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DETERMINANTS OF CLIMATE CHANGE ADAPTATION AMONG ARABLE CROPS FARMERS IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

This main objective of this research work was to ascertain the Determinants of Climate Change Adaptation in Ikot Ekpene local government area, Akwa Ibom State, Nigeria. Data was collected with the aid of a well-structured questionnaire administered to 120 farmers selected from two clans of the LGA through a multistage sampling technique used in selecting the arable Crop farmers. Descriptive statistics and multi regression analysis were used to analyze the objectives of the study.Majority of the respondents about 88.18% (X=3.22) claimed to have idea of climate change, Noticeable increase temperature (X=2.99), Also 42.72% with mean of (X=2.48) of the respondents is aware of experience poor and unpredictable yield. Also 85.46% (X =3.18) of the respondents agreed knowing the risk of rainfall irregularities, since late rainfall has adverse effect on crop growth and yield. Other variables include occurrences of drought (X =1.74), moisture stress causes severe damages (X =2.20), indicating that 70% do not really know or experience such in their area. Increasing pests and diseases (X =2.99), implying that 73.64% notice increase in pest and diseases in the study area. The mean of measures adapted by respondents included, Change planting and harvesting time (x=3.99), Prevent bush burning (x=3.81), Plant legumes (x=3.85), Practice crop rotation (x=3.82), Treatment of soil (x=3.73), Use improved /drought resistant variety (x=3.63), Control erosion (x=4.49). There is need for multidisciplinary approach of extension so that there is an increased and strengthened adaptive capacity of the households. There is need to bring together farmers all stakeholders to develop common understanding of different perceptions to facilitate a better and acceptable strategy.

Key Words : Determinants ,Climate Change, Adaptation, Arable Crops

INTRODUCTION

According to Intergovernmental Panel on Climate Change (IPCC) (2001; 2007) climate change is the average weather conditions of a given place over time. The classical period is 30 years as defined by the World Metrological Organization (WMO). Climate encompasses the statistics of temperature, humidity, atmospheric

pressure, wind, precipitation, atmospheric partial count and other metrological elemental measurement in a given region. On the other hand, climate change is a significant and lasting change in the statistical distribution of weather patterns over period ranging from decades to millions of years (Wikipedia, 2010). Climate change and Agriculture are inter-related processes, both of which take place on a global scale.

Adaptation helps farmers achieve their food, income and livelihood security objectives in the face of changing climatic and socioeconomic conditions, including climate variability, extreme weather conditions such as droughts and floods, and volatile short-term changes in local and large-scale market (Kandlinkar and Risbey, 2000). In this perspective, Farmers therefore have the ability to reduce the potential damage by making tactical responses to these changes.

Arable crops happens to be those crops in which the life cycle is within one year; from germination to seed production and maturity, examples are; yam, maize, cocoyam, cassava, and many others. The increase in food prices and food insecurity in various homes is connected with the challenges facing arable crop production in the rural areas. Arable farming or farming as the case may be is subjected to various challenges ranging from scarcity of land and poor soil fertility, natural hazards, soil degradation, pests and diseases infestation, variations in rainfall and temperature, among others. Climate change has been observed to have serious direct impact on agricultural production, because of the climate-dependent nature of agricultural production systems (Enete et al., 2011).

Sowunmi and Akintola (2010) in their studies observed that the decline in crop yield and food production could be attributed to reduction or changes in rainfall, increased temperature, increased relative humidity, among others which are agents of climate requires that farmers to perceive the changes in the prevailing climatic conditions and then identify useful mitigation practices or strategies. Nigeria is an Agrarian Economy with 75% small farmers accounting for the nation's agricultural output making arable crop farmers to depend largely on rainfall for high level of productivity. According to Sha, Fischer and van Velthuizen (2009) the adverse consequences of climate change will take an irreplaceable toll on food production and food security especially in developing countries which have a low capacity to cope and adapt to these challenges. Temidayo Gabriel Apata (2009) also asserted that climate change in the form of higher temperature, reduced rainfall and increased rainfall variability reduces crop yield and threatens food security in low income and agriculture-based economies like Nigeria. Evidence from Schlenker and Roberts (2009) confirmed the effects of climate change on farm net revenue in different parts of the globe through rainfall and temperature variability.

In Akwa Ibom State, effort have been made by small scale farmers to adapt to the changing climate but since it is at a local level, it seems unorganized and influenced by a set of factors. It therefore needs well integrated and holistic approach to the entire system of agriculture.The production of arable such as crops cassava, yam, maize, cocoyam, etc are declining drastically due to the effect of climate change in the rural area which could be seen physically through indiscriminate delayed rainfall, high temperature, infestation of pest and diseases and couple with other constraints such as low income level of the farmers, lack of credit facilities and many others. The researcher at this point was aimed at digging

deep to find the determinants of climate change adaptation among arable crop farmers in the study area. The Broad Objective of the study was to analyze the determinants of climate change adaptation among arable crops in, Akwa Ibom State, Nigeria.

Methodology

Study Area

Akwa Ibom is a state in Nigeria. It is located in the coastal southern part of the country; it is has a total land area of 714km$^{2.}$ It lies between Latitude 7^{o} 71' and 5^{o} 33 North; and Longitude 7^{o} 35' E and 8^{o} 25's East. The study area is in the rainforest zone and has two distinct seasons via: the rainy and the dry season. The annual precipitation ranges from 2000-3000mm per annum. Most of the inhabitants of the study area are small scale farmers dwelling especially in the peri-urban and rural communities and the most commonly cultivated crops grown in the area include: Yam, cocoyam, Cassava, maize, Raffia palm, Citrus and Vegetables etc.

Sampling Size and Sampling Technique

Multistage sampling technique was used in selecting respondents for the study. This was done to ensure unbiased selection of respondents. 60 respondents were randomly selected from two agricultural zones making a total of 120 respondents. Data for the study was from primary source. A structured questionnaire was administered to the 120 farmers and personal interviews was also granted to ensure consistency and accuracy of data collection and the entire questionnaire was retrieved and data entered for analysis.

Data Analysis

To identify the socio-economic characteristics of arable crop farmers; frequency count and percentage was used

To identify the level of farmers' awareness to climate change; A 4-point likert rating scale of strongly disagree = 1, disagree = 2, agree =3, strongly agree = 4 with a means of 2.5 was used to assess the level of awareness of climate change.

Explicitly, 1+2+3+4=10

10/4=2.5

To identify the effectiveness of the adaptation measures used by the farmers; A 5-point likert rating scale of analysis, never, rarely, seldom often, always to which the numerical values 1,2,3,4,5 was assigned respectively, when added up and divided by 5 gives a mean of 3.

Explicitly, 1+2+3+4+5= 15

15/5=3

Results and Discussion

The socio-economic characteristics of arable crop farmers in Ikot Ekpene Local Government Area of Akwa Ibom State is presented in table 1a and 1b with 56.4% of the respondents being male and 43.6% being female implying that men were found to be more active participants than female farmers. Also majority 69.1% of the respondents is married while 10.0% of the respondents are single, 6.4% is divorce, 14.5% are widowed. This may indicate that the majority of arable crop farmers in Ikot Ekpene Local Government Area can generate enough income to sustain the family.

Table 1a.Socio-Economic Characteristics of Arable Crop Farmers

Gender	Frequency	Percentage (%)

Male	62	56.4
Female	48	43.6
Total	**110**	**100**
Age Range	**Frequency**	**Percentage (%)**
18-30	11	10.0
31-50	65	59.1
51-60	22	20.0
61-above	12	10.9
Total	**110**	**100**
Marital Status	**Frequency**	**Percentage (%)**
Single	11	10.0
Married	76	69.1
Divorced	7	6.4
Widowed	16	14.5
Total	**110**	100
Educational Level	**Frequency**	**Percentage (%)**
Non-Formal	7	6.4
Primary	22	20.0
Secondary	56	50.9
Tertiary	25	22.7
Total	**110**	**100**

Source: Field Survey Data, 2019

Also the educational status of the respondents shows that about 50.9% of the arable crop farmers had secondary education, 22.7% had tertiary education while 20.0% had primary and 10% had primary respectively while 7% of the arable crop farmers had no formal education.

Table 1b.Socio-Economic Characteristics of Arable Crop Farmers

Arable crop farmers	**Frequency**	**Percentage (%)**
Yes	98	89.1
No	12	10.9
Total	**110**	**100**
Years of Experience	**Frequency**	**Percentage (%)**
1-5	6	5.5
6-10	12	10.9
11-15	41	37.3
16-20	34	30.9
21-above	17	15.4
Total	**110**	**100**
Purpose of Cultivation	**Frequency**	**Percentage (%)**
Household	29	26.4
Commercial	22	20.0
Both	60	53.6

Total	**110**	**100**
Cooperative Member	**Frequency**	**Percentage (%)**
Yes	39	35.5
No	71	64.5
Total	**110**	**100**
Land Acquisition	**Frequency**	**Percentage (%)**
Inheritance	54	49.1
Purchase	28	25.5
Leased	8	7.2
Contract	1	0.9
Both	19	17.2
Total	**110**	**100**
Farm size	**Frequency**	**Percentage (%)**
Less than 1 ha	54	49.0
More than 1 ha	56	50.9
Total	**110**	**100**
Non faming activities	**Frequency**	**Percentage (%)**
Civil service	27	24.5
Pensioner	15	13.6
Artisan	15	13.6
Petty trader	41	37.1
Driver/rider	1	0.9
Bulk seller	2	1.8
Others	9	8.2
Total	**110**	**100**
Income per annum	**Frequency**	**Percentage (%)**
< N 100,000	31	28.2
N100,000- N150,000	52	47.3
N151,000 -N200,000	14	12.7
>N 200,000	13	11.8
Total	**110**	**100**
Type of labour	**Frequency**	**Percentage (%)**
Family	58	52.7
Hired	41	37.3
Both	11	10.0
Total	**110**	**100**
Seed acquisition	**Frequency**	**Percentage (%)**
Market	27	24.5
ADP	3	2.7
Neighboring farm	6	5.6
Previous harvest	14	12.7
Combined	60	54.5
Total	**110**	**100**

Farm distance	Frequency	Percentage (%)
< 1 Mile	77	70.0
> 1 Mile	33	30.0
Total	**110**	**100**
Type of tools used	**Frequency**	**Percentage (%)**
Local tools	100	90.9
Tractor	0	0
Both	10	9.1
Total	**110**	**100**

Source: Field Survey Data, 2019

The educational status of crop farmers will enable them to acquire knowledge and skill and this will help to increase their productivity and reduce food insecurity. This result is in collaboration with the findings of Okon, Agom, Ukpe & Amusa (2016) who observed high literacy level of farmers in the study area.

About 68% of the respondents had 11-20 years of experience in farming, implying that these farmers are well knowledgeable on farming activities. According to Brady, Dumanski, Johnston, Chiotti, Singh (2008), greater years of farming experience increase the possibility of adoption of innovations and new technologies. 53.6% of the respondents cultivate arable crops for family use and commercial use; this implies that food security is ensured. 49.1% inherited the land they used in cultivation and 25.5% purchased the land while 17.2% acquired the combination of the above land sources, implying that they have land for cultivation. Over sixty percent (64.5%) of the respondents did not belong to cooperative societies while about 35.5% were members of co-operative societies. The result also reviled that 90.0% of the farmers used local tools and implement while 9.1% used both tractor and local tools implying that large agricultural activities is not predominant in the study area.

More so, since agriculture is a seasonal activity respondents engage into different non agricultural activities which was reviled to be the following, civil service 24.5%, pensioners 13.6%, artisans 13.6%, petty trade 37.1%.The results of farmers' annual income showed that majority (47.3%) of the farmers were low income farmers. Only 11.8% of the farmers had earned above N 200,000 annually from the sales of their farm produce. This showed that farming in the study area was practiced at a subsistence level.

Respondent's Knowledge of Climate Change

Result from Table 2 below shows that majority of the respondents about 88.18% (X=3.22) claimed to have idea of climate change, which implies that they are aware of the effect of climate change. Noticeable increase temperature (X=2.99), indicates that the respondent are aware that the temperature is increasing.

Table 2. Respondents Awareness of climate change issues (n=110)

Awareness indicators	SD 1	D 2	A 3	SA4	TR	MEAN	DECISION
Idea of climate change	7	6	52	45	355	3.22	Accepted
Increase in temperature of your locality	8	13	61	28	329	2.99	Accepted
Idea of the risk of rainfall irregularities	2	13	54	40	350	3.18	Accepted
Experience poor and unpredicted yield	20	30	47	13	273	2.48	Rejected
Increase in pest in diseases	5	24	48	33	329	2.99	Accepted
Moisture stress cause severe damage to crop	38	39	6	27	242	2.20	Rejected
Occurrence of drought	56	35	11	8	191	1.74	Rejected
Other weather irregularities	32	29	36	14	254	2.31	Rejected

Source: Field Survey Data, 2019

Also increased temperature in the study area could also lead to poor crop development and poor yields. Also 42.72% with mean of (X=2.48) of the respondents is aware of experience poor and unpredictable yield. Also 85.46% (X =3.18) of the respondents agreed knowing the risk of rainfall irregularities, since late rainfall has adverse effect on crop growth and yield. Other variables include occurrences of drought (X =1.74), moisture stress causes severe damages (X =2.20), indicating that 70% do not really know or experience such in their area. Increasing pests and diseases (X =2.99), implying that 73.64% notice increase in pest and diseases in the study area. The result implies that farmers sampled for the study had variation in their responses due to their varying degrees of knowledge about climate change.

Table 3: Farmers' Level of Adoption of Climate Change adaptation strategies

Adaptation measures	Never 1	Rarely 2	Seldom 3	Often 4	Always 5	TR	MEAN X
Change planting and harvesting time	8	12	8	19	63	439	3.99
Prevent bush burning	7	12	22	23	46	419	3.81
Plant trees	47	23	9	14	16	241	2.19
Plant legumes	8	9	12	34	47	424	3.85
Remove crop residues after harvest	30	24	30	15	11	283	2.57

Plant wind break	51	25	6	13	15	246	2.24
Create forest	84	19	2	0	5	153	1.39
Establish fire break	20	24	28	23	16	324	2.95
Practice crop rotation	2	11	15	27	54	420	3.82
Treat your soil	6	22	18	14	50	410	3.73
Use improved/drought resistant variety	10	13	20	16	51	399	3.63
Control erosion	2	6	3	24	75	494	4.49

Source: Field Survey Data, 2019

Table 3 shows the mean adoption score of 2.50 serving as the cut-off between high and low level of adoption of climate change adaptation measures. Only 6 out of the adaptation measures very high adoption, they included, Change planting and harvesting time (x=3.99), Prevent bush burning (x=3.81), Plant legumes (x=3.85), Practice crop rotation (x=3.82), Treatment of soil (x=3.73), Use improved /drought resistant variety (x=3.63), Control erosion (x=4.49).

However, (2) measures were recorded Very low (least) adoption which was planting of trees(x=2.19) and creating of forest(x=1.39). This finding is in consonance with the findings of Nkeme & Ndaeyo (2013) who reported low level of adoption of irrigation among farmers in the rain forest zone.

Conclusion / Recommendations

Since most rural farmers depend on rain-fed agriculture as their source of livelihoods and have a low capacity to adapt to changes in climate change, policies to help farmer adopt are of great importance. An understanding of the adaptation measures employed by the household will enhance policy towards tackling the effects of climate change. Adaptation strategies employed by households in the study area; Change planting and harvesting time , Prevent bush burning , Plant legumes, Practice crop rotation , Treatment of soil, Use improved /drought resistant variety, Control erosion. The state government, farming communities and farming households and other agricultural stakeholders should encourage and promote the formation of social group among farmers to strengthen interaction among practicing farmers. This will give them more access to relevant information on climate change adaptation. There is need for multidisciplinary approach of extension so that there is an increased and strengthened adaptive capacity of the households. There is need to bring together farmers all stakeholders to develop common understanding of different perceptions to facilitate a better and acceptable strategy.

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