



ASSESSMENT OF FARMERS' AWARENESS ON CLIMATE CHANGE AND ADAPTATION MEASURES FOR YAM PRODUCTION IN PAIKORO LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

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ABSTRACT

The study assessed the farmers' awareness on climate change and adaptation measures for yam production in Paikoro Local Government Area of Niger State. A multistage random sampling technique was used to select the sample size of 100 respondents from five wards. Data were collected with the aid of structured questionnaires. Data were analysed using frequencies, percentages; means and chi-square analysis. The results revealed that the respondents were between the ages of 30-40 years old, mostly male, married and 46% had informal education. The mean household was 9 persons, the mean farm size was 3ha and the mean annual income was ₦19,085:00k. The result further revealed that the respondents were fully aware of climate change. The climate change adaptation measures adopted by the farmers in the study area includes: Early planting (28%), Using early maturing crop (27%), Using resistance improved varieties (11%) and Planting more than one crop (11%). The constraints to adoption of climate change adaptation measures includes: Lack of capital (24%), Lack of knowledge (30%), Lack of extension agent; (19%) and Lack of information (11%). The farmers should form cooperatives to tackle the problem of fund, Government should provide farm inputs at affordable and Government should provide adequate extension station for agricultural information, demonstrations of innovations prior to adoption provision of inputs were offered as recommendations.

Keywords: Adaptation, Change, Climate, Farmers and Measures.

INTRODUCTION

Climate can be defined as the typical weather pattern seen over an extended period of time, or as the average weather of a place during that length of time. Temperature, precipitation, water, and radiant energy, or solar radiation, are the three main meteorological factors that affect crop development and output (Adebayo *et al.*, 2012). As a result of altered weather patterns brought on by climate change, seasonal cycles become unbalanced, ecosystems are harmed, and water supplies are affected, which has an impact on agriculture and food production and raises sea levels. Climate change is the cause of extreme weather occurrences including droughts, landslides, and floods. Among the biggest risks to sustainable development is climate change, which has a negative influence on economic activity, food security, human health, water supplies, and other natural resources. Farmers' investment and policy decisions, as well as their level of adaptation at the farm, all influence how severe the effects of climate change will be (Apata, 2011).

Nigeria is so far the world's largest producer of yams, accounting for over 70 to 76 percent of the world production. Statistically in 2004, the global yam production was about 47 million metric tons, which about 95 percent of the metric tons was produced in Africa. Nigeria alone accounted for about 70 percent of the world production. With growing demand, yam has assumed great importance in Nigeria. The nation produces about 31.5 million metric tons of yams annually



(FAO, 2007). Yam is one of the most important tuber crops in Nigeria because of its various uses (Waziri *et al.*, 2014). Yam is consumed by man as food, feed for animals' raw materials especially in drug manufacturing by pharmaceutical companies and planting materials for yam propagation. Yam is an important component of engagement lists (requirements for marriage) in South-western and Eastern Nigeria. Apart from its nutritional value, yam plays an important role in religious festivals.

In many areas of West Africa, it is a vital integral part of the cultural heritage of the people. Yam plays important roles in sacrificial ceremonies of traditional religions (Oguntade *et al.*, 2010). In Nigeria, yam is becoming more expensive and relatively unaffordable in urban areas as production growth has not kept pace with population growth leading to demand exceeding supply and entirely dominated by small-scale farmers. Yam is the fore most staple food to the people of Paikoro Local Government, appreciated for its taste and significant cultural role as a major menu when pounded in ceremonial occasion. Furthermore, the production of this crop like every other crop is affected by factors varying from physical, economic to cultural. Climate is one of the physical factors and the most crucial factor which determines the nature of the natural vegetation, the characteristics of the soils, the crops that can be grown, and the type of farming that can be practiced in any region. Climate change impacts the four key dimensions of food security availability, stability, access, and utilization. Availability of agricultural products is affected by climate change directly through its impacts on crop yields (Adebayo, 2012).

In Paikoro Local Government Area of Niger state, evidence of climate change include: delayed onset date of rains, increase in number of dry days during the rainy season and increase in maximum temperature. In recent years, farmers in the State have been faced with problems of crop failure or low yield arising from climate variability particularly the delayed onset of rains and increasing length and frequency of dry spell during the growing season. In view of the above, this study assessed the farmers' awareness of climate change and adaptation measures for yam production. The specific objectives are to: describe the socio - economic characteristics of the farmers in the study area, assess the level awareness of climate change by the farmers in the study area; examine the adaptation measures adopted by the farmers and know the constraints associated with the adoption of climate change adaptation measures in the study area.

MATERIALS AND METHODS

The Study area

The study was conducted in Paikoro Local Government Area of Niger state. Paikoro Local Government is one of the 25 Local Government areas in the State. It was located on latitude 8° 20'N and 11° 30'N, longitude 3° 30'E and 7° 20'E and covered an area of 2,259.24 square kilometers and estimated population of 158,086 (NBS, 2019). The Local Government Area falls within the Southern Guinea Savannah region, with an average annual rainfall ranging between 1,100 mm-1,300 mm. The mean temperature of the area is 37°C during the dry season. The Area is endowed with large water bodies such as River Niger, River Gurara, River Chanchaga and numerous streams and extensive flood plains. The climate, soil nature and hydrology permits the cultivation of most of Nigerians staple crops such as rice, maize, yam, cassava, sorghum, cowpea and groundnut. The major indigenous ethnic groups are the Gbagyi, Kadara and Koro. Farming is the major occupation of the inhabitants of the area. About 85% of the active labor force is engaged in agricultural production while the remaining 15% are engaged in other vocations such as white

collar jobs, businesses; arts and crafts. Similarly, there are natural resources such as gold, marble, dolomite, granite, limestone, potash, clay, and iron ore (Waziri *et al.*, 2014).

Sampling procedure

Multistage and Simple random sampling technique were used to select respondents from the existing wards in Paikoro local government area. One hundred respondents were selected to form the sample size for the study. In the first stage, five wards were purposively selected namely: Nikuchi/Tungan-mallam, Paiko Central, Gwam, Kaffin-Koro and Kwakuti. This is because the wards have been identified in the Local Government Area among major producer of yam. In the second stage, twenty households were selected at random from each of the selected wards using Simple random sampling technique to make a total of one hundred (100) households. In the final stage, one respondent was selected from each of the selected households to make a total of one hundred (100) respondents for the study (Table 1).

Table 1: Sample Size and Location of the Study Area

S/n.	Wards	Households	Number of respondents
1.	Nikuchi/Tungan-mallam	20	20 respondents
2.	Paiko- Central	20	20 respondents
3.	Gwam	20	20 respondents
4.	Kaffin-Koro	20	20 respondents
5.	Kwakuti	20	20 respondents
Total		100	100 respondents

Source: Field survey, 2022

Data collection

Data for the study was obtained with the aid of structured questionnaire administered by the researcher assisted by some village extension agents in the Local Government. The data consist of information on the farmers' socioeconomic characteristics, awareness of the farmers about climate change, climate change adaptation measures employed and constraints to use of adaptation measures.

Data Analysis

The data for the study was analysed using frequency, percentage and mean to achieve the research objectives. Chi-square analysis was used to test the association between the awareness of climate change and adaptation measures to climate change.

Analytical Techniques

Percentage

This was used to determine the population of respondents to a particular response.

Percentage is specified as:

$$\text{Percentage (\%)} = \frac{X}{n} \times 100 \quad \dots(1)$$

Where;

% = percentage, X= Individual observation, n= Total observations

Chi – square

This was used determine the association of the variables considered.

Chi-square model is specified as follows:

$$X^2 = \sum \frac{(O-E)^2}{E} \quad \dots(2)$$

Where,

χ^2 = Chi-square; Σ = Summation O = Observed value of variable; and E = Expected value of variable.

RESULTS AND DISCUSSION

Respondents' Socioeconomic Characteristics

The result in Table 2 shows the distribution of respondents according to their socioeconomic characteristics. The result shows that 57% of the respondents were between the ages range of 20-30 years with a mean age of 33 years. This implies that the respondents in the study area are young, active and within their productive age as such they are ready to adopt climate change adaptation measures. The result agreed with finding of Owolabi (2014) that reported that this age group range of 30-45 years tends to be very productive.

As indicated in Table 2, more than half (64%) of the respondents were male and married (52%). This implies that farming is a tedious work that will be handle by men while the process activities are mostly done by female. Musa (2018) asserted that physical labour productivity depends on their socioeconomic characteristics namely: age, sex and health status. This further implies that most of the arable crop farmers are married and that agriculture is very much practiced by married people to make end meet and cater for their children. These findings corroborated Owolabi (2014) who asserted that majority of the arable crop growers are married.

The result in Table 2 further revealed that 38% of the respondents had a household size of 6-10 and the mean household size was 9 people. This finding was in line with Ogunbemeru *et al.* (2018) who found a significant relationship between household and family labour.

Table 2 also indicated that reveal that 46% of the respondents were having informal education, 24% had primary education and 30% had secondary education. This implies that the farming activities were conducted by less educated people in the study area. This means the advanced ways of farming may not be easily applicable as it requires sound education and computer literacy. Most Nigerian farmers, according to Omotayo (2005), are illiterates.

Table 2 revealed that less than half (47%) of the respondents had less than 1ha farm size with the mean of 3ha. This implies that the respondents are small scale and subsistence farmers. This further implies that that the farmers will not invest in climate change adaptation measures. Farm size according to Musa (2010), is an essential determinant in resource allocation, which will have impact on final output and returns.

Results in Table 2 indicated that more than half (53%) of the respondents inherited their farmlands. This implies that more than half of the total farmlands are controlled by inheritance as such the farmland is fragmented and passed from one generation to another. There is no gain in investing on climate change adaptation measures to improve their farm. In addition, the farmers in the study area will continue to produce at subsistence level. This is in accordance with Musa (2010) findings that most Nigerian farmers produce at subsistence level.

Table 2 revealed that 44% of the respondents had income up to ₦20,000 with mean income of ₦ 19,085:00k. This implies that respondents in the study are would have a hard time coping with farm and family expenses. This negate the adaptation of adaptation measures as fund is the soul of any agricultural business. Money is the major determinant of speed of adoption of adaptation measures to climate change (Eid *et al.*, 2006).

Table2: Distribution of Respondents based on their socioeconomic characteristics



Variable (n=100)	Frequency	Percentage	Mean
Age (in years)			
20 – 30	57	57.0	33 years
31 – 40	20	20.0	
41 – 50	13	13.0	
51 – 60	6	6.0	
>60	4	4.0	
Sex			
Male	64	64.0	
Female	36	36.0	
Marital status			
Married	52	52.0	
Single	48	48.0	
Educational status			
Informal education	46	46.0	
Primary education	24	24.0	
Secondary education	30	30.0	
Household size			
1-5	15	15.0	9 persons
6-10	18	18.0	
11-15	29	29.0	
16-20	18	18.0	
Farm size (in ha)			
< 1	47	47.0	3 ha
1-5	35	35.0	
6-10	2	2.0	
>10	16	16.0	
Source of farmland			
Inheritance	53	53.0	
Purchased	31	31.0	
Rent	4	4.0	
Borrowed	9	9.0	
Government	3	3.0	
Annual income (in ₦)			
1,000-10,000	20	20.0	₦19,085
11,000-20,000	44	44.0	
21,000-30,000	12	12.0	
31,000-40,000	9	9.0	
41,000-50,000	7	7.0	
>50,000	8	8.0	

Source: Field survey, 2023

Climate Change Awareness, Adaptation Measures Adopted and Constraints to Adoption of Adaptation Measures.

Findings in Table 3 revealed that majority (81%) of the respondents were aware of climate change. This implies that the respondents are ready to take appropriate adaptation measures to adapt to the prevailing climate change scenarios in order to improve on their production. Also, Ani, (2007) and Yakubu (2011), recognized awareness as the first stage in the adoption process.

Results in Table 3 indicated that 28% of the respondents adopted early planting while 27% adopted early maturing crops and 11% adopted resistance varieties and planting more than one crop respectively. These were the most adopted climate change adaptation measures in the study area. The implication of this result was that the respondents in the study area knew the benefit

of adaptation measures that was the main reason they adopted it. These research findings supported Hassan and Nhemachena (2008) who reported that the adaptation measures farmers perceived as appropriate include: using early maturing crops, crop diversification, and using resistance crop varieties.

Table 3 indicated that less than half (30%) of the respondents were having lack of knowledge as their constraints to adoption of adaptation measures followed by lack of capital (24%) and extension services (19%). This implies that adoption of adaptation measures would be difficult especially those that require finance and technical knowhow. These research findings supported the result of a study conducted by Eid *et al.* (2006), who reported that money, labour, farm size, tenure status, level of education of the farmers, adequate information on climate change and access to extension service are the major determinants of speed of adoption of adaptation measures to climate change.

Table3: Distribution of Respondents based on Climate Change Awareness, Adaptation Measures Adopted and Constraintsto Adoption of Adaptation Measures

Variable (n=100)	Frequency	Percentage	Mean
Climate Change Awareness			
Aware	81	81	
Unaware	19	19	
Adaptation Measures Adopted			
Early planting	28	28	
Using early maturing crop	27	27.0	
Using Resistance / Improved varieties	11	11.0	
Using cover crop	2	2.0	
Planting more than one crop	11	11.0	
Using soil conservation techniques	5	5.0	
Using irrigation	7	7.0	
Using minimum/ zero tillage	9	9.0	
Constraints to Adoption of Adaptation Measures			
Lack of capital	24	24.0	
Lack of knowledge	30	30.0	
Lack of extension agent	19	19.0	
Lack of information	11	11.0	
Not easily accessible	7	7.0	
Not affordable	4	4.0	
Not usable	5	5.0	

Source: Field survey, 2023

Awareness of climate change and climate change adaptation measures

Table 4 revealed the Chi-square test of association between awareness of climate change and adaptation measures to climate change by the farmers. The calculated value of 8.729 was greater than the p-value of 0.324. Therefore, we concluded that there is a significant association between the awareness of climate change and climate change adaptation measures. This implies that the adoption of climate change adaptation measures depends on the awareness of the adaptation measures, the more the awareness the more the adoption. Ani, (2007), Yakubu (2011) and Ubandoma (2016) recognized awareness as the first stage in the adoption process.

Table 4: Association between Awareness of Climate Change and Climate Change Adaptation Measures

	Value	df	Significance
Pearson Chi-square	8.729 ^a	7	0.053
Likelihood Ratio	12.614	7	0.042
Linear-by-Linear Association	7.494	1	0.006
N of Valid Cases	100		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .38.

CONCLUSION AND RECOMMENDATIONS

The findings from the study indicated that the respondents were at their productive age, married with the household size of 9 people. More than half of the respondents were educated while less than half were having 1ha as farm size with the mean farm size of 3ha. The climate change adaptation measures adopted by the farmers in the study area includes: early planting, using early maturing crop, planting more than one crop and using crop resistance varieties. The constraints to adoption of climate change adaptation measures includes: lack of capital, lack of knowledge and lack of extension agent. The chi-square test of the association indicated a significance association. According to the result of chi-square, as the awareness of climate change increases the adoption of climate change adaptation measures will also increase.

The findings from this study recommends the following:

- The farmers should form cooperatives to tackle the problem of fund.
- Government should provide farm inputs at affordable prices and accessible to farms.
- Government should provide adequate extension station.
- Government should make the weather information readily available to farms.

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