



## Assessment of Crop Farmers Indigenous Knowledge on the Use of Climate Change Adaptation Strategies in Lavun Local Government Area of Niger State, Nigeria

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DOI: [10.5281/zenodo.8369341](https://doi.org/10.5281/zenodo.8369341)

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### Abstract

This study examined the crop farmers' indigenous knowledge on the use of climate change adaptation strategies in Lavun Local Government Area of Niger State. A multi-stage random sampling technique was used to select 85 respondents. Data were collected using questionnaire and analyzed using descriptive and inferential statistics. The results reveal that majority (87.1%) were male with a mean age of 41 years. Majority (69%) of the respondents were married and most (78%) had formal education and most (73%) of the them had no contact with extension agent with an average annual household income was ₦125,000. The result also depicts that most (91.8%) of the respondents were aware of climate change mostly on increase in temperature (85.9%), early/late cessation of rain and draught (64.7%). Among the indigenous knowledge used by the respondents as climate change adaptation strategies were changes in dates of planting (74.0%), mixed farming (55.0%) and diversification in crop production (49.0%). The result of the relationships between socio-economic characteristics and awareness to climate change indicates that; marital status, level of education and extension contact are significant respectively at  $p \leq 0.05$  level of significance. The major constraints to the use of indigenous knowledge as climate change adaptation strategies were inadequate knowledge on how to cope (77.6%), poor response to adverse effect (61.2%), identified high cost of improved crop variety (57.6%) and low income level (48.2%). It was concluded that, respondents were able to develop indigenous adaptation strategies and marital status, level of education and extension contact were significantly related with climate change awareness. The study recommended that extension service should be increase for a successful adaptation programme, relevant information on climate change adaptation practices should reach the farmers through radio stations, news-papers, public lectures, seminars as well as other mass media means and provision of improved crop varieties at affordable price to the farmers.

**Keywords:** Climate Change, Indigenous Knowledge, Adaptation.

## INTRODUCTION

Rural dwellers play a critical role in farming for ensuring food security. However, this indigenous people and local communities' dwell and live in harsh natural environment and have had to cope with extreme weather and adapt to environmental change for centuries in order to survive (Yieching *et al.*, 2011). They have done this using long standing traditions practices or traditional knowledge (TK) relating to adaptive ecosystem management and sustainable use of natural resources (Krystyna *et al.*, 2011).

It is essential to note that farmers' knowledge on the use of indigenous climate change adaptation strategies is of paramount importance to the nature and type of crops produce in a locality (Nwaiwu, 2014). Indigenous peoples' knowledge focuses on elements of significance for local livelihoods, security and well-being, and as a result, it is

essential for Climate change adaptation strategy. The significance of local knowledge has been known in the design and implementation of sustainable development projects; little has been done to include this into formal climate change adaptation strategies (Ziervogel *et al.*, 2010).

It is important to establish local systems of knowledge as they relate to specific locations and are based on experience and understanding of local conditions of production. Therefore, traditional knowledge practices embody local adaptive management to the changing environment and complement scientific research. Managing climate change impacts has traditionally been the responsibility of households, except large extreme weather events and disasters. Improving farmers' knowledge and their capacity is an essential element in the development of integrated soil fertility management technologies (Deugd *et al.*, 2009).

In combating climate change impact, it requires the involvement of many stake holders ranging from communities who experience the effects on a daily basis, to scientists attempting to understand the bio-physical and socio-economic causes and consequences of climate change as well as developers and policy makers at all levels. Particularly in the Agriculture sector, climate change adaptation can go hand-in-hand with mitigation. Climate change adaptation and mitigation measures need to be integrated into the overall development approaches and agenda (IPCC, 2017).

Indigenous farmers largely depend on organic farming which also is capable of reducing the greenhouse gas emissions. It is also recognized that forest plays an important role in the global carbon cycle by sequestering and storing carbon (Karjalainen *et al.*, 2002). Mulching regulates soil temperature and extremes, suppresses diseases and crop pests and conserves soil moisture hence increasing the agricultural productivity.

Climate change affects the four dimensions of food security, food availability, food accessibility, food utilization and food systems stability. This has an impact on livelihood assets, food production and distribution channels, as well as changing purchasing power and market flows. It is necessary to strengthen the silence of rural people and to help them cope with this additional threat to food security, particularly in the agriculture sector, climate change adaptation can go hand-in-hand with mitigation. Climate change adaptation and mitigation measures need to be integrated into the overall development approaches and agenda. In view of the above, the study aimed at examining the crop farmers' indigenous knowledge on the use of climate change adaptation strategies in Lavun Local Government Area of Niger State, Nigeria. Specifically, the study intends to achieve the following objectives:

- i. Describe the socio-economic characteristics of the respondents;
- ii. Examine the level of awareness of climate change among the respondents;
- iii. Identify the indigenous climate change adaptation strategies used by the respondents; and
- iv. Identify the constraints to the use of indigenous knowledge on climate change adaptation strategies in study area.

## METHODOLOGY

The study was carried out in Lavun Local government area (LGA) of Niger State located in the guinea savannah zone of Nigeria. The L.G.A is bordered to the north-west by Gbako and Bida; to the south by river Niger; to the east by LKatcha; to the west by river Kaduna. It lies between latitude between 90 1200°N and longitude 50 3600°E. (Balki, 2012). It has distinct dry and wet seasons with mean annual rainfall of between 76.2mm and 1016mm. The minimum temperature which is 25°C, occurs in December- January while the maximum is 38°C, in march –April. The vegetation is guinea savannah with mixtures of trees, shrubs, herbs, and grasses. The soils are of low to medium fertility levels and can be used for growing cereals, root and tree crops. The LGA has a population of 209,017 (NPC,2006).

Purposive and random sampling technique was used for the study. Seven wards of the L.G.A (Dabban, Busu, Gaba, Jima, Egbako, Batati, and Kutiji) were purposively selected in the study. The wards were selected based on higher concentration of crop farmers and registered farmer's associations. Simple random sampling technique was used to select ninety-four (94) rice farmers, out of which eighty-five questionnaires were retrieved. Questionnaire was used as an instrument for data collection. The questionnaire was designed based on the objectives of the study and comprises both open and close ended questions. Descriptive statistics was used to achieve the research objectives.

## RESULTS AND DISCUSSION

### Socio-Economic Characteristics of the Respondents

The results from Table 1 reveal that the respondents have a mean age of 47 years. This implies that respondents in the study area have many years of experience in crop production which is in line with the report of Akinola, (2013) that the age of maize farmers influences their experiences in farming activities, thus increasing productivity of these farmers. Majority (87.1%) of the respondents were male while 12.9% were female, this implies that sexual division of labour is

predominant in Nigeria and farming is generally perceived as a male oriented occupation. It can be concluded that majority of respondents who practice farming as an occupation are males. This is in line with the findings of Adesina (2006), about 80% of FADAMA land are controlled by men. The results also showed that majority (69.0%) of the respondents were married while 28%, 2% and 1% were single, widowed and divorced respectively. This implies that majority of the respondents have responsibilities and that could influence their farming activities.

The results in table 1 further revealed that, almost half (41.0%) of the respondents have attended secondary school and a reasonable proportion (22.0%) have attended tertiary education while 18.0%, 5.0% have primary and non-formal education respectively in the study area. The result from table 1 also revealed that 72.9% of the crop farmers had no contact with an extension agent while only 27% had contact with extension agents. This implies that adequate extension service is required by the respondents in the study area so as to have adequate knowledge on how to cope with climate change effects thereby seeking for various alternatives in improving their crop production. The results in the table also depicts that, a reasonable proportion (41%) of the respondents had an income range of ₦101,000-₦150,000 while 22%, 18%, 14% and 5% had an income range of ₦151,000-₦200,000, ₦50,000-₦100,000, ₦250,000 and ₦50,000 respectively. Income is an important resource that individuals and families use in order to meet their goals. The family depends on this income for providing needs such as food, clothing, shelter and leisure. This income was from both agricultural and non-agricultural sources. Because the annual income is low and cannot meet the respondents needs, this is why farmers in the study area supplement their incomes from various crop farming by rearing of livestock for household consumption in addition to getting credit every time for their farming activities.

**Table 1: Distribution of Respondents According to Socio-economic Characteristics (n = 85)**

Variables	Frequency	Percentage
<b>Age (years) [Mean = 41 years]</b>		
<25	5	6.0
25-34	17	20.0
35-44	26	31.0
45-54	32	37.0
55 and above	5	6.0
<b>Gender</b>		
Male	74	87.1
Female	11	12.9
<b>Marital Status</b>		
Married	58	69.0
Single	24	28.0
Widowed	2	2.0
Divorced	1	1.0
<b>Educational level</b>		
Non-formal education	19	5.0
Primary education	48	18.0
Secondary (SSCE)	10	41.0
Tertiary education	8	22.0
<b>Contact with Extension Agent</b>		
Yes	23	27.0
No	62	72.9
<b>Income (₦) [Mean = ₦125,000]</b>		
Less than 50,000	4	5.0
51,000-100,000	15	18.0
101,000-150,000	35	41.0
151,000-200,000	19	22.0
Above 200,000	12	14.0

Source:Field Survey, (2023)

### Respondents' Awareness on Climate Change

Table 2 shows that majority 91.8% of the respondents in the study areas were aware of climate change. While only 8.2% were not aware of climate change. The result of the finding revealed that majority of the farmers in the study areas were aware of climate change and this will help them adapt easily to the effect of climate change. Table 2 also point out that most (85.9% and 75.3%) of the respondents were aware of increase in temperature respectively and early/late cessation of rainfall. Majority (64.7%) were aware of drought due to climate change. Other type of climate change aware

by the respondents include flooding, desertification and decrease in temperature constituting 24.7%, 17.6% and 5.9% of the respondents respectively in the study area.

**Table 2: Distribution of Respondents According to Awareness on Climate Change(n=85)**

Variables	Frequency	%
<b>Climate change awareness</b>		
Yes	78	91.8
No	7	8.2
<b>Type of climate change aware</b>		
Drought	55	64.7
Flooding	21	24.7
Early/late cessation of rainfall	64	75.3
Desertification	15	17.6
Increase in temperature	73	85.9
Decrease in temperature	5	5.9

Source: Field Survey, (2023)

\* Multiple responses

### Indigenous KnowledgeUsed as Climate Change Adaptation Strategies

Table 3 present the indigenous adaptation strategies used by crop farmers in the studied area. As indicated, 74% of the farmers used adjustment in planting dates as climate change adaptation strategy, 55% used mixed farming as one of their adaptation strategies, and 49% used diversification in crop production as their adaptation strategies. Crop diversification can also serve as insurance against rainfall variability as different are affected differently by climate events (Orindi *et al.*, 2015). As an adaptation strategy to unpredictable rainfall, some farmers identified the following strategies, 48% mulching operation, 21% use of cover crops, 20% intercropping, 18% use of improved variety, and 13% planting of trees respectively.

**Table 3: Indigenous KnowledgeUsed as Climate Change Adaptation Strategies (n=85)**

Indigenous knowledge	Frequency	Percentage*
Diversification in crop production	42	49
production of improved variety	15	18
Agro forestry	08	9
Adjustment in planting dates	63	74
Mulching	41	48
Planting of trees	11	13
Mixed farming	47	55
Intercropping	17	20
Zero tillage	10	12
Cover Cropping	18	21

Source: Field Survey, (2023)

\* Multiple responses

### Relationship between Socio-Economic Characteristics and Awareness to Climate Change

Table 4 revealed the relationship that existed between the socio-economic characteristics and awareness to climate change. From the table, it can be deduced that marital status, level of education and extension contacts are significant at  $p \leq 0.05$  while gender and age of the respondents are not significant to the awareness to climate change at  $p \leq 0.05$  respectively.

**Table 4: Correlation Result of Relationship Between Socio-Economic Characteristics and Awareness to Climate Change**

Variables	Chi-square(calculated value)	Chi-Square (Tabulated value)	d.f	Decision
Gender	1.68	3.84	1	Not Significant
Age	6.90	9.49	4	Not Significant
Marital status	18.85	7.81	3	Significant
Level of Education	10.70	7.81	3	Significant
Extension Contact	7.57	3.84	1	Significant

Source: Field Survey, 2023.

$P \leq 0.05$ ,

d.f = degree of freedom

## Constraints to the Use of Indigenous Knowledge as Climate Change Adaptation

The results in Table 5 revealed that most (77.6% and 61.2%) identified inadequate knowledge on how to cope and poor response to adverse effect respectively, as the major constraints in climate change adaptation strategies. Majority (57.6%) conceived identified high cost of improved crop variety and almost half (48.2%) were constraints by low income level, while 35.3%, 35.3%, and 29.4%, were constraints by high cost of farm labor, limited access to improve crop variety, and poor extension contact respectively in mitigating and adapting to climate change effects. The result suggests that farmers are limited in adaptation strategies adopted by a myriad of constraints. This may be an indication of their vulnerability to the effect of climate change.

**Table 5: Constraints to the Use of Indigenous Knowledge on Climate Change Adaptation Strategy(n=85)**

Constraint	Frequency	Percentage*	Rank
Limited access to improve crop variety	30	35.3	5 <sup>th</sup>
High cost of improve crop variety	49	57.6	3 <sup>rd</sup>
High cost of farm labour	30	35.3	5 <sup>th</sup>
Poor extension contact	25	29.4	7 <sup>th</sup>
Low income level	41	48.2	4 <sup>th</sup>
Inadequate knowledge on how to cope	66	77.6	1 <sup>st</sup>
Poor response to adverse effect of climate change	52	61.2	2 <sup>nd</sup>
Poor access to credit facilities	15	17.6	9 <sup>th</sup>
Distant to water bodies to cushion the effect of drought	22	25.9	10 <sup>th</sup>

Source: Field Survey, (2023)

\*Multiple responses

## CONCLUSION AND RECOMMENDATIONS

It was concluded that respondents were aware of climate change and its impact on food crop production. However, the indigenous crop farmers were able to develop adaptation strategies such as diversification in crop production, use of cover crops, mulching operation, growing drought-resistant crop varieties, use of pest/disease resistant crop varieties, use of irrigation etc. these strategies are seen as the best by the local farmers in the study areas, due to increment in crop yield of productivity. Marital status, level of education and extension contact are significant respectively at  $P \leq 0.05$  level of significant.

### Recommendations

- i. Relevant information on climate change adaptation practices should reach the farmers through different communication medium such as radio stations, news-papers, public lectures, seminars as well as other mass media means.
- ii. Increasing extension -farmers' ratio will make extension service more accessible to farmers, and might be the key components of a successful adaptation programme.
- iii. Provision of improved crop varieties at affordable rate to the indigenous crop farmers will enhance productivity.
- iv. Indigenous climate change adaptation strategy can be introduced to the crop farmers in form of non-formal educational strategy, as the crop farmers educational level is an important factor of awareness to climate change.

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**CITE AS**

Tafida, M., Yusuf, U.A, Abdullahi, S, & Yusuf, M. M. (2023). Assessment of Crop Farmers Indigenous Knowledge on the Use of Climate Change Adaptation Strategies in Lavun Local Government Area of Niger State, Nigeria. *Global Journal of Research in Agriculture & Life Sciences*, 3(5), 16–21. <https://doi.org/10.5281/zenodo.8369341>