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ADAPTATION MEASURES UTILIZED BY FOOD CROP FARMERS TO MITIGATE CLIMATE CHANGE EFFECT IN NORTHWEST DISTRICT OF AKWA IBOM STATE, NIGERIA

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ABSTRACT

The study assessed the adaptation measures utilized by farmers to mitigate climate change effects in Akwa Ibom State North West district, Nigeria. Specifically, the study ascertained the level of awareness of the farmers on climate change, examined the perceived effect of climate change on farming and human activities, determined the extent of utilization of the adaptation measures to mitigate climate change, and identified the constraints to the utilization of the adaptation measures. Data for the study were obtained from 145 farmers, using a multi-stage sampling procedure and analyzed using descriptive statistics. The result revealed that 54.5% of the respondents were women, mostly married with an average number of 6 persons per household. The farmers earned a mean income of ₦90,500 annually and had been farming for an average of 25.5 years. The climate change awareness level was high, and the major sources of information on climate change were radio (20%), contact farmers (18.6%), and peer groups/friends (17.9%). Consequently, 67% of the adaptation strategies were utilized by the farmers. They ranged from mulching, increased weeding, and mixed farming to the diversification of sources of livelihood giving a total of 1.66 mean scores. The study also revealed that climate change had a significant effect on farming activities. Furthermore, all the variables presented were significant constraints to adaptation measures to cope with the effects of climate change. The study therefore suggested that extension workers should be trained more on the issues of climate change to assist farmers to better understand changes in the climate as it affects their farming/livelihood sources.

Keywords: *Climate change, Adaptation strategies, Mitigation, Food crop farmers.*

INTRODUCTION

Climate change has a deleterious effect on the environment, economy, and agriculture. Mahendra 2010; Ogunpaimo, Oyetunde-Usman, and Surajudeen (2021) affirmed that climate change will result in ecological degradation and further threaten the fragile dry soil with serious consequences on crops, livestock, and food security. Nwankpa, (2022), the report revealed extreme weather conditions with low agricultural yields, poor nutrition, poverty, the proliferation of disease vectors and pests, malaria, dengue fever, sleeping sickness, and schistosomiasis as a resultant effect of climate change. This is because 80% of the country's farmers are rain-fed dependent.

The implications and characteristics of climate change show that it is a multi-dimensional problem whose causes and effects are challenges to recent development initiatives. These observed challenges have the ability to increase the already existing poverty situations across many countries of the world and affect more people generally thereby increasing the vulnerability of the poorer countries and groups. The most susceptible or vulnerable are developing countries, especially Nigeria. The Nigerian situation compounds the fragility of the country's both the socio-economic and environmental system of the people. Extreme weather conditions, fierce longer dry seasons, and shorter, more intense rainy seasons exacerbate the challenges (Nwankpa, 2022). This negative impact is directly associated with agriculture and its productivity.

Indeed, Akwa Ibom State has been experiencing changes in annual rainfall, an increasingly hot climate, drought, soil degradation, unexpected flooding, high winds, and the proliferation of diseases and pests to crops. The most threatening issue of climate change is that the irregular seasons have affected the long age practice of farmers' ability to predict when to plant their crops and this has caused a general decline in most of the subsistent crops resulting in hunger. Thus, the importance of adaptation measures for rural dwellers who depend on agriculture for their subsistence becomes an absolute priority. In order to reduce the potential negative, direct, or indirect effects of climate change on crop production, farmers must utilize adaptation measures to cope with and sustain increased productivity in their farm enterprises.

Adaptation is identified as one of the policy options to reduce the negativities from changes in climatic conditions if crop farmers must thrive in the business of farming (Nkeme and Ndaeyo 2013; Lazkano, Marrouch, Nkuiya, 2016). Adaptation to climate change is a process that initially requires farmers and households to perceive that the climate has changed and then identify the necessary adaptation strategies to mitigate the adverse impact of climate variation on ecosystems and livelihoods (James and Washington, 2013; Fagariba, Song and Baoro, 2018). It requires the development of natural resource management strategies that ensure the sustainable use of soils and water, stop biodiversity decline, and deal with emerging issues such as growing demand for renewable energy (Nzeadibe *et al*., 2012). Farmers in rural communities must, therefore, respond through climate mitigation measures (by reducing the concentration of greenhouse gases in the atmosphere) finding ways to moderate the negative effects, and exploit beneficial opportunities.

In Nigeria, evidence shows that rural farmers, knowingly or unknowingly have been adapting to the changing climatic conditions over time, through their traditional knowledge, innovations, and practices (Uyigue and Agho 2007; Etuonovbe 2008). This revealed that adaptation awareness has already been introduced in this region. However, it does appear that the extent of utilization of these adaptation strategies to climate change in the region leaves much to be desired. As a result, the need for effective utilization of adaptation measures among farmers has become necessary. Thus, this paper assessed the extent of utilization of adaptation strategies, such as mulching, increased weeding of cropped land, mixed farming, diversifying sources of livelihood, and planting different varieties of crops. to mitigate climate change by farmers. It assessed the level of awareness of farmers on climate change. It also examined the perceived effect of climate change on farmer's livelihood activities. Lastly, the research looked at the constraints to the utilization of the adaptation measures to cope with climate change by food crop farmers in Akwa Ibom State North West district of Akwa Ibom State, Nigeria.

METHODOLOGY

The Study Area

The study was conducted in Akwa Ibom State Northwest district. Akwa Ibom State North West district is made up of ten Local Government Areas. The people speak Ibibio and Annang languages and are predominantly farmers, traders, and craftsmen. The climate is tropical, with distinct rainy season (April- October) and dry season (November- March). It has an annual rainfall of between 3000 mm and 4000 mm.

Sampling Technique

The multi-stage sampling procedure was used to first select Akwa Ibom North-West district which falls under the Akwa Ibom State senatorial districts. Five Local Government areas were randomly selected from the 10 (LGAs) that make up the Akwa Ibom Northwest district, where 2 communities from each of the 5 LGAs were randomly selected, making a total of 10 communities. Finally, fifteen (15) respondents were randomly selected from the 10 sampled communities, making a total of 150 respondents. Primary data were collected using a structured questionnaire, administered to the 150 respondents. Only 145 of the questionnaire were successfully retrieved. Data were analysed using descriptive statistics, such as percentages, and means.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents on Climate Change

Results in Table 1 showed that more than half (54.5%) of the population in the sample area were female. This probably indicated that a high percentage of women were involved in crop production. The result on farmer's age showed that the average age of the farmers was 45.5 years, showing a population in their middle age. This suggests that farmers in the study area were economically active in performing any farming task.

Findings revealed that 47.0% of the farmers were married. Studies by Okoro (2012) and Egbule (2010) revealed that the majority of farmers in Nigeria are married. The implication of this is that being married comes with responsibilities and an increase in the number of mouths to be fed as well as the number of family-farm labour availability.

On the educational status of respondents, the result reveals that only 22.1% of the farmers had no formal education, and the remaining about 77.9% had one form of education or the other. The large proportion of 77.9% indicates that farmers in the study area are better equipped to source information about agriculture in their communities.

On livelihood activities, 43% were traders, 22.1% were civil servants, 20.7% were artisan, 8.3% were pensioners, and others 6.2%. This indicates that farmers have sources of livelihood. Based on annual income, the mean annual income was ₦90,500. This indicated that the farmers in the study area were low-income earners.

Concerning years of experience in crop production, the mean years of farming experience in the study area was 25.5 years which suggests that farmers have had various degrees of experience for a long time.

Table 1 Percentage Distribution of Farmers According to their Socio-economics Status

Socio-Economic Characteristics	Frequency	Percentages	Mean
Sex			
Male	67	45.5	
Female	79	54.5	
Age			
<30	12	8.3	
31-40	31	21.4	
41-50	47	32.4	**45.5**
51-60	50	34.5	
>60	5	3.4	
Marital Status			
Single	42	29	
Married	68	47.0	
Separated/Divorce	15	10.3	
Widow	20	13.7	
Educational status			
No formal education	32	22.1	
Primary	63	43.4	
Secondary	29	20	
Tertiary	12	8.3	
Adult	9	6.2	
Household size			
3-Jan	36	24.8	

6-Apr	78	53.8	**6.25**
9-Jul	27	18.6	
>9	4	2.8	
Livelihood activities			
Civil servant	32	22.1	
Artisan	30	20.7	
Trader	62	42.8	
Pensioner	12	8.3	
Others	9	6.2	
Monthly Income			
<50,000	22	15.2	
51,000-100,000	12	8.3	**90.5**
101,000-150,000	47	32.4	
Above 150,000	64	44.1	
Years of Experience			
<10	32	22.1	
10-20	39	26.9	**25.5**
21-30	43	29.7	
31-40	23	15.9	
>40	8	5.5	

Source: Field survey, 2022

Farmer's Awareness of Climate Change

The level of awareness of farmers to climate change is presented in Table 2. The majority (86.9%) of farmers affirmed that they were aware of the climate change phenomenon. This implied that there was a high level of climate change awareness in the study area. The implication of the high awareness might have stemmed from farmers' understanding of climate change as changes in weather patterns that have been observed in recent years.

Table 2: Distribution of Respondents According to their Awareness of Climate Change

Awareness	Frequency	Percentages
Aware	126	86.9
Not aware	19	13. 1
Total	145	100

Source: Field survey, 2022

Utilization of Adaptation Strategies to Mitigate Climate Change

Results in Table 3 show the distribution of farmer's utilization of adaptation strategies to mitigate climate change effects. Findings revealed a grand mean of 1.66, indicating that 67% of the adaptation strategies were utilized by farmers in the study area. The high level of utilization must have been evidence that farmers have been practicing most of the adaptation strategies for over a decade even before the concept of climate change became a topical issue in development policy discourse.

Table 3: Mean Score Distribution of Adaptation Strategies Utilised by Respondents in Mitigating Climate Change

Adaptation Strategies	Mean Scores	Remark
Increase in the use of organic manure and inorganic fertilizer	1.36	NS
Planting pest and disease-resistant crops	1.29	NS
Mulching	1.51	S
Use of early maturing crop varieties	1.45	NS
Increase use of chemicals like herbicides and insecticides	1.48	NS
Increase weeding of cropped land	2.01	S
Practicing mixed farming	1.95	S
Diversifying sources of livelihood	1.77	S
Planting different varieties of crops	2.32	S
Use of windbreaks	1.08	NS
Changing Planting and harvesting dates	2.06	S
Processing of crops to minimize post-harvest losses	1.97	S
Planting of cover crops to help conserve soil moisture	2.67	S
Planting crops deeper or shallower than usual planting depth	1.98	S
Planting of trees to provide shade	1.48	NS
Grand mean	**1.66**	S

Source: Field survey, 2022 * Decision rule: X ≥ 1.5 indicates significant while x< 1.5 indicates 'Not significant'

Adaptation strategies such as increased use of chemicals like herbicide/insecticide and planting of trees to provide shade (M=1.48), use of early maturing crop varieties (M=1.45), increase in use of organic manure and inorganic fertilizer (M=1.36), planting pest and disease resistant crops (M=1.29), and use of windbreaks (M=1.08) were not utilized by farmers in the study area. The implication is that since the farmers do not have adequate contact with extension agents, they are limited to information on access to these strategies. Also, their poor financial status has contributed to their inability to utilize most of the measures.

Farmer's Perception of Effects of Climate Change on Farming Activities

Findings revealed a grand mean of 1.81 which indicated that climate change has a positive effect on farming and human activities in the study area.

This finding is in line with studies by Egbule and Agwu (2011), and Nkeme, (2021) who found that farmers in the Niger Delta, Nigeria perceived loss of farm produce due to high temperature and low crop yield as effects of climate change. Also, Iwuchukwu and Onyeme (2012); and Ozor, Urama &Mwangi (2012) found that farmers in Sub-Saharan Africa, especially in Nigeria, are facing reductions in crop yields and productivity because of climate change.

Table 4: Mean Score Distribution on Perceived Effects of Climate Change on Farming Activities

Perception of Effects of Climate Change	Mean Scores	Remark
Inadequate rainfall and high temperatures can lead to the death of crops	2.16	S
Prolonged rainfall can result in water logging/flooding which cause loss of farmlands and houses	2.39	S
Early/late onset of rainfall delays the planting of crops	1.84	S
Prolonged dry season can lead to drought	1.65	S
Water/food contamination causes frequent outbreaks of diseases (cholera, dysentery, malaria, typhoid)	1.99	S
Heavy windstorms destroy field crops and houses	1.93	S
Excessive heat can dry rivers and streams	1.46	NS
Increased temperature causes premature ripening of fruits	1.85	S
High rate of weed growth among field crops	2.13	S
Low crop yield due to high temperature/high humidity	1.96	S
High temperature and humidity can cause losses of roots and tubers under storage	2.04	S
High humidity increases pests and disease infestation	1.93	S
Low fruiting of economic plants	1.84	S
Deforestation distorts and destructs wildlife ecosystems	1.81	S
Grand mean	1.84	S

Source: Field survey, 2022 * Decision rule: X ≥ 1.5 indicates significant statements while x< 1.5 indicates 'Not significant'

Constraints to Utilization of Climate Change Adaptation Strategies

Results in Table 5 show the constraints to utilization of climate change adaptation as follows: inadequate information on climate change adaptation measures with mean score of 1.52, limited access to improved crop varieties (M=1.52), poor government attention to climate problems

(M=1.49), high cost of improved crop varieties (M=1.46), high cost of manure/ fertilizer (M=1.45) and insufficient funds to purchase and use some of the adaptation measures (M=1.43). Others include; lack of access to weather information/forecasts (M=1.37), irregularity of extension services (M = 1.29), and limited knowledge on adaptation measures (M=1.06). The result reveals a grand mean of 1.39 which indicates that constraints in utilizing climate change adaptation strategies in the study area were very severe. This finding corroborates with Umunakwe (2011) who asserted that poor extension services, limited access to and high cost of improved crop varieties, and lack of government policy on adaptation, among others, are factors that prevent farmers in Nigeria from adapting effectively to climate change.

Table 5: Mean Score Distribution of Constraints to Utilization of Climate Change Adaptation n= 145

Constraints	Mean Scores	Remark
Inadequate information on climate change adaptation measures	1.52	S
Insufficient funds to purchase/use some of the adaptation measures	1.43	S
Lack of access to weather information/forecasts	1.37	S
Limited access to improved crop varieties	1.52	S
High cost of manure/ fertilizer	1.45	S
High cost of improved crop varieties	1.46	S
Limited knowledge of adaptation measures	1.06	S
Poor government attention to climate problems	1.49	S
Irregularity of extension services	1.29	S
Grand mean	1.39	S

Source: Field survey, 2022 * Decision rule: X ≥ 1 indicates significant constraint while x< 1 indicates 'Not significant' constraint

CONCLUSION AND RECOMMENDATIONS

Although the level of awareness on climate change was high it was still a major challenge in the quest for innovative approaches to food security and agricultural adaptation to climate change in Akwa Ibom State. Therefore, researchers and policymakers should involve farmers in the policy-making concerning adaptation measures to climate change.

Many factors limited farmers in utilizing the adaptation measures, among which were inadequate information on climate change adaptation measures and poor attention from the government. It is suggested that policymakers could tap into the vast potential of the media to disseminate climate change information and create more awareness about the causes, and consequences of climate change as well as strategies for climate change adaptation. This will educate the farmers more than accessing information from friends and contact farmers. Also, adequate attention from the

government is needed as it will enhance investments that will bring about the provision of interventions to mitigate climate change. The perceptions of farmers on the effects of climate change on their farming and human activities could be an advantage in the development of adaptation measures, as engaging them in knowledge sharing could lead to the emergence of better measures of adapting to climate change.

Since the observed adaptive measures were indigenous to the farmers, it is imperative therefore that extension workers should be trained more on the issues of climate change to assist farmers in better understanding the changes in the climate as it affects their farming/livelihood sources and provide them with the available basket of opportunities for transformative growth.

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