and its relationship with domestic and international policy. Micro-level analysis of adaptation focuses on tactical decisions farmers make in response to seasonal variations in climate, economic and other factors. Macro-level analysis on the other hand focuses on strategic national decisions and policies on local to regional scales taking in to account long term changes in climate, market and other conditions over non-time period (Bradshaw et al., 2004).

Some attempts have been made to study farm level adaptation methods in the Rain Forest Zone of Africa. The studies of Deressa et al. (2008) and Yesuf et al. (2008) in Ethiopia, and Gbetibouo (2009) in the Limpopo Basin of South Africa, identified the determinants of each of the adaptation methods but such studies in the Benue Valley of Nigeria seems to be limited , which has led a void in literature. Despite the fact that efforts have been made towards fighting climate change from scientific view, research into farmers' perceptions and knowledge of adaptation measures to climate change are needed so as to empirically direct policies that will motivate them to adapt to changing climate. The broad objective of the study, therefore, is to assess crop farmers perception of climate change and analyze the determinants of

adaptation measures in Benue State of Nigeria. The specific objectives are to determine the level of farmers' awareness and perceptions of climate change and variability; identify and assess the adaptation options adopted by the farmers as coping strategies, analyze the determinants of adaptation options; and identify barriers to adaptation measures. Findings of the study will provide information on the available adaptation measures which will guide farmers in their options of adaptation options for enhanced adoption of coping strategies. Also, it will analyze the determinants of adaptation options which will guide policy makers in articulating polices that promote adaptation to climate change and provide a database for further research on climate change adaptation measures for food production in Nigeria at large.

METHODOLOGY

The study was carried out in Benue State, Nigeria, located between latitudes 6^0 30'N to 8^0 , 10'N and longitudes 6^0 35'E to 10^0 E in the Southern Guinea Savannah agro-ecological Zone. Divided into three agricultural Zones, with Makurdi as the State capital, the State has a population of 4,780,389 (NPC, 2006) and 413159 farm families with a land mass of 33,955

Square Kilometer (BNARDA, 2005). Characterized by low lying large parcels of farm land that are traversed by rivers, streams, flood plains, lakes, ponds and few undulating hills, the drainage all empty into rivers Benue and Katsina-Ala and the two rivers combined give one of the biggest water ways in Nigeria. Benue State has a typical tropical climate marked with two distinct seasons, wet and dry seasons. The wet season lasts from April to October and the dry from November to March. The wet or rainy season with a mean precipitation of 15600mm has two peaks, May/June and August/September (BNARDA, 2005). Acclaimed the "Food Basket" of Nigeria, farming is the predominant occupation of Benue State indigenes. Diverse crops produced in the State include; cereal crops like rice, sorghum, maize, millet; roots and tubers include: yam, cassava, cocoyam, sweet potato; oilseed crops like pigeon pea, soyabean, sesame, groundnut; tree crops include: citrus, mango, oil palm, guava and cashew.

A multistage sampling procedure was used to purposively select one Local Government Area (LGA) from each of three Zones in the State, based on accessibility and proximity. From each of the selected LGAs, 115 crop farmers were randomly selected giving a total of 345 respondents for the study. The main tool for data collection was structured questionnaire which was administered on the respondents for collection of primary data.

Data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics used included frequency, percentage and mean while inferential statistics involved the use of multinomial logit regression model. Multinomial logit model is a probability model used to analyze the effect of several independent variables on a dichotomous dependent variable. The multinomial logit model was used because the categories in the independent variables are truly unordered (without sequence). This situation warrants the specification of multinomial logit model which can be used to estimate the effect of explanatory variables on a dependent variable with unordered response categories (Eboh, 2009). It is a multivariate technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables. Logit analysis produces statistically sound results by allowing for the transformation of a dichotomous dependent variable to a variable ranging from 0 to 1, the problem of out of range estimate is avoided audit assumes logistic distribution of errors in a set data. The uniqueness of this model is that the dependent variable is dummy or dichotomous (Vasisht, 2012).

The multinomial logit model is expressed as $Y=\ln [P_i/(1-P_i)]= a+ \beta_i X_i+u$

Where: Y = response probability, P= adaptation measures, a = constant, β_i = coefficients X_i = regressors, u = error term

Explicitly, it was stated as;

$Y =\ln [P_i/(1-P_i)] = a_o+ \beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4\beta+ \beta_5X_5\beta+ \beta_6X_6+ \beta_7X_7 +\beta_8X_8+\beta_9X_9\beta +\beta_{10}X_{10}+u$ Where: P= adaptation measures (dummy; 1= adapt, 0=no adaptation)

ao= constant

βs = vector of parameters to be estimated which increase or decrease Y

P_i=adaptation measures (i=1,2,3…..8): I=planting improved varieties, 2= cultivating different crops, 3= changing planting dates, 4= changing of farm size, 5 = irrigation farming, 6=use of fertilizers, 7= mulching, 8=changing from farm to nonfarm activities: X_i = regressors (i=1,2,3,…..10): X_1 = farmers' age (years), X_2 = farmers' gender (dummy: male = 1 female = 0), X_3=farmers educational level (years),X_4 farmers' farming experience (years), X_5 = farmers' farm size (hectares), X_6= farmers' household size (numbers), X_7 = farmers income (₦), X_8= farmers' contact with extension services (dummy: contact = 1, no contact = 0), X_9= farmers' access to credit (dummy: access = 1, no access = 0).

RESULTS AND DISCUSSION

The result of analysis of farmers awareness of climate change and observed variation in some climatic factors in their locations in the past 10 years is presented in Table 1. The result showed that all (100%) the respondents were aware of variation in rainfall while 88.7%, 98.5%, 97.4% and 52.2% reported awareness of variation in sunshine hours, hot day, temperature and

Table 1: Respondents Awareness and Perceived Climate Change and Variability in Benue State

Climatic Factors	Awareness		Observed	Variation
	frequency	%	frequency	%
Rainfall	345	100		
Onset of rain				
Early			327	94.8
Delayed			18	5.2
Volume of rain				
Increased			2.75	79.6
Decreased			70	20.4
Duration of rain				
Increased			328	95.0
Decreased			17	5.0
Sunshine hours	306		88.7	
Longer hours			282	81.7
Shorter hours			48	13.9
No change			15	4.4
Hot day	340	98.6		
Temperature	336	97.4		
Higther than normal			340	98.6
Lower than normal			-	-
No change			05	1.4
Wind speed	180	52.2		
Increased			136	39.4
Decreased			44	12.8
No change			165	47.8

Source: Field Survey, 2012

wind speed, respectively. This result corroborates IPCC (1995, 2001) reports that there is climate variation and long term climate change. The fact that all the respondents were aware of climate change and observed climate variability shows how obvious climate change is in Nigeria. While the IPCC reports contain information on global and regional climate change, this result demonstrates the local situation in Benue State, Nigeria.

Further results in Table 1 indicated that, 94.8% observed early onset of rains, 79.6% increased volume while 95% observed longer duration. Majority of the respondents reported longer hours of sunshine (81.7%), increased hot day (98.5%) and higher than normal temperatures (99%) while 47.8% observed no change in wind speed. This agrees with IPCC (2001) report that the global average temperature has increased over the 20th century by about 0.6^{o}C and Zabbey (2007) that Nigeria contributes significantly to global warming through flaring of gas. This may have contributed to the higher than normal temperatures reported by the respondents.

Results of analysis of respondents perceived effects of climate change and variability on crop farming activities in Benue State showed a number of effects presented in Table 2. The most preponderance effect of climate variation indicated is decrease in yield (98%), followed by crop loss (95.2%), increased weeds pests and diseases (86.8%), increased farm labour (85.6%) uncontrolled weeds (82.2%) and increased total cost of production (81.7%) in that order, with the last recorded effect of prolonged rainy season (33%). This result shows that there is a logical relationship among the climate change effects observed by the farmers and corroborates the findings of Umoh and Eketekpe (2010). Increased volume and duration of rainfall will expectedly lead to more infestation of weeds, pests and diseases, and flooding. Build up of weeds pest and diseases leads to decrease in yield and increased labour requirement which consequently leads to increase in total cost of production, and when flood occurs and persists, field crops are likely to be smothered leading to crop loss and sometimes loss of farm land.

The adaptation measures adopted by the farmers to guard against the impact of climate change are presented in Table 3. The result showed that the most used method is crop diversification which includes cultivating different crops (94.4%) and planting improved crop varieties (89.4%) followed by changing planting dates (82.3%), changing farm size (80.7%) and use of fertilizer (73.6%). The least methods adopted were

Table 2: Respondents Perceived Effects of Climate Change and Variability on Crop Farming Activities

Effects	Frequency	*Percentage	Ranking
Decreased Yield	338	98.0	1
Crop loss	328	95.2	2
Increased, pests and diseases	299	86.8	3
Increased farm labour	295	85.6	4
Uncontrolled weeds	284	82.3	5
Increased cost of production	282	81.7	6
Flooding of farm lands	250	72.4	7
Loss of farm lands	245	71.0	8
Unpredictable rainy season	221	64.0	9
Prolonged rainy season	219	63.5	10

Source: Field Survey, 2012

*Responses add up to more than 100% due to multiple responses

Table 3: Respondents Adaptation Measures to Climate Change and Variability in Benue State

Adaptation Options	Frequency	*Percentage	Ranking
Cultivating different crops	326	94.	1
Planting improved Varieties	308	89.4	2
Changing planting date	284	82.3	3
Changing farm size	278	80.7	4
Use of fertilizers	254	73.6	5
Mulching	215	62.3	6
Irrigation farming	166	48.1	7
Diversifying from farm to non-farm activities	135	39.0	8

Source: Field Survey, 2012

*Responses add up to more than 100 % due to multiple responses

reported to be irrigation (48.1%) and diversifying from farm to non-farm activities (39%). The adoption of crop diversification as the most common measure could be associated with the lower expense and ease of access by farmers, while the limited use of irrigation and diversifying from farm to non-farm activities could be attributed to the dependence on rainfed agriculture in the State and the need for more capital for irrigation and non-farm activities.

In assessing the determinants of farmers adaptation to climate change the multinomial logic regression model was estimated and presented in Table 4. The likelihood ratio statistics as indicated by chi square (χ^2) is highly significant at 1 percent, suggesting that the model has a strong explanatory power. The significance of the likelihood ratio statistics shows that farmers' socio-economic characteristics significantly affect adaptation to climate change. The results of the analysis are indicated as follows: Age (X_1): age of farmers is positive across cultivating different crops, changing planting dates, use of fertilizers and mulching, indicating a positive relationship between this variable and the likelihood of choosing these adaptation options. This could be because these options have been practiced for a long period of time. On the other hand, age of farmers has a negative influence on the likelihood of adopting planting improved varieties, irrigation farming, changing farm size and changing from farm to non-farm activities. This result agrees with the findings of Shiferaw and Holden (1998) that a negative relationship exists between age and adoption of improved soil conservation practices and that age decreases the probability of uptake of adaptation measures to climate change. Young and energetic farmers are expected to cultivate larger farms compared to the older and weaker farmers. Age also determines the ability to seek and obtain off farm jobs and income which younger farmers can do better. Gender (X_2): farmers' gender indicated positive sign across all adaptation options implying that male farmers adapt more readily to climate change than their female counterparts.

They significantly adapted to climate change with planting improved varieties and different crops, changing farm size, irrigation farming, use of chemical fertilizers and changing from farm to non-farm activities. This could be because male headed households are more likely to

Table 4: Constraints to Adaptation to Climate Change and Variability Indicated by Respondents in Benue State

Constraints	Frequency	*Percentage	Ranking
Poor income lack of capital	327	94.8	1
Lack of improved inputs	297	86.0	2
High cost of inputs	297	85.5	3
Inadequate credit facilities	289	83.7	4
Poor infrastructures	284	82.7	5
Poor extension service delivery	263	75.9	6
Inadequate information on climate change	247	71.6	7
Inadequate intervention by government	243	70.3	8
Lack of irrigation facilities	111	32.3	9

Source: Field Survey, 2012

*Responses add up to more than 100 % due to multiple responses

get information about new technologies and undertake more risky businesses than female headed households (Azfaw and Admassie, 2004). Also, having a female head of household may have negative effects on the adoption of soil and water conservation measures, because women may have limited access to information, land and other resources due to traditional social barriers (Tenge et al., 2004). Education (X_3): education of farmers is positive across all adaptation options indicating the positive relationship between education and adaptation to climate. Education significantly increases the planting of improved varieties, changing farm size, use of chemical fertilizers and changing from farm to non-farm activities. As the level of education increases, the percentage of farmers that adapt to climate change increases. This is probably because with increase in the level of education, farmers are able to adopt more modern farm technologies thus improving their adaptation capabilities. Farming experience (X_4): farming experience was positively signed across all adaptation options. and significantly influenced cultivating different crops, changing planting dates and mulching.. This implies that farmers' with longer experience in farming were likely to highly adapt to climate change. It is possible that these have over the years perceived climate change and have come to realize the need to adapt to climate change in order to maximize production and revenue. Farm size (X_5): farmers area of land cultivated is positively related to adaptation to climate change a cross all adaptation measures. The farm size of farmers significantly increases the likelihood of adopting planting of improved varieties, cultivating different crops and irrigation farming probably because these options need large land area to be practiced. The larger the farm size of the farm, the more the likelihood of adopting adaptation measures to reduce the negative effect of climate change. A farmer with a larger farm size, therefore, would more easily adapt to climate change than a farmer with a smaller farm size. Household size (X_6): the coefficient of household size is positively signed across all the adaptation options. As the household size increases, the probability of farmers adapting to climate change increases probably because a larger household size provides more readily available family labour to cope with increased labor requirement for adaptation. Household size was significant for adaptation options of cultivating different crops, changing farm size and from farm to non-farm activities, all of which require additional labour. Income (X_7): farm income increases the farmers access to adaptation measures as it was positively signed across all adaptation options. This variable had a positive and significant effect on planting improved varieties and different crops, changing farm size, irrigation farming, use of fertilizers and changing from farm to non-farm activities. Higher income farmers are less risk
averse and have more access to information, a lower discount rate and a longer term planning horizon (CIMMYT, 1993; Knowler and Bradshaw, 2007). Extension access (X_8): contact with extension agents had a positive influence on all adaptation options, except changing from farm to non-farm activities, implying that extension contact increases the likelihood of adapting measures to climate change that would increase agricultural production, which suggests extension services are important in reducing negative effects of climate change on farmers. Extension access positively and significantly influenced adaptation options of planting improved varieties, changing planting dates, use of chemical fertilizers and mulching. Credit access (X_9): farmers' access to credit facilities was positively signed across all the adaptation options. Credit has a positive and significant effect on farmer's likelihood of adopting planting of improved varieties and different crops, changing farm size, irrigation farming, use of chemical fertilizers and changing to non-farm activities to counteract the negative effects of climate change. Climate information (X_{10}): information on climate has positive and significant impact on cultivating different crops, changing planting dates and changing from farm to non-farm activities. Non-farm activity as an activity engaged in by farmers aside farming to supplement household income can increase the likelihood of adopting other adaptation measures.

Results in Table 4 show the constraints encountered by

respondents in their use of adaptation measures to climate change. The major constraints reported include lack of capital to acquire modern inputs and techniques (94.8%) lack of improved inputs such as seeds, fertilizers agrochemicals (86%) high cost of inputs, especially labour and fertilizers (85.5%), inadequate credit facilities (83.7 %), poor infrastructures (82.4 %) in that order and the least as lack of irrigation facilities (32.3%). The implication of this finding is that inadequate capital limits strategies that the farmer can adopt since most of the adaptation measures have cost implication. This situation is further worsened with the absence of credit facilities. Access to credit would greatly assist farmers to employ the adaptation strategies that require high capital outlay. Where agricultural extension service is inadequate farmers may be limited in comprehending the information they receive on climate change sometimes information from family and friends may be highly unreliable as some authors have noted that such channels of farm information may not be held in high credibility by farmers (Deressa, 2008; Ozor et al; 2010). High costs of associated some adaptation measures may constrain farmers from adopting them. For instance, many of the identified strategies such as planting different crops and changing farm size, place a heavy demand on labour. Unfortunately, hired labour may be expensive and or unavailable thus constraining farmers ability to use such strategies. This finding agrees with that of Kandlinkar and Risbey (2000) that lack of credit, rationing of inputs and lack of improved seeds limit the ability of farmers to get the necessary resources and technologies they need in order to adapt to changing climatic conditions. Also, the result corroborates the findings of Benhin (2006) and Ozor et al. (2010) that farmers are constrained by several, factors notably among which are limited availability of land, poor extension service delivery, and small farm size, lack of access to weather information, high cost of adaptation strategies, lack of access to credit facilities, government irresponsiveness to climate change risk management, high cost of inputs, labour and income constraints. This implies that the likelihood of farmers adapting measures to mitigate the effects of climate change is greatly influenced by these constraints

CONCLUSION AND RECOMMENDATIONS

The study has provided empirical evidence of perceived climate change and variability and adaptation measures to climate change by crop farmers in Benue State of Nigeria. The results have shown that farmers perceived climate variation in rainfall pattern, temperature, sun shine hours and hot day, and adapt in various ways to changes in these climatic factors. The common adaptation options delineated include planting of improved varieties and different crops, use of fertilizers, mulching, changing farm size and planting dates. The results of this research have some policy implications for development in agriculture in Benue State, and Nigeria at large, through adaptation to climate change.

Government policies should ensure that farmers have access to affordable credit and land to increase their ability and flexibility to change production strategies in response to perceived climate change. Education and extension contact are important determinants of resilience to climate change. Farmers should be encouraged to obtain more training education in school to help them get access to increased institutional support for adaptation to climate change.

Government should ensure proactive extension services, particularly information and packages that will help farmers adapt most of the responses to change.

Encouragement of responses to climate change at the State level by government at the National level will affect the speed and extent of adaptation. This response at the National level will be necessary, especially to encourage research training and communication concerning the most appropriate adaptive options (Onyeneke and Nwajiuba, 2010). The result of the analysis of the determinants of farmers adaptation measures usingmultinomial logit regression model indicates that farmers education, farm income, extension contact, farm size and access to credit positively and significantly influenced the likelihood ofadopting all adaptation measures. This result calls for policies that will ensure farmers increased educational level, farm income, extension contact, farm size access to credit to counter the negative effects of climate change in Benue State and Nigeria in general.

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