Farmer's perception of climate change and adaptation measures in Ikot Ekpene Local Government Area of Akwa Ibom State, Nigeria

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1: Abstract

The objective of this study was to assess the level of climate change awareness and adaptation measures by farmers in Ikot Ekpene Local Government Area of Akwa Ibom State, Nigeria. Multistage sampling technique was used to select the respondents for the study. There are two districts (Urban and Amanyam) in Ikot Ekpene L.G.A, consisting of forty five villages. Five villages (Nyara enyin nto uno, Ikot ediet, Nsiak, Abak oko, and Ikot Ekpene), using 10% sampling intensity were randomly selected out of the two districts (three in Urban district and two in Amanyam district), and 24, 23, 24, 25, and 29 households were randomly selected from each the villages respectively on 0.8% sampling intensity. In all, 125 farmers constituted the sample size for the study. Structured questionnaires, focused group discussion and personal interviews were used to elicit in-depth information from the respondents. Data were analyzed using descriptive and inferential statistics. Charts and tables were used in the presentation of data. Chi-square (X^2) statistics was used to test the hypotheses. The results showed that majority (76 %) of the household heads were men and (47.2%) belonged to the gender category of adult male within the age bracket of 31- 40years, with the family size of 4-6 members. The results of the study also revealed that nearly 60% of respondents knew little or nothing about climate change and its impact. Specifically, it was found that 12.8% of the respondents knew little about climate change while 46.4% stated that, they do not know about climate change at all. On the other hand about 40.8% of respondents indicated that they were aware of climate change impacts. The study also revealed that adaptation measures to climate change impact were adopted by 39.2% of the respondents. These include use of improved crop varieties, weather forecast, education and training, soil and water conservation among others. The result from the chi-square analysis showed ($P > 0.05$) indicating that awareness and adaptation measures were low. Based on the findings of this study, it was recommended that farmers need to be more educated on climate variability affecting them through forest extension agents, institutions and government using radio and television. Adequate environmental education for farmers, afforestation/reforestation programmes, and adequate forest law enforcement should be carried out.

Keywords: *Adaptation, climate change, farmers, measures, perception.*

2: Introduction

Climate change refers to a change which is attributed directly or indirectly to human activities that alter the composition of the global atmosphere and which are in addition to natural climate variability observed over comparable time periods (United Nations Framework Convention on Climate Change, 1992). It has become one of the major global challenges of the 21st century. Nigeria's climate is already changing (NIMET, 2008), and it has been observed that the developing Local Government Areas in Akwa Ibom State (Ikot Ekpene inclusive) may suffer most from the impacts of climate change. The extent of climate change and its impact however differs from place to place. The current scientific consensus attributes the major causes of climate change to anthropogenic (human) activities associated with agriculture, fossil fuel and change in land use which result in the consensus release of greenhouse gases such as carbon (IV) oxide (CO_2), methane (CH_4), Nitrous oxide (N_2O) and water vapour, which are naturally occurring in the atmosphere and their consequent destruction of the ozone (O_3) layer

Climate change has therefore, emerged as a major challenge to development in the 21st century (Speranza, 2010). Human activities have tended to exacerbate climate change and its impacts on agriculture and livelihoods in Ikot Ekpene L.G.A of Akwa Ibom State, Nigeria.

It is to be noted that farming in Ikot Ekpene is highly dependent on rain, as irrigation is seldom practiced. The changes in rainfall, temperature, sunshine patterns have greatly affected crops, livestock and non - timber forest products (NTFPs). There are numerous ways in which climate change may have impact on Agricultural production. In some cases drought has hindered rain fed agriculture as crops will wither in the absence of rain. In other areas, change in rainfall distribution and quality has decreased the photodiode which will decrease crop production in long-

day plants. All these impacts necessitate a change in the method of cultivation and the use of improved seeds that adapted to drought or long periods of heavy rain.

Eboh, (2009), stated that the impact of climate has led to flooding, erosion, drought, pest and diseases outbreak on crops, changes in dates of onset and end of rainy season which in turn has led to decline in agricultural productivity, poverty, malnutrition and migration among farmers. All these have contributed to climate change, the impacts of which are already being felt in the region with food insecurity, increasing risk of disease and the rising costs of extreme weather damage.

To cope with this obstacles, the rural poor depends on indigenous knowledge for adaptation, hence, climate action through adaptation is therefore increasingly important. Adaptation is understood to include efforts to adjust to ongoing and potential effects of climate change. Within the context of climate change, adaptation includes the actions people take in response to, or in anticipation of changing climate conditions in order to reduce adverse impacts or take advantage of any opportunities that may arise, (Mani, 2008). Noteworthy is the fact that farmers of Ikot Ekpene communities, may knowingly or unknowingly be adapting to the changing in climatic conditions using their traditional knowledge, innovations and practices.

Climate change also requires the development of natural resource management strategies that ensure the sustainable use of soils and water, halt biodiversity decline and deal with emerging issues such as growing demand for renewable energy. Societies must therefore respond by both minimizing further warming by reducing the concentration of greenhouse gases in the atmosphere and finding ways to adapt to the impacts that warming will bring, such as changes in rainfall and temperature, more frequent and severe extreme weather events, and sea-level rise.

This knowledge is beyond the understanding of the local farmers. A careful study of the change that have taken place in the climate of the study area is necessary in order to identify the adaptation measures that are best suited to the area under consideration. It is for this purpose that this research has been proposed to provide answers to the following questions:

- What are the socio-economic characteristics of farmers?
- To what level are the farmers of Ikot Ekpene Local Government Area aware of climate change?
- What measures, if any, have they taken to adapt to climate change effect?

3: Materials and Method

3.1: Description of the study area:

Ikot Ekpene Local Government Area is located in the northern part of Akwa Ibom State. Geographically, It is located between latitude 5^0 10'' and 5^0 30'' North and longitude 7^0 30'' and 7^0 45'' East and occupies a landmass of 45 Sq km (116 km^2) (Tom and Okure, 2014). The soils are loose and highly weathered, but support intensive agricultural activities in the agro-ecological zone (Wokocha, 2009).

The area is characterized by gently undulating topography with hills located in the northern parts and is sloping towards southwest (George, Akpan and Obot, 2014).

The area has an annual rainfall that ranges from 1,712 – 2,000 mm per annum. The rainfall pattern has a characteristic bimodal distribution with peaks usually in June and October, ending March. Currently, the rainfall pattern is dramatically changing due to environmental changes in which the rainfall pattern cannot be predicted, (George, *et al.*, 2014). Relative humidity is prevalent in the area and varies throughout the year between from 70 % - 80% (Wokocha, 2009).

The maximum daily mean temperature lies between 28° C and 32° C during March and the minimum daily temperature lies between 23° C and 24° C during July and August (George *et al.*, 2014).

The Vegetation is of the heavy rain forest type. What is left in most places is secondary forest and derived savannah. Dominant vegetation is herbaceous plants, green trees, foliage, shrubs and oil palms (George *et al.*, 2014).

3.2: Population of the study area and sampling method

Ikot Ekpene Local Government Area of Akwa Ibom State has a population of 143,077 people with 75, 548 male and 67, 529 female (National Population Census, 2006).

The area is made up of two (2) districts with forty five (45) villages (Table 1). The first district, (Urban) consists of twenty seven (27) villages, while the second district (Amanyam) consists of eighteen (18) villages (Nigeria Zip Codes, 2017).

Table 1: List of Villages in the two districts of Ikot Ekpene Local Government Area

S/N	Urban district	Amanyam district
1	Abak Oko	Abak Ifia
2	Abiakpo Edem Idim	Abiakpan Ikot Irem
3	Abiakpo Ikot Essien	Abiakpo Ntak-Inang
4	Akanaan	Adaratak
5	Ibiakpan	Essien Mbiaso
6	Ibiakpan Ikot	Ibong Ikot Akan
7	Ibiakpan Nto Akan	Ikot Akpan-Abia
8	Ibiakpo Edem Idim	Ikot Edet
9	Ibong Nto Akan	Ikot Enwang
10	Ifuho	Ikot Obong Otoro
11	Ikot Idem	Ikot Osura
12	Ikot Abia Idem	Ikot Out
13	Ikot Inang	Ikot Uboh
14	Ikot Obong Edong	Ikot Udo Osong
15	Ikot Out	Mbiaso Ikot Uso-Udo
16	Ikot Ekpene Village	Mbiaso Nto-Obio Ekong
17	Ikotobio Okpon	Nbo Obodom Ibiaso
18	Itak Ikot Udo-Okop	Nyara Enyin-Ntong Uno
19	Ndem Ekpot	
20	Nkap Ikot Obio Ebok	
21	Nsiak	
22	Obioekere	
23	Uruk Uso	
24	Utu Edem Usong	
25	Utu Ikot Ekereneng	
26	Utu Ikot Essien	
27	Utu Ikpe	

Source: Nigeria Zip Codes, 2017

3.3: Sampe size and sampling techniques

Multistage sample technique was used for this research. A total of forty seven (47) villages in the two (2) districts make up the villages in Ikot Ekpene Local Government Area of Akwa Ibom State. Based on this, a sample size of five (5) villages (3 in Urban district, and 2 in Amanyam district), representing 10 % sampling intensity of the villages in each district were randomly selected for this study by draws from two baskets, one containing a collection of all the villages in Urban district, and the other, villages in Amanyam district, all in folded pieces of papers. The selected villages from Urban district were Abak Oko, Ikot Ekpene village, and Nsiak, while Ikot Ediet and Nyaraeyin Ntong uno villages were selected from Amanyam district.

In the selection of number of respondents, a simple random sampling technique was adopted. From the 2006 N.P.C population record of the above selected villages, 0.8 % sampling intensity was adopted, and was used to randomly select the required number of respondents for the study (Table 2).

Table 2: Population of the study area

N/S	COMMUNITIES	MALE	FEMALE	TOTAL POPULATION (NPC, 2006)	0.8 % SAMPLING INTENSITY
1	Nyara enyin nto uno	1,814	1,230	3,044	24
2	Ikot Ediet,	1,299	1,451	2,850	23
3	Nsiak	1,500	1,487	2,987	24
4	Abak Oko	1,629	1,515	3,144	25
5	Ikot Ekpene	1,894	1,678	3,572	29
	Total	**8,136**	**7,361**	**15,497**	**E = 125**

Source: NPC, 2006

At the village forum, village chief, village secretary, village chairman, vice chairman, women leader and youth president were purposively selected from the selected villages for the focused group discussions based on the fact that they may have more knowledge about their villages. In all, a total of 125 respondents were sampled.

From each of the selected villages, 25, 29, 24, 23, and 24 farmers from Abak Oko, Ikot Ekpene, Nsiak, Ikot Ediet, and Nyaraeyin Ntong Uno respectively, were randomly selected, making a total of 125 farmers/respondents. The gender group of farmers include: Elderly male, elderly female, adult male, adult female, male youth and female youth.

3.4: Data collection

The data used for this study were obtained from both primary and secondary sources in order to address the objectives of this study.

Primary source was based on the administration of structured questionnaire, focused group discussion, personal interview, identification and direct field observations through transect walk.

Data were also gathered from secondary sources. These sources are; Population Commission office at Ikot Ekpene, River Basin Development Authority Akwa Ibom State and the Department of Geography and Environmental Science, University of Calabar, and others related documented such as; text books, Journals, magazine, conference proceedings and reports.

3.5: Method of data collection

Rapid Rural Appraisal (RRA) (transect walks, identification and observation) was used first to encourage the respondents to describe their relationship with their natural resources, particularly the indigenous adaptation measures. Again, this helped in identifying variables of importance to the farmers and in the formulation of questions that were included in the structured questionnaires. Secondly, Structured questionnaires, personal interview and focused group discussions (FGDs) were also used in collecting the relevant data for this study.

3.6: Structure of the Research Instrument (Structured Questionnaire)

The structured questionnaire was divided into three sections (A-C) and all the sections are relevant to the analysis presented in this working paper. Section A (17 items) which deal with socio- economic/bio data of respondent. Respondents' were asked to tick option most appropriate to their personal data and to list the most important livestock, crops and non -timber forest products (NTFPs) in their agricultural venture in order of preference. Section B (3 items) determined farmers' level of climate change awareness. Respondents' were asked of their awareness and understanding of the phrase Global warming and/or climate change, by ticking against the appropriate responses/options of "Yes" or "not much" or "No". The respondents' were also asked to indicate with their knowledge the direction of change of the climatic elements such as rainfall, temperature, sunshine and wind for the past twenty years. The items elicited responses on a 4 point scale of increasing 4, decreasing 3, no change 2, and I don't know 1 point. Section C (4 items) elicited the adaptive/coping measures adopted by farmers to mitigate the negative effects of climate change in their communities. In this case, respondents were asked to indicate the extent to which they apply adaptive measures such as improved varieties of crops, listening to weather forecast, education and training among others to mitigate or cope with the negative effects of climate change. The perceived levels of effectiveness of the different adaptation strategies were measured on a Five-point Likert-type scale of Strongly Disagree = 1, Disagree = 2, Undecided = 3, Agree = 4, Strongly Agree = 5.

3.7 Administration of the questionnaires

The questionnaires used for data collection were administered through the help of two trained-field assistants. This helped prompt collection of the questionnaire on the spot. A total of 125 questionnaires were administered. It was administered one per any of the gender group in the selected households viz: Elderly male, elderly female, adult male, adult female, male youth and female youth. However, all the questionnaires were used for analysis.

3.8: Reliability of the research instrument

To establish the reliability of the research instrument, the structured questionnaires were administered through the help of two trained-field assistants. This helped prompt collection of the questionnaire on the spot. Photographs were also taken with the respondents for the reliability of the research instrument.

3.9: Method of data analysis

Descriptive statistics such as frequency distribution, running average and percentages were used to analyze the socio-economic/bio data of the farmers which include household head, gender, age, educational level, marital status, household size, major occupation and farming experience among others.

Descriptive method viz: charts, tables and photographs were used to display results. Inferential statistic (chi-square) was used to test the hypothesis. Data collected from FGDs and personal interviews were analyzed by first transcribing and translating them from Annang language to English and then organizing them into themes. Verbatim quotations from FGDs were used to illustrate the indigenous adaptive practices of the farmers. Both data types were used in drawing of conclusion on climate change awareness and adaptation in Ikot Ekpene Local Government Area of Akwa Ibom State, Nigeria.

4.0: Result

4.1 Demographic data of respondents

From Table 3, 76% of the household heads were men while 24% were women. The gender categories in Table 3 also revealed that 17.6% were young males, 6.4% were young females, 48.8% were adult male, 12% were adult females, 9.6% were elderly males and 5.6% were elderly females. The age distribution of respondents shown in Table 4 indicated that individuals who were 18 to 20 years made up 7.2% of the population, 21 to 30 years 23.2%, 31 to 40 years 44.8%, 41 to 50 year represented 9.6% and those above 50 years represented 15.2%.

Marital status of the population comprised of 24% single, 62.4% married, 3.2% divorced, 0.8% separated and 9.6% widowed individuals. For house hold, 4, 28.8% had household size of between 1 and 3, 39.2% had household size of 4 to 6 while 32% had household size of above 6. Base on the occupation of respondents, 72% were farmers, 7.2% traders, 5.6% civil servants, 0.8% public servants, 4% self-employed, 6.4% were artisans and 4% were unemployed.

Table 3: Demographic data of household head

Sex	Nyara enyin	Ikot Ediet	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
M	20	20	20	16	23	99	76.00
F	4	3	4	9	6	26	24.00
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**
Gender							
YF	1	2	1	2	2	8	**6.4**
AM	12	8	10	12	19	61	**48.8**
AF	3	2	2	5	3	15	**12.0**
EM	1	4	3	2	2	12	**9.6**
EF	2	1	1	2	1	7	**5.6**
Total	24	23	24	25	29	125	**100**
AGE							
18-20	1	2	2	1	3	9	**7.2**
21-30	7	4	2	9	7	29	**23.2**
31-40	9	10	13	10	14	56	**44.8**
41-50	4	2	3	1	2	12	**9.6**
>50	3	5	4	4	3	19	**15.2**
Total	24	23	24	25	29	125	**100**
Marital status							
Single	6	8	8	4	4	30	24.00
Married	12	12	14	18	22	78	62.40
Divorced	2	1	0	0	1	4	3.20
Separated	1	0	0	0	0	1	0.80
widowed	3	2	2	3	2	12	9.60
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**
Family size							
1-3	5	7	10	7	7	36	28.80
4-6	9	10	8	10	13	49	39.20
Above 6	10	6	7	8	9	40	32.00
Total	24	23	24	25	29	125	100.00
Occupation							
Farming	17	19	17	19	19	90	72.00
Trading	1	2	3	2	1	9	7.20
Civil Servant	2	1	0	1	3	7	5.60
Public Servant	0	0	0	0	1	1	0.80
Self employed	1	1	1	1	1	5	4.00
Artisan	2	0	2	2	2	8	6.40
Unemployed	1	1	1	0	2	5	4.00
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**

Source: Field survey, 2017

4.2 Trend in average annual yield of crops in the past 20-30 Years

From Table 4, it was shown that 8.8% were of the opinion that the trend in average annual yield of crops was increasing, 56.8 % were of the opinion that it was decreasing, 3.2 % thought it was stagnant while 31.2 % had no idea. As revealed in Table 4, 5.6% of the populations were of the opinion that the trend in annual animal production was increasing, 32.8% were of the opinion that it was decreasing, 1.6 % thought it was stagnant while 60% had no idea.

Climate change awareness

4.3 Climate change awareness

Table 5 reported that 40.8 % of the population was aware about climate change, 12.8 % knew little about climate change while 46.4 % had no idea.

4.4 Trend in weather variation in the study area

As shown in Table 6, 19.2% were of the opinion that rainfall was increasing, 48.8% were of the opinion that rainfall was decreasing, 1.6% indicated that there was no change while 30.4% had no idea. On temperature variation, 8, 54.4% reported that there was a rise in temperature, 11.2% said there was a decrease in temperature, 4.8% submitted that there was no change while 29.6% had no idea. Responding to variation in sunlight 51.2% submitted that sunlight was increasing, 12.8% that it was decreasing, 4.8% that there was no change while 31.2% stated that they did not know. Also on wind variation, 20% of the respondents revealed that wind was increasing, 47.2% revealed that wind was decreasing, 3.2% thought there was no change and 29.6% had no idea.

Adaptation measures to climate change impact

4.5 Cropping system (Improved varieties)

As seen in Table 7a, 39.2% of the respondents strongly agreed to the adoption of improved crop varieties, 25.6% agreed. 29.6% were neutral, 2.4% disagreed and 3.2% strong disagreed.

4.6 Conservation strategy

Concerning listening to weather forecast as a conservation strategy, Table 7a revealed that 36% strongly agreed, 20.8 agreed, 29.6 were neutral, 6.4% disagreed and 7.2% strongly disagreed. Concerning education, 38.4% strongly agreed that education and training was an adaptive strategy to mitigate the impact of climate change, 20.8% agreed, 31.2% were neutral. 2.4% disagreed and 7.2% strongly disagreed.

4.7 Management practices

As displayed in Table 7b, 42.4% of the population strongly agreed that soil and water conservation was a climate change adaptive measure while 31.2% agreed, 19.2% were neutral, 2.4% disagreed and 4.8% strongly disagreed.
On the acceptance of afforestation and reforestation as an adaptive measure to climate change impact, it was indicated that 4% strongly agreed, 8% agreed, 30.4% were neutral, 18.4% disagreed and 39.2% strongly disagreed.
On planting adaptable crop species, 16, 38.4% strongly agreed that planting of crops that could adapt to evolving climate could be used to reduce the impact of climate change while 22.4% agreed. However, 32% were neutral, 2.4% disagreed and 4.8% strongly disagreed to that effect. On changing planting and harvesting time,, 43.2% of the population opined that changing of planting and harvesting date was an adaptive measure to curb the impact of climate change, 19.2% agreed, 30.4% were neutral, 2.4% disagreed and 4.8% strongly disagreed.
Also in Table 7b, 37.6% of the respondents strongly agreed while 24.8% agreed that the change in time of land preparation activities was a climate change adaptation strategy.
From Table 7a, it was revealed that 42.4% strongly agreed while 20% agreed that the protection of watershed and mulching, 29.6% were neutral, 6.4% disagreed and 1.6% strongly disagreed.

4.8 Use of law enforcement

The use of law enforcement as an adaptive measure to tackle climate change shown in Table 7a revealed that 24% of the population strongly agreed, 14.4% agreed, 26.4% were neutral, 9.6% disagreed and 25.6% strongly disagreed.

4.9 Summary of chi square analysis on adaptive measures

As shown in Table 22, the chi square analysis yielded lower calculated values than tabulated values at 0.05 level of significance, except for item 5. Thus, the null hypothesis which stated that there are no significant adaptation measures adopted by farmers about climate change issues in the study area.

Table 4: Trend in average annual yield of crops and animals in the past 20-30 Years

Trend	Nyara Enyin	Ikot Ediet,	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
Crop							
Increasing	4	2	3	2	0	11	8.80
Decreasing	11	15	13	15	17	71	56.80
Stagnating	2	0	1	1	0	4	3.20
No Idea	7	6	7	7	12	39	31.20
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**
Animal							
Increasing	3	2	0	0	2	7	5.60
Decreasing	6	8	13	9	5	41	32.80
Stagnating	1	0	0	0	1	2	1.60
No Idea	14	13	11	16	21	75	60.00
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**

Table 5: Trend in weather variation

Trend	Nyara enyin	Ikot Ediet	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
Rainfall							
Increasing	6	7	4	6	1	24	19.2
Decreasing	11	12	12	12	15	61	48.8
No change	0	0	0	1	1	2	1.6
I dont know	7	5	8	6	12	38	30.4
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Temperature							
Increasing	13	10	12	17	16	68	54.4
Decreasing	3	7	4	0	0	14	11.2
No change	1	1	1	2	1	6	4.8
I dont know	7	5	7	6	12	37	29.6
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Sunlight							
Increasing	12	13	13	10	16	64	51.2
Decreasing	3	4	3	6	0	16	12.8
No change	2	1	0	2	1	6	4.8
I don't know	7	5	8	7	12	39	31.2
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Wind							
Increasing	4	6	5	7	3	25	20
Decreasing	12	11	12	10	14	59	47.2
No change	1	1	0	2	0	4	3.2
I don't know	7	5	7	6	12	37	29.6
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**

Source: field survey, 2017

Table 6: Awareness on climate change

Response	Nyara enyin	Ikot Ediet	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
Yes	10	11	12	7	11	51	40.80
Not much	3	4	3	4	2	16	12.80
No	11	8	9	14	16	58	46.40
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100.00**

Table 7a: Adoption of improved varieties of crops, weather forecast, education, watershed protection and law enforcement

Response	Nyara enyin	Ikot Ediet	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
Improved varieties							
SA	7	7	9	12	14	49	39.2
A	9	11	6	5	1	32	25.6
UD	7	5	7	6	12	37	29.6
DA	1	0	1	1	0	3	2.4
SD	0	0	1	1	2	4	3.2
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Weather forecast							
SA	7	8	9	10	11	45	36
A	7	5	6	6	2	26	20.8
UD	7	5	7	6	12	37	29.6
DA	3	3	0	2	0	8	6.4
SD	0	2	2	1	4	9	7.2
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Education/training							
SA	10	5	10	13	10	48	38.4
A	4	8	5	4	5	26	20.8
UD	9	5	7	6	12	39	31.2
DA	0	2	0	0	1	3	2.4
SD	1	3	2	2	1	9	7.2
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Protection of watershed/mulching							
SA	7	14	1	12	11	53	42.4
A	8	2	5	6	4	25	20
UD	7	5	7	6	12	37	29.6
DA	2	1	2	1	2	8	6.4
SD	0	1	1	0	0	2	1.6
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Use of law enforcement							
SA	2	6	5	10	7	30	24
A	3	6	4	2	7	18	14.4
UD	6	4	6	6	7	33	26.4
DA	3	0	2	1	6	12	9.6
SD	10	7	7	6	2	32	25.6
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**

Source: field survey 2017

Table 7b: Adoption of soil and water conservation, afforestation/reforestation, planting adopting species, harvesting time, and planting time

Response	Nyara enyin	Ikot Ediet	Nsiak	Abak Oko	Ikot Ekpene	Total	Percentage
soil and water conservation							
SA	11	11	7	9	15	53	42.4
A	9	5	8	8	9	39	31.2
UD	3	5	7	4	5	24	19.2
DA	0	0	1	0	2	3	2.4
SA	1	2	1	2	0	6	4.8
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Afforestation/Reforestation							
SA	1	1	3	0	0	5	4
A	3	4	0	2	1	10	8
UD	8	5	7	6	12	38	30.4
DA	1	10	3	9	0	23	18.4
SD	11	3	11	8	16	49	39.2
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Plant adopting to evolving climate							
SA	6	8	9	13	12	48	38.4
A	8	7	6	5	2	28	22.4
UD	9	5	7	6	13	40	32
DA	0	1	0	1	1	3	2.4
SD	1	2	2	0	1	6	4.8
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Changing planting/harvesting time							
SA	7	11	9	13	14	54	43.2
A	7	5	7	5	0	24	19.2
UD	8	5	7	6	12	38	30.4
DA	0	1	1	0	1	3	2.4
SD	2	1	0	1	2	6	4.8
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**
Change in time of land preparation activities							
SA	8	9	9	10	11	47	37.6
A	7	7	5	7	5	31	24.8
UD	8	5	8	6	12	39	31.2
DA	1	2	0	2	0	5	4
SD	0	0	2	0	1	3	2.4
Total	**24**	**23**	**24**	**25**	**29**	**125**	**100**

Source: Field survey, 2017

Table 8: Summary of chi square analysis on adaptive measures

SN	Variable	X^2 cal	DF	X^2 tab	Inference
1	Adoption of improved varieties of crops	19.594	16	26.3	Accept null
2	Listening to weather forecast	18.31	16	26.3	Accept null
3	Education and training	22.527	16	26.3	Accept null
4	Soil and water conservation	12.014	16	26.3	Accept null
5	Afforestation and reforestation	37.527	16	26.3	Reject null
6	Plant crop that can adapt to evolving climate	15.327	16	26.3	Accept null
7	Changing of planting and harvesting date	16.75	16	26.3	Accept null
8	Change in time of land preparation activities	14.779	16	26.3	Accept null
9	Protection of watershed and mulching	16.526	16	26.3	Accept null
10	Use of law enforcement	22.425	16	26.3	Accept null

4.10 Focused Group Discussion (FGD)

Interactions during the FGDs indicate that farmers are adopting the "spiritual approach" or "prayers" for adaptation to the effect of climate change. They noted that "these changes are brought about by God and that they can only pray for mercies". Some of the more widely adopted adaptive measures identified by the farmers themselves during the FGDs and community forums included:

- Agroforestry
- Mixed farming
- Multiple cropping
- Contour farming
- Mixed cropping
- Green manuring
- Use of wind break and shelter belts
- Adopt crop spacing
- zero tillage so as not to expose the soil to loss of nutrients
- Shifting cultivation
- Minimal to no pesticide use
- Beat-up (crop replacement)
- Choosing sustainable seed and plant varieties
- Planting cover crops like melon to help conserve soil moisture
- Regular weeding of cropped farmland
- Early planting with first rain especially for crops like maize and cassava
- Mulching and use of organic manure
- Preservation and selection of seeds for next planting season

The farmers argued that while noticing the manifestations of climate change "we adopted these measures and they have been helping our crop farming activities". When probed further on the sources of these innovative strategies for climate change adaptation, some of them remarked that "we did not learn the practices from anywhere and that they are indigenous to us". Some of them further opined that "these measures have served us well in soil and water conservation management". There said that there is inadequate rainfall for recent years because of that some farmers in the community are practicing bush burning to reduce the labour of clearing the bush which may in turn lead to global warming through the continuous release of greenhouse gases into the atmosphere.

There further said that lack of awareness campaign is one of the challenges there are facing. Some of them said that the problems of drought, high temperature and incidence of pest and disease have aggravated their loss which consequently increases the incidence of poverty and malnutrition in the community.

4.11 Personal interview

The questionnaire by virtue of its nature may not have allowed for exhaustive and in-depth answer to the research questions, therefore personal (Oral) interview was also conducted because some farmers were illiterate and the questions had to be translated into local language (Annang). The result of personal interview was used to supplement the information provided by the respondent.

5.0 DISCUSSION

This section discussed the findings from the analyzed data. The discussion is based on the hypothesis of the study. The demographic characteristic of farmers that affect their level of awareness and adaptation measures of climate change in the study area included their household head, gender, age, educational level, marital status, household size, major occupation and farming experience among others.

The results obtained from this study reveals that majority (76%) of the household heads interviewed were men while 24% were women (table 3) in which the highest number (48.8%) of respondents were adult male, 17.6% were young males, 12% were adult females, 9.6% were elderly males. 6.4% were young females and 5.6% were elderly females (table 3). The study also reveals that majority (44.85%) were in the age range of 31- 40 years, 23.2% were 21 - 30 years,15.2% were above 50 years, 9.6% were 41 - 50 years and 7.2% were in the age range of 18 - 20 years (table 4). This finding was in support of the findings of (Enete *et al.*, 2012). In their study, the household head were men in the gender of adult male within the age range of 31-40 years. This showed that the respondents were adult and energetic and could actively participate in farming activities.

It was also observed that 31.2% of the respondents had OND/HND, 30.4% had B. Sc. 17.6% had WASSC, 15.2% had FSLC and 5.6% had post graduate . Ifeanyi-obi *et al.*, (2012) noted that educated farmers are expected to be more aware of climate change impacts and there can easily adapt to it. Apata *et al.* (2010) indicated that education influenced adaptation positively. This implies that the level of awareness of climate change impacts would be high as education affects the awareness level positively.

The marital status of the population of respondents shows that majority (62.4%) were married, 24% single, 9.6% widowed, 3.2% divorced, and 0.8% were separated due to misunderstanding. This implies that greater proportion of the farmers in the area were married individuals. Consequently, it increases access to production variables such as land and labour which are traditionally owned and provided by husband. Ekpo *et al.*, (2014) revealed in their separate studies that majority of farmers in Nigeria were married. This shows that married people dominates agricultural production in which they used members of their family as labour force.

Majority (39.2%) of the population of respondents had household size of between 4 and 6. 32% had household size of above 6 While 28.8% had household size of 1 – 3. More so, 72% of the respondents were farmers. 7.2% were traders, 5.6% were civil servants, 0.8% public servants, 4% self-employed, 6.4% artisans and 4% were unemployed. Udo, (1983) which noted that majority of people in the study area has farming as their major livelihood activity. This agrees with the findings of (Nseadibe *et al.*, 2011) they inferred that large household may be advantageous in farming as labour may be derived from the members. But the disadvantage is that there is an increase in anthropogenic (human) activities which result in the continuous release of greenhouse gases into the atmosphere.

On climate change awareness, results obtained from the study further revealed that 40.8% of the population were aware of climate change, 12.8% knew little about climate change, while 46.4% had no idea (table 5). This is confirmed by Esiobu *et al.*, 2014; Nwankwo *et al.*, 2012 ; Thaddeus *et al.*, 2011 were they stated that there is a low level of awareness of climate change issue among farmers in Niger Delta region of Nigeria. Climate change was viewed as change as in the atmosphere, to be caused by greenhouse gases, ozone layer depletion, excessive sunshine and changes that causes poor yield and crop failure. Thaddeus *et al.*, (2011) also confirmed in their studies that the basic understanding of climate change is change in weather.

Regarding the trend in rainfall variation, 19.2% of the population were of the opinion that rainfall was increasing, 48.8% were of the opinion that rainfall was decreasing, 1.6% indicated that there was no change while 30.4% had no idea (Table 6). This corroborates with the works of Adebayo, 1998; Anuforom, 2010 where they opined that climate change leads to warmer seasons and decline in rainfall amount by about 15-20%. Regarding the trend in temperature variation, 54.4% of the population reported that there was a rise in temperature, 11.2% said there was a decrease in temperature, 4.8% submitted that there was no change while 29.6% had no idea (table 6). Adebayo, 2012; Adebayo *et al.*, 2012a, 2012b, Adebayo, *et al.*, 2013 stated that evidence of climate change includes delayed onset date of rains, increase in number of dry days during the raining season and increase in maximum temperature. It was also revealed that 51.2% submitted that sunlight was increasing, 12.8% were of the opinion that

it was decreasing, 4.8% were of the opinion that there was no change while 31.2% stated that they did not know (table 10). More so, 20% of the respondents revealed that wind was increasing, 3.2% thought there was no change and 29.6% had no idea (table 6).

The study revealed that adaptation measures to climate change impact were adopted by the respondents to include cropping system in which 39.2% of the respondents strongly agreed to the adoption of improved crop varieties, 25.6% agreed 29.65 were neutral, 2.4% disagreed and 2.3% strongly disagreed (Table 7a). Akpan, (2012) opined that adoption of improved crop varieties is the most frequently used adaptive measures to climate change impact used by farmers. These modern improved varieties offer much higher yields, better quality, early maturation, more stable production and are suitable for rain fed agriculture in areas where rainfall is low and erratic, they offer higher and more stable yields higher tolerance/resistance to disease, insect, pests, drought, heat, cold, parasite weeds and other stress factors, (International Center for Agricultural Research in Dry Area) (ICARDA, 2013).

Also, Developing and using new varieties/species of crop with increased tolerance to flooding, and salinity can survive under declining soil fertility.

Concerning listening to weather forecast as a conservation strategy, it was revealed that 36% of the respondents strongly agreed, 20.8% agreed, 29.6% were neutral, 6.4% disagreed and 7.2% strongly disagreed (Table 7a). It was further revealed that 38.4% strongly agreed that education and training was an adaptive strategy to mitigate the impact of climate of climate change, 20.8% agreed, 31.2% were neutral, 2.4% disagreed and 7.2% strongly disagreed (Table 7a). This agrees with the work of Enete *et al.*, (2012) that education influenced adaptation positively.

The study further revealed that 44% of the population strongly agreed that soil water conservation was a climate change adaptive measures, while 31.2% agreed, 19.2% were neutral, 2.4% disagreed, and 4.8% strongly disagreed (Table 7b). This is confirmed by the work of Obiora *et al.*, (2012), where they opined that soil and water conservation is a crucial adaptive strategy to mitigate the impact of climate change. Afforestation and reforestation was also accepted as an adaptive measure to climate change impact. It was indicated that 4% strongly agreed, 8% agreed, 30.4% were neutral, 18.4% disagreed and 39.2% strongly disagreed (Table 7b). More so, 38.4% strongly agreed that planting of crops that could adapt to evolving climate could be used to reduce the impact of climate change while 22.4% agreed. However, 32% were neutral, 2.4% disagreed and 4.8% strongly disagreed to that effect (Table 7b).

It was also revealed that 43.2% of the population opined that changing of planting and harvesting date was an adaptive measure to curb the impact of climate change, 19.2% agreed, 30.4% were neutral, 2.4% disagreed, and 4.8% strongly disagreed (Table 7b). Regarding change in time of land preparation activities, 37.6% of the respondents strongly agreed while 24.8% agreed that the change in time of land preparation activities was a climate change adaptation strategy (Table 7b). It was also revealed that 42.4% strongly agreed while 20% agreed that the protection of watershed and mulching was a climate change adaptation strategy. 29.6% were neutral, 6.4% disagreed and 1.6% strongly disagreed (Table 7a). Sasaki *et al.*, (2010) reported that adaptation/copping measures adopted by the farmers are; Plant crop adaptable to evolving climate, changing of planting and harvesting dates, change in time of land preparation activities, protection of water sheds and mulching and use of law enforcement. The use of law enforcement as an adaptive measure to tackle climate change from this study revealed that 24% of the population strongly agreed, 14.4% agreed. 26.4% were neutral, 9.6% disagreed and 25.6% strongly disagreed (Table 7a).

From the chi-square analysis in Table 8, the tabulated value was higher than the calculated value at 0.05 level of significance thus the null hypothesis which stated that there is low awareness on climate change by farmers in Ikot Ekpene local government Area of Akwa Ibom State, Nigeria was accepted that is there are no significant adaptation measures adopted by farmers about climate change issues in the study area (Table 8).

References