Assessment of Cassava-Based Farmers Willingness-to-Accept Climate Smart Agriculture in Etche Local Government Area Rivers State

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Abstract

This study assessed cassava-based farmers willingness-to-accept climate smart agriculture in Etche Local Government Area of Rivers State, Nigeria. A simple random technique was employed to select 80 cassava-based farmers with well-structured questionnaire. Descriptive statistics, 4-point likert scale and contingency valuation method ***(CVM)*** *were used for the assessment. The result revealed that the average age and farming experience of farmers were 42years and 19 years respectively, majority (87.50%) of the respondents were females, the average household size was 6 persons and the average income was #300,000. Also, there was a high-level awareness of* ***CSA*** *among the respondents. The* ***CVM*** *gave a supply curve which revealed that the higher the amount of money offered to respondents the more they are willing-to-accept* ***CSA*** *practices in the study area. Majority (19.22%) attested that cost of adoption were their major constraint. It was recommended that extension agents prioritize awareness campaigns and educational programs that provide farmers with comprehensive knowledge about climate change, develop tailored financial products and support mechanisms that target* ***CSA*** *initiatives, training programs should be established to enhance farmers technical knowledge and skills* ***CSA*** *practices, develop suitable policies that will encourage rural farmers to adopt and utilize* ***CSA*** *practices.*

Key Words: *Assessment, Cassava-Based Farmers, Willingness-To-Accept Climate Smart, Agriculture, Rivers State*

1. INTRODUCTION

The application of CSA in cassava farming worldwide can help to promote sustainable agricultural practices that mitigate the impacts of climate change on crop production. Climate change is affecting agricultural productivity and food security, particularly in developing countries like Nigeria. In Nigeria, the use of drought-resistant cassava varieties increased cassava yield under drought conditions (Phiri, A.T et al,2022). Conservation agriculture is also a CSA practice that is applicable to cassava farming. This practice involves minimal soil disturbance, permanent soil cover, and crop rotation. Cassava farming in South-South Nigeria, particularly in Rivers State, several CSA practices have been identified, which includes Agroforestry: Agroforestry is the integration of trees and crops in the same land area. This practice has been found to improve soil health, enhance water retention, and reduce greenhouse gas emissions. According to a study by Mensah, H, et al (2021), cassava farmers in Rivers

State have adopted agroforestry by planting trees like oil palm and raffia on their farms. The trees provide shade for the cassava plants while also serving as a source of additional income. Environmental sustainability is crucial for the long-term survival of the planet, and requires the conservation and efficient use of resources such as water, air, energy, and biodiversity. It involves reducing the production of waste and pollution, and finding ways to mitigate and adapt to the impacts of climate change. Climate-Smart Agriculture (CSA) can be a solution to environmental sustainability by reducing greenhouse gas emissions, conserving natural resources, and improving ecosystem services. One example of how CSA can help reduce greenhouse gas emissions is through the use of improved crop and soil management practices, such as intercropping, crop rotation, and conservation tillage, which have been shown to reduce emissions from agricultural activities (FAO, 2018). In addition, CSA can help conserve natural resources such as water and soil by promoting the use of practices like agroforestry and conservation farming, which have been shown to reduce soil erosion and improve water retention (Abdulai et al., 2020). Although the problems confronting the applicability of CSA are enormous. It is equally a known fact that, the bulk of food produced in Nigeria are by the efforts of rural peasants' farmers who depends on rainfed Agriculture. These farmers are poor and lack the capacity to adopt CSA as majority lacks technical knowhow, poor extension contact and government intervention programme with poor rural infrastructure and so on. Many researchers have studied CSA, but few have dived into assessment of cassava-based farmers willingness-to-accept climate smart Agriculture. Therefore, this study aims to close the gap existing in this direction. At this point the study subsequently ask the following research questions: 1). what is the socio economics characteristics of the respondents? (2) what is the different CSA practised in the study area? (3) what is the awareness level of the respondents about CSA? (4) what are the compensatory measures that encourages respondents to accept CSA in their agricultural practice (5) what is the major constraints encountered by the respondents to adopt climate smart agricultural practices? This study answered all the research questions.

2. MATERIALS AND METHODS

The study was conducted in Etche Local Government Area (LGA) in Rivers State, Nigeria. It is located in the south-eastern part of the state and has its administrative headquarters in Okehi. The LGA shares borders with several other LGAs in Rivers State, including Omuma to the east, Port Harcourt to the south, and Etche to the north. The area of Etche LGA is approximately 500 square kilometres, and it has a population of over 180,000 people (The 2006 National Population and Housing Census). Etche Local Government Area (LGA) has a latitude of 5.0167° north and longitude: 6.75° east; its elevation is located in the low-lying areas of the Niger Delta region, with an average elevation of approximately 15 meters above sea level. The predominant language spoken in Etche Local Government Area (LGA) is Etche, a language classified as a member of the Igboid group of the Niger-Congo language family. However, due to its location in the south-eastern region of Nigeria, English is also widely spoken and used as a language of formal communication. Etche Local Government Area (LGA) in Rivers State, Nigeria is made up of several clans which include, Ekpeye, Ogba, Umuoyima, Alakahia, Mba, Edeoha. Etche is known as the food basket of her state as farming is the predominant economic activity. The farmers in the area engage in subsistence and commercial farming, which provide food for both the local market and nearby urban centres. Cassava production is the most significant farming activity in Etche LGA. The crop is extensively cultivated in the area, and its products are widely consumed as a staple food by the people in the region. Other crops, such

as yam, plantain, maize, and vegetables, are also grown on a smaller scale. This study adopted simple random sampling method. A sample of 10 towns was selected using a simple random sampling method. Then 8 cassava farmers were selected from each of the 10 sample towns using the snowball sampling method. This gave a total of 80 respondents as the sample size for the study. Objectives 1,2 and 5 was analysed using descriptive statistics. Objective 3 was achieved by the use of 4-point likert scale. Objective 4 was achieved using the use of contingency valuation method.

3. Model specification

This is a psychometric scale most widely used in survey research, in a likert questionnaire item, respondents specify their level of agreement or disagreement on a symmetric agree-disagree scale for a series of item statements. Thus, the scale captures the intensity of their feelings. A 4-point rating scale was used in this study to examine the respondent's awareness level to CSA in the study area. This scaling was agreed as: Very high level (VHL), High level (HL), Low level (LL) and Very low level (VLL). The mean score of respondents based on a -point rating scale was computed as 4+3+2+1/4=2.50=cut off point. Using the interval scale of 0.05, the upper cut-off point was 2.50+0.05=2.55 while the lower limit cut-off will be 2.50-0.05=2.45. Based on this, any mean score below 2.45 was taken as Very low level, while those items with mean score between 2.45 and 2.55 was considered as Very high level.

4. Contingency valuation method (CVM)

CVM is a survey-based method used to estimate the economic value of non-market goods or services, often related to environmental or public policy issues. This method helps estimate the economic value that individuals place on specific environmental goods or services. In the context of this analysis, the CVM was used to determine the respondent's willingness-to-accept compensatory measures in the form of money to adopt climate-smart practices and the factors that influence their decision.

5. RESULTS AND DISCUSSIONS

Table 5.1, below revealed that 12.50% of the farmers were male, while 87.50% were female. This gender disparity is consistent with the gender dynamics typically observed in rural agricultural communities in Nigeria. This supports the findings of (Ogundipe and Ogunniyi, 2018) who attested that the predominance of female farmers can be attributed to cultural and historical factors, as well as the increasing role of women in agricultural activities. The average age of respondents in the study area was found to be 42 years showing activeness and ability to adopt an innovation. This finding aligns with previous studies conducted in ogun state, Nigeria by Adepoju, 2017 and Oyekale, 2018. They accentuated that majority of farmers fall within the productive age group, suggesting they are innovative and they can easily adopt CSA.This study also revealed that majority, (91%) of cassava farmers in the study area were married, 2.50% were divorcees, 5.00% were widows, and 1.30% were widowers. These findings indicate a high prevalence of marriage among the farming population, which is in line with the cultural values and norms of the community (Adeoye, 2018). On average, cassava farmers in the study area had received 9 years of formal schooling. This finding suggests that the level of education among farmers is relatively low, which can impact their access to new innovation (CSA), modern farming techniques, and market opportunities (Meshesha, A.I et, al,2022). This is in consonance with a study conducted by Oduntan et al. (2022), which

emphasized that education is a vital human capital that has serious implications on farmers level of awareness and adoption of CSA. The average household size was reported to be 6 persons, reflecting the presence of extended family systems and communal living arrangements. Most rural peasants' farmers rely on family labour which removes the needs for hired labour. However, the average farming experience among the cassava farmers was reported to be 19 years. This finding indicates a considerable level of expertise and knowledge in cassava cultivation and farming practices. It is consistent with previous studies that highlight the long-standing tradition of cassava farming in the region (Adeoye, 2018). In terms of income status, the study revealed that majority (82.25%) earned between 200,000 and 400,000 Naira, while only (1.25%) earned less than 100k naira. No farmer earned above 1,000,000 Naira. This income distribution aligns with the economic conditions prevalent in rural agricultural communities, where income levels are generally low and subject to seasonal variations (Oyekale, 2017). Majority (56.25%) engaged in trading as an alternative income source. These findings highlight the diversification of income sources among farmers, which is crucial for livelihood resilience and poverty reduction.

Table 5.1: Distribution of socio-economic characteristic of Respondents in the study area

Socio-economic Characteristics	Frequency	Percentage	Mean
Gender			
Male	10	12.50	
Female	70	87.50	
Total	**80**	**100**	
Age			
0-14	0	0	
15-24	8	10.00	
25-54	48	60.00	42
55-64	20	25.00	
Above 64	4	5.00	
Total	**80**	**100**	
Marital Status			
Married	73	91.30	
Divorcee	2	2.50	
Widow	4	5.00	
Widower	1	1.30	
Total	**80**	**100**	
Year spent in formal schooling			

0	2	2.5	
6	46	57.5	8
12	32	40.0	
16	0	0.00	
Total	**80**	**100**	
Household size			
1-3	18	22.50	
4-7	46	57.50	6
8-11	9	11.25	
Above 11	7	8.75	
Total	**80**	**100**	
Farming experience			
1-10	12	15.00	
11-20	48	60.00	19
21-30	14	17.50	
Above 30	6	7.50	
Total	**80**	**100**	
Income Status			
Less than ₦100k	1	1.25	
₦200k - ₦400,000.00	66	82.25	
₦500k- N700,000.00	13	16.25	
Above ₦100,000.00	0	0.0	
Total	**80**	**100**	
Other Sources of income			
Hunting	2	2.50	
Okada ridding	25	31.25	
Petrol business	5	6.25	
Trading	45	56.25	
Others	3	3.75	
Total	**80**	**100**	

Source: Field survey, 2023.

5.2: The Types of Climate Smart Agriculture Practice in Etche L.G.A

Table 5.2: below accentuated that only 4.86% of the respondents adopted cover cropping as their climate smart agricultural practice in the study area. Cover cropping involves planting crops that help in protecting the soil against erosion, conserving water, and improving soil fertility (Fischer, H., and Priess, J. A. 2018). While, 2.31% of the respondents practice planting drought and heat tolerant varieties. This practice involves planting cassava varieties that can tolerate high temperatures and drought conditions (Nizzy, A.M and Kannan,S. 2022). Irrigation

farming method was adopted by a small percentage of cassava farmers (2.78%). This is because irrigation involves the provision of water to crops during dry periods using various methods like drip, furrow, or flood irrigation (Arunthathee and Sanhueeze, 2019). While only (5.78%) of the cassava farmers practice agro-forestry, which is the integration of trees and crops on the same plot of land. This practice helps to improve soil nutrient content, control erosion, and provide shade for crops (Kiptot et al., ,2019). The practice of crop rotation was adopted by 9.26% of the respondents. It involves the systematic planting of different crops on the same piece of land over a period to enhance soil fertility, reduce pests, diseases, and maintain crop yields. (Kumar et al.,2019). While, majority (22.69%) adopted intercropping as their climate smart agricultural practice. This practice involves the planting of two or more crops on the same piece of land at the same time. This helps to maximize land use and improve soil fertility (Asare, 2019). The study shows that only (17.13%) of the respondents use organic manure as a means of improving soil fertility. Organic manure was made from animal waste, crop residue, and other organic materials as accentuated by (Kumar et al.,2019). The study also revealed that (16.20%) of the cassava farmers adopted early planting. Early planting involves planting cassava crops early to reduce pest and disease pressure, increase yield, and shorten the maturation period as pointed by (Olatunji and Aro, 2019). While, 11.57% of the respondents practiced early harvesting. It is important to note that early harvesting involves harvesting of cassava crops before they are fully matured. This helps to reduce yield loss due to pest and disease pressure and improve the quality of the harvested crops as revealed by (Olatunji and Aro, 2019). Finally, conservation agricultural practices were adopted by (7.41%) of the respondents. Conservation agriculture involves maximizing soil cover, minimizing soil disturbance, and crop rotation to enhance soil quality, reduce erosion, and improve crop yields (Fischer, and Priess, 2018).

Table 5. 2: Distribution of respondents according to Climate Smart Agriculture Practiced in the study Area.

CLIMATE SMART PRACTICES	FREQUENCY	PERCENTAGE
COVER CROPPING	21	4.86
PLANTING DROUGHT AND HEAT TOLERANT VARIETIES	10	2.31
IRRIGATION FARMING	12	2.78
AGRO-FORESTRY	25	5.78
CROP ROTATION	40	9.26
INTER CROPPING	98	22.69
USE OF ORGANIC MANURE	74	17.13
EARLY PLANTING	70	16.20
EARLY HARVESTING	50	11.57
CONSERVATION AGRICULTURE	32	7.41
TOTAL	**432**	**100**

Source: Field Survey: 2023.

Multiple responses Recorded.

5.3 The Cassava Based Farmers Awareness Level of CSA in Etche L.G.A

Table 5.3: shows the distribution of respondents' level of awareness on climate-smart agriculture in the study area. The 4-point scale showed 2.84 mean score, revealing high- level of awareness by respondents on climate-smart agriculture (CSA) in the study area. These responses were represented by 65% of the respondents in the study area. It was only (13.8%) of respondents who have a very high level of awareness. On the other hand, a smaller percentage of farmers were found to have low level of awareness, with 12.5 percent. Finally, only 8.8% of cassava-based farmers responded to a very low level of awareness. These findings imply that farmers with a high level of awareness can be better equipped to adopt CSA practices that can enhance food security, increase agricultural productivity, and reduce the vulnerability of agricultural production systems to climate change-induced risks. This is in line with the findings of Oduntan et al., (2022) who stressed that good and adequate knowledge was a prerequisite for CSA adoption.

Table 5. 4: Distribution of respondents according to their level of awareness of Climate Smart Agriculture in the study Area.

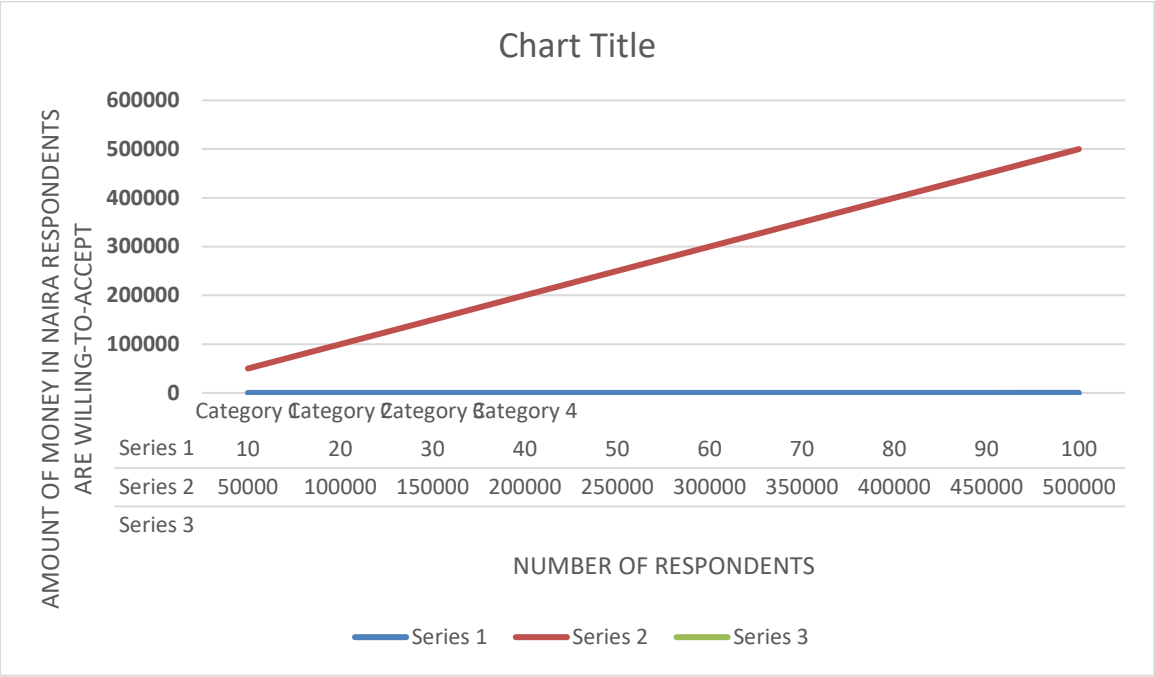
Awareness level of Climate Smart Agriculture	Frequency	Percentage	Mean
Very high-level of awareness (4)	11	13.8	
High level of awareness (3)	52	65	**2.84**
Low level of awareness (2)	10	12.5	
Very low level of awareness (1)	7	8.8	
	80	**100**	

Source: Field Survey: 2023.

5.5: Compensatory Measures to Encourage cassava Based Farmers to Accept CSA in Their Agricultural Practice in Etche L.G.A

Table 5:5 below revealed the graphical representation of respondent's willingness-to-accept and adopt CSA. A **supply curve** was obtained revealing that as the amount of money respondents are offered to practice CSA increases, they will be willing -to-accept, the innovation in their farming activities. This is in consonance with the findings of Shittu et al., (2021) who emphasized that the higher the incentives provided to farmers, the more likely they will be willing to adopt CSA practices. This finding implies that the adoption of climate smart agriculture in Etche L.G.A, can be incentivized by offering monetary compensation to the respondents as they are peasant farmers who can hardly funds any climatic adaptative practices like CSA without government funding. It is also important to note that the amount of money offered must be significant enough to motivate adoption. Based on their responses #400,000 naira was the highest amount, respondents are willing-to-accept climate smart agriculture in their study area.

Table 5.5: Graphical representation of the amount of money in naira respondents are' willing-to-accept to adopt Climate Smart Agriculture in the study area.



Source: Field Survey: 2023.

5.6. Constraints Encountered by Cassava Based Farmers to The Adoption of CSA in Etche L.G.A

Table 5.6, below revealed that majority (19.22%) stated cost of adoption were their major constraints. This finding is in consonance with the findings of Ajayi (2017), who emphasized the need for awareness campaigns and training programs to educate farmers about modern farming techniques and market opportunities. The study reviewed that high cost of adopting modern farming practices and technologies was a predominant constraint among cassava-based farmers. This finding also aligns with the research conducted by Onuoha (2019), who highlighted the financial burden faced by farmers in adopting improved cassava varieties and mechanized farming techniques. It was only (**4.07%**) who complained size of farm land as their least constraints. This is because Etche is known as food basket of Rivers State with enormous land availability. However, as a result of land grabbing by state actors, population growth and urbanization, there has been series of land fragmentation faced by the respondents. This constraint is in line with the findings of Oluwafemi (2017), who highlighted the challenges faced by farmers due to land fragmentation, population growth, and urbanization. Also, the findings showed that Inadequate Planting Materials (9.32%), negatively affects cassava production. This constraint is consistent with the research conducted by Ogunniyi (2021), who emphasized the importance of ensuring the availability of disease-free and high-yielding cassava stems to enhance productivity. The findings revealed that the labour intensive (4.47%) nature of cassava farming poses a challenge to farmers. This finding is supported by the research of Ajayi (2018), who highlighted the need for labour-saving technologies and mechanization to reduce the physical exertion required in cassava cultivation. While, Lack of Skills (9.51%), among farmers is a constraint to cassava production. This finding corresponds

with the research conducted by Eze (2017), who emphasized the importance of training programs to equip farmers with the necessary skills for improved cassava farming practices. Also, the findings reviewed that Inadequate Finance (19.03%) hampers cassava cultivation in the study area. This constraint is in consonance with the findings of Adebayo (2019), who stressed the need for accessible credit facilities and financial support to enhance farmers' access to inputs and resources. While, land tenure (12.43%) created challenges for cassava-based farmers. This finding aligns with the research conducted by Okolo (2018), who highlighted the need for land reform policies and secure land tenure systems to encourage long-term investments in agriculture. Lastly, Lack of Information about Weather Conditions (11.07%) affects cassava farming. This constraint corresponds with the findings of Adeleke (2019), who emphasized the importance of weather forecasting services and climate-smart agricultural practices to mitigate the impact of climate change on cassava production.

Table 5.6: Distribution of respondents according to constraints encountered in the study Area.

Constraints Encountered	Frequency	Percentage
Lack of awareness	56	10.87
Cost of adoption	99	19.22
Size of farmland	21	4.07
Inadequate planting materials	48	9.32
Labour intensive	23	4.47
Lack of skills	49	9.51
Inadequate finance	98	19.03
Land tenure	64	12.43
Lack of information about weather conditions	57	11.07
TOTAL	**515**	**100**

Source: Field Survey: 2023.

Multiple responses Recorded.

Conclusion and Recommendations

Etche Local Government area, Rivers State is a well-known local government area that engages in cassava farming as a major farming occupation, having carried out research on Assessment of cassava-based farmers willingness-to-accept climate smart agriculture in the study area, with the various methods of data analysis, the study achieved it's set objectives and showed that that the cassava-based farmers in the study area are willing to accept CSA. It was recommended that extension agents prioritize awareness campaigns and educational programs that provide farmers with comprehensive knowledge about climate change, develop tailored financial products and support mechanisms that target CSA initiatives, training programs should be established to enhance farmers technical knowledge and skills CSA practices, and develop suitable policies that will encourage rural farmers to adopt and utilize CSA practices

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