LAND CONSERVATION PRACTICES AND ATTAINMENT LEVEL OF FOOD SECURITY IN IKOM EDUCATION ZONE OF CROSS RIVER STATE, NIGERIA.

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INTRODUCTION

Food insecurity remains a pressing issue particularly in developing countries like Nigeria where millions of people struggle to access nutritious food. Cross River State is not an exception to this challenge. The problem is multifaceted, stemming from factors such as poverty, limited access to land, inadequate agricultural practices and climate change. Researches (Oyediran & Oladiji, 2023, Oyetunde-Usman & Olagunji, 2019) have shown that food insecurity has severe consequences on individuals, communities, and nations. Some of the consequences include malnutrition, reduced economic productivity and increased vulnerability to diseases. Land conservation practices are crucial for ensuring food security, particularly in regions with fragile ecosystems and high population growth rates. In Cross river State, where agriculture is a significant contributor to the economy and food supply, adopting sustainable land management practices is essential for maintaining soil fertility and promoting agricultural productivity (Srinivas, Rammohan & Reddy, 2021).

A study by Guyen, Bauer and Grote (2022), has shown that many farmers are aware of and adapt various soil conservation practices such as using urban waste crop mixtures and animal manure due to the scarcity and high cost of inorganic fertilizers. Land conservation practices are crucial for food security by maintaining soil health, promoting sustainable agriculture and ensuring

long term productivity. These practices include methods such as land tenure, agricultural extension service, soil conservation, ecological restoration, crop rotation and conservation agriculture (which involves minimal soil disturbance, permanent soil cover, and crop diversification), and improved soil and water management. By protecting and enhancing the land, a stable food supply can be ensured for present and future generation (Nasrim & Uddin, 2021). Poor Land conservation practices contribute to food scarcity by non-maintenance of soil health. Land degradation as a result of unsustainable land management practices pose a threat to food security because the majority of Cross Riverians depend on agricultural productivity. A devastated environment and degradation aggravated by the negative impact of climate change is leading to a decrease in the availability of natural resources and decline in productivity. This situation jeopardizes food security and increases poverty. Sustainable land management (SLM) practices may be a solution to soil fertility changes as they help increase average productivity, reduce seasonal fluctuations in yield, diversify production and improve incomes to ensure food security (Adebiyi, 2019).

However, various land conservation practices support the management and restoration of soil fertility which may enhance food security. These include land tenure, agricultural extension services soil conservation and ecological restoration (Traore & Kovara, 2019). These techniques are part of the integral land conservation practices that result in fortified food security. In addition, improved microclimate conditions which represent a potential for increased land productivity. It is therefore important to deepen one's knowledge on sustainable land management practices and their impact on soil quality for better food security in a climate change context.

Decreasing agricultural land area indirectly affects food availability, just like increasing dependence on food imports, decrease biodiversity, reducing green open space and damaging the environment sand local culture (meinzenDick, Predhan, Decleene, 2024). To provide such food it

is necessary to preserve sustainable food cropland in urban areas, approaches that can synergize social, cultural, environmental and economic aspects. Food security is pressing issue globally, particularly in developing countries like Nigeria, where significant portion of the population faces hunger and malnutrition. Land conservation practices is essential for sustainable agricultural productivity which is essential for achieving food security. However, the effectiveness of these practices in improving food security outcomes remains understudied. Nigeria faces significant challenges in achieving food security with high prevalence of hunger and malnutrition, particularly in rural A reas. Land degradation, soil erosion and climate change exacerbate the problem, threatening agricultural productivity. Land conservation practices such as land tenure system, agricultural extension services, soil conservation practices, ecological restoration and crop rotation.

Land tenure refers to the relationship between individuals or groups and land, defining their rights and responsibilities regarding land use, ownership and management. As a variable, land tenure can significantly impact agricultural productivity, food security and sustainable land management. Understanding land tenure system is crucial for developing effective land policies that promote agricultural development and food security. The relationship between land tenure and food security is complex and multifaceted, rooted in the ways land rights influence agricultural productivity, investment and access to resources. Land tenure system encompassing customary, statutory, or hybrid arrangement shape the security of land rights which in turn impacts farmers incentives to invest in land improvements, adopt new technologies and engage in sustainable practices. (De Soto, 2020). Conversely insecure land rights often lead to under investments, land depreciation and increased vulnerability to displacement, all these undermine food availability and access (Food security).

Insecure land tenure can discourage farmers from investing in soil fertility, irrigation infrastructure or crop diversification as they face the risk of eviction or loss of rights. The short-term focus reduces overall agricultural productivity and hamper efforts to improve food security. When land rights are insecure, marginalized groups such as small holders, women and indigenous people often face additional barriers limiting their access to productive resources and markets which further acerbates food insecurity. Furthermore, insecure land tenure can lead to fragmentation and disputes, disrupting agricultural activities and destabilizing local food systems. On the other hand, well designed and protected land tenure arrangements can promote equitable access to land, encourage sustainable land use and facilitate investments that enhance food security at both household and community lands. Secure land rights are also linked to better access to credits and markets, enabling farmers to diversify income sources and buffer against shocks such as droughts or price fluctuations. This financial stability and increased productivity contribute to improved food availability, nutritional outcomes, and resistance to climate change. Land tenure security is a fundamental determinant of agricultural productivity, resources management and social equity which are essential for achieving food security.

Agricultural extension services play a crucial role in promoting agriculture and development of food security by providing farmers with the knowledge, skills and technologies needed to improve their productivity and livelihood. It also refers to organized efforts to advise, educate, and assist farmers and rural communities in adopting innovated farming techniques, improving crop and livestock management and adopting sustainable practices. These services are often provided by government agencies, non-governmental organizations (NGOs), or private sector entities and encompass activities such as training, demonstration, advisory visits and dissemination of information. Agricultural extension services are recognized as vital mechanisms

for promoting agricultural development, improving productivity, and ultimately contributing to food security (Anderson & Feder, 2024). Agricultural extension services serve as a conduit for transferring new knowledge, technologies and practices from research institutions to farmers. By providing farmers with vital information on crop management, pest control, soil fertility and irrigation techniques, helping farmers to adopt new methods that can significantly boost crop yields and livestock productivity. This knowledge dissemination is crucial in regions where farmers may lack access to formal education or information networks. For instance, the adoption of high-yielding varieties (HYVS) of crops, facilitated through extension programmes has been instrumental in increasing food production in countries like India, Bangladesh, thereby reducing food insecurity. Beyond technological transfer, extension services also promote sustainable agricultural practices that preserve natural resources and ensure long-term productivity. Techniques such as integrated pest management, conservation agriculture and organic farming help maintain soil health, conserve water and reduce dependency on chemical inputs, which are essential for environmental sustainability and food security. These practices are especially significant in regions facing climate change impacts, where resilience building becomes critical. For example, climate-smart agriculture promoted through extension programmes enables farmers to adapt to changing weather patterns, reduce crop failure rates and stabilize food supplies (Lipper, 2024). Furthermore, extension services facilitates access to essential agricultural inputs such as quality seeds, fertilizers and credit facilities. By linking farmers with markets and financial institutions, extension agents help reduce barriers to technology adoption and improve farmers income stability. Increased income enhances household purchasing power, enabling them to access a diversified and nutritious diet which is a core component of food security. The development of farmer cooperatives and collective marketing often driven by extension agencies,

further empowers smallholders to negotiate better prices access larger markets and reduce post-harvest losses which are factors that directly influence food security (World Bank, 2017).

Extension services also play a crucial role in building farmers' capacity to manage risks associated with natural disasters, pests, and market fluctuations, providing timely weather information, training on disaster preparedness, and promoting desertification strategies help mitigate shocks that threaten food security (World Bank, 2017). This resilience building function is vital in vulnerablerural communities where food insecurity often results from unpredictable shocks.

LITERATURE REVIEW

Land tenure and attainment level of food security.

Land tenure systems significantly impact food security outcomes in agrarian communities. Studies have shown that secure land tenure is crucial for improving agricultural productivity, income and access to food (benaett & Alemi, 2016). Farmers with secure land tenure are more likely to invest in their land, adopt sustainable agricultural practices and enjoy high crop yields, leading to improved food availability and access.

Kehinde, Shittu, Adewuyi, Osunsina, Adeyonu (2021), investigated 'land tenure and property rights and household food security among rice farmers in Northern Nigeria. The reports a study that examined LTR's among small holders rice farmers in Northern Nigeria and the influence on household food security (HFS). It used cross section data obtained from 549 rice farmers, selected by multistage sampling across 84 rice-growing communities, seven (7) states and three (3) geopolitical zones in northern Nigeria. Data was collected through personal interview of Adult members of the farmers' households, focusing on the household' socio-economics, livelihoods, and LTPRs on farmland cultivated during 2016/17 farming seasons.HFS was assessed within the framework of the united State Department of Agriculture' HFS survey module. LTRs assessment

was in terms of the type (source) and registration of titles to farmlands. HFS modeling was within the framework of Potsson, instrumental variable Potsson (IVP) and zero-initiated potsson (ZIP) regression methods, with endogeneity concerns and choice of specification addressed within hausman specification test. The results show that land tillage is not endogenous in the estimated models and that IIPS is significantly (p<o.o) enhanced with an increase in shares of freehold and leasehold in the households' farmland, as against reliance on communal holdings. But no significant influence on HPS. The evidence support the need to develop land markets to enhance the case of land transfer as part of measure to enhance HPS in Northern Nigeria.

Mathew and Keneth (2022) conducted a study on the relationship between land tenure and food security, with focus on the impact of secure land tenure on agricultural productivity, income and access to food. The research revealed that farmers with secure land tenure are more likely to secure their land, adopt sustainable agricultural practices, and enjoy higher crop yields and leading to improve food availability and access. The Findings suggests that land tenure reforms aimed at enhancing tenure security can have positive impact on food security, particularly for smaller holder farmers and vulnerable groups. The study highlights the importance of considering the complex relationship between land tenure, agricultural productivity , and food security in policy and program design.

Sanusi, Madakai, David and Adole (2021), carried out a study on " Land Tenure Systems and Agricultura productivity in Nigeria: a case of Rice Production". The stuydy examined land tenure systems and rice production in Nigeria. Primary Data were used for the study. Data were collected with the aid of a well-structured questionnaire. A four stage sampling technique was used to select a total sample size of three hundred and forty-nine (349) rice farmers based on the number of questionnaire correctly filled and returned from the selected sample size. Data were analyzed

using descriptive statistics, total factor productivity and scholastic production frontier model. The study revealed that large portion of land (over 40%) was used for rice production were acquire through inheritance mode of land acquisition and communal type of land tenure systems widely practiced. The result of total factor productivity indicated that 62.18% of the rice farmers were sub-optimal productivity level. The result of the stochastic production frontier function revealed that seed ($P<0.01$) were the significant factors influencing technical efficiency of rice production in the study area. Based on the findings, the study recommended that current land use act and policy should be amended to prevent concurrent grabbing of agricultural land for non- agricultural purposes in order to enhance accessibility and availability of land for agriculture thereby enhancing food security.

Oladehinde, Olayiwola & Papoola (2023), investigated "Security of Land tenure: A comparative analysis among sub-ethnic groups in rural communities of Oyo State, Nigeria. The study compared the security of land tenure among sub-ethnic groups in rural communities of the study area. The study found that a majority of respondents do not have a written agreement on land while 100%, 80% and 67.3% of the respondents from Uyo, Ibarapa, and Oke-ogun sub-ethnic groups respectively, have not experienced conflict. Findings show that gender, age, income education, length of stay and landholding systems were the significant drivers of security of land tenure among the sub-ethnic groups.

Obayelu, Arowolo, and Osinowo (2017), conducted a study on Land tenure, Governance and accountability in Nigeria: the implications on food production to feed the present and future. The purpose of the study was to ascertain the relationship between land tenure governance and food security. The study adopted the survey research design, stratified and simple random sampling technique were used to sample 620 respondents. The questionnaire was used as an

instrument for data collection, simple regression and multiple regression statistical techniques were used in analyzing the collected data. The findings revealed that there is a significant relationship between the variables of the study.

Agricultural extension services and Attainment level of food security

Agricultural extension services play a crucial role in enhancing food security by providing farmers with the necessary knowledge, skills and technology to improve crop yields and productivity. Ansah, Cornelius and Ihle (2019) conducted a study on "Resilience and household food security: a review of concepts, methodological approaches and empirical evidence". The study review concepts, methodological approach and empirical evidence on resilience from a food security perspective, focusing on socio-economic research. The study performed a systematic literature research to identify recent publications that analyze resilience from the perspective of household food security. The researchers examined historical evolution of concepts and methods use for measuring resilience and synthesize the evidence. The study revealed that the conceptual and analytical models have evolved over time, important technical adjustments. Studies initially focused on measuring resilience as an end itself, but, more recently resilience is understood as a means to an ultimate end, hence resilience capacity is measured instead. Also, resilience was initially measured as an indicator of food security. The study revealed that household with higher resilience capacity tend to have less child malnutrition and better food security. The study also revealed that pathways through which resilience capacity affects food security in a microeconomic framework are barely explicitly considered in empirical analyses

Somanje, Mohan and Saito (1995) investigated " effectiveness of agricultural extension services in Ghana and Zambia". The study presened current situation and role of agricultural extension services for farmers and indicates the potential solutions for the optimum effectiveness

of these services the investigated the vital determinants influencing the farmers attitude towards using agricultural extension services in Ghana and Zambia. Mixed-method research analysis of data from a household survey of 240 farm,ers and 8 key informant interview in the upper West Region of Ghana and Southern Province of Zambia. Results revealed that the significant factors affecting the association of agricultural extension officers with farmers are regular meetings, demands for services and productivity b and the adoption rate of technology, Notably approaches based on information communication technology indicators include owning cell phones; futher having radio access significantly affects agricultural practices. The study concluded that understanding the critical determinants will provide potential solutions to national agricultural research entities and policy makers to scale-up the effectiveness of agricultural extension services, particularly in Ghana and Zambia. The study is relevant to this present study in that it investigated the effectiveness of agricultural extension services which is one of the variable of the present study.

Obinyan and Fadiji (2024) conducted a study on "Exploring the effect of agricultural extension services on farm households' food security in Abuja, Nigeria". The study delves into the dynamics of agricultural extension services accessed by farm households' in Abuja aiming to provide a comprehensive understanding of the prevailing practices and their impact on the local agricultural landscape. Through a systematic exploration of the services utilized by farm households', the research sheds light on the effectiveness of existing extension programs in enhancing agricultural productivity and sustainable practices. The study utilized surveys and interviews conducted among a representative sample of farm households' in Abuja capturing diverse perspective and experiences. Key parameters under investigation include the type of extension services accessed, the frequency of engagement, and the perceived benefits and challenges encountered by farm households' in utilizing these services. By examining these

aspects, the research sought to identify patterns, gaps and potential areas for improvement within the current agricultural framework. The findings of the study contribute valuable insights to policy makers, agricultural practitioners and researchers, informing strategies to optimize extension services for enhanced farmer engagement and productivity. Additionally, the research addresses the unique socioeconomic and environmental context of Abuja, offering localized recommendations for improving the accessibility and relevance of agricultural extension services on the region. Ultimately, the study serves as a crucial resource for fostering sustainable agricultural practices and bolstering the resilience of farm house-holds in Abuja. The study is relevant to this present study in that it explores the effect of agricultural extension services on farms' house-holds food security which is also one the concern of this present study.

Abang (2025) conducted a study on "agricultural extension services and food security in Boki local government area of Cross River State, Nigeria. The purpose of the study was to ascertain the effect of agricultural extension services on food security in the study area. The survey research design was adopted for the study, utilizing simple random sampling technique to sample 520 respondents from the study area. The questionnaire was used as instrument for data collection, Cronbach alpha reliability technique was used to ascertain the reliability of the instrument. Simple and multiple regression statistic was used to analyze the collected data. The result showed that there is significant relationship between agricultural extension services and food security in Boki local government area of Cross river state. The findings of the study is relevant to this present study in that, it investigated agricultural extension services and food security which is the concern of this present study.

RESEARCH METHODOLOGY

The research design adopted for the study is the Ex-post facto research design. Ex-post facto research design is a retrospective study design and that investigates cause-and-effect relationship by examining existing conditions and retrospectively searching for possible causes. The Area of study is Ikom education zone. The zone encompasses six local government Areas (LGAs) within the zone: Abi, Boki, Etung, Ikom, Obubra and Yakurr, all in Cross River State, Nigeria. The zone lies between latitude 4°27" and 5°32" North of the Equator and longitudes 7°50" and 9°28" East of the Greenwich meridian. It covers a land area of 23, 07425 kilometers with a projected human population of 1,076,501 million people (National Population Commission, 2025). The projected population of study comprised of 35,643 residents of Ikom Education Zone in Cross River State according to Cross river state Bureau of Statistics (2025). The purposive sampling technique was adopted in selecting the six local government areas in Ikom Education zone. Twelve communities were eventually selected for the study. The selection of communities that was used for the study was done through proportional sampling of 1.4%. The sample for this study was 510 respondents drawn from the six local government area that formed Ikom Education Zone of Cross River State. The questionnaires was distributed and collected from respondents and was used for data analysis. The sample is presented in Table 2.

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TABLE 2

Distribution of respondents by Education zones, local government areas and study communities

Local Government in Ikom Education Zones.		Community sampled		Population of sampled communities		No. of Respondents 1.43%
Boki		Iso-bendeghe		2600		37
		Okonde		3005		43
Yakurr		Ugep		6800		97
		Ikori		2700		39
Etung		Ajasor		2201		32
		Agbokim waterfalls		1807		26
Ikom		Ikom town		4200		60
		Nkarasi I		2300		33
Abi		Adadama Imabana		2703 2507		39 36
Obubra		Ababene		2200		31
		Ofodua		2620		37
Total				35,643		510

***Source**: Field work (2025)*

The questionnaire titled Land conservation practices and attainment of food security Questionnaire (LCPAFSQ) was used foe data collection. The questionnaire had two parts. Part one contained items that are meant to elicit information on the demographic data of the respondents such as sex, age, occupation, educational background. Part two focused on items exclusively on the influence Land conservation practices on attainment of food security. The items in the questionnaire were presented on a modified four (4)-point Likert Scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Each statement sought to determine the relationship between forest management practices and biodiversity conservation. The drafts copies of the instrument were presented to three senior lecturers from the Department of Educational Foundation, Faculty of Education for face and content validity. To establish the reliability of the instrument (questionnaire), a trial test was done using 35 respondents that were not part of the study. Cronbach alpha reliability procedure was used to determine the internal consistency of the instrument which was found to range from .70 to .82 which imply that the instrument is both valid and reliable to be used for this investigation. The researcher employed the services of two research assistants (community members). This research assistants were instructed to administer the questionnaire to the respondents in their communities until the expected number from each community was reached.

Presentation of results

The hypotheses were stated and tested in order to provide solution to the problem of this study. Each hypothesis was tested at .05 level of significance.

Hypothesis one: There is no significant influence of land tenure on attainment level of food security. The independent variable is land tenure while the dependent variable is attainment level of food security. To test this hypothesis, simple regression statistical analysis was used and the result as presented in Table 1.

TABLE 1

Simple regression analysis of the influence land tenure on attainment level of food security in Ikom education zone of Cross River State

Variable	R	R^2	Adj. R^2	Std. Error
Land tenure	.187[a]	.035	.033	2.09456

Source of variation		SS	Df	MS	F	Sig.
	Regression	94.853	1	94.853	21.620*	.000[b]
	Residual	2623.541	508	4.387		
	Total	2718.393	509			

*significant at p <.05

The analysis in Table 1 showed that the Adj $R^2$is 0.033 This implies that 3.3% of the variance in the dependent variable (attainment level of food security) could be accounted for by Food security. However, though the percentage contribution is small, a cursory look at the table showed that F=21.620 (p<.05) is significant. Also since p(.000) is less than p(.05), it implies that land tenure do significantly influence attainment level of food security. Therefore, the stated null hypothesis is rejected.

Hypothesis two:

There is no significant influence of agricultural extension services on attainment level of food security. The independent variable is agricultural extension services while the dependent variables attainment of food security. To test this hypothesis, simple regression statistical analysis was used and the result as presented in Table 2

TABLE 2
Simple regression analysis influence of agricultural extension on attainment level of food security in Ikom education zone of Cross River State

Variable	R	R^2	Adj. R^2	Std. Error
Agricultural extension	.146[a]	.021	.020	2.10912

Source of variation		SS	Df	MS	F	Sig.
	Regression	58.265	1	58.265	13.098*	.000[b]
	Residual	2660.128	598	4.448		
	Total	2718.393	599			

*significant at p <.05

The analysis in Table 2 showed that the Adj $R^2$is .020. This implies that 2.0% of the variance in the dependent variable (attainment level of food security) could be accounted for by agricultural extension services. However, though the percentage contribution is small, a cursory look at the table showed that F=13.098 (p<.05) is significant. Also since p(.003) is less than p(.05), it implies that agricultural extension services do significantly influence attainment level of food security. Therefore, the stated null hypothesis is rejected.

Discussion of findings

The basis of this result from hypothesis 1 could probably be attributed to the fact that is a practice that boost food security. The findings is in agreement with Kehinde, Shittu, Adewuyi, Osunsina, Adeyonu (2021), who investigated 'land tenure and property rights and household food security among rice farmers in Northern Nigeria, and found that land tillage is not endogenous in the estimated models and that IIPS is significantly (p<o.o) enhanced with an increase in shares of freehold and leasehold in the households' farmland, as against reliance on communal holdings. But no significant influence on HPS. The evidence support the need to develop land markets to enhance the case of land transfer as part of measure to enhance HPS in Northern Nigeria.

The findings is also in line with Mathew & Keneth (2022), who conducted a study on the relationship between land tenure and food security, with focus on the impact of secure land tenure on agricultural productivity, income and access to food, and found that land tenure reforms aimed at enhancing tenure security can have positive impact on food security, particularly for smaller holder farmers and vulnerable groups.

The findings from analysis of the second hypothesis stated that the null hypothesis was rejected and the alternative hypothesis upheld which implied that indeed agricultural extension services significantly influence attainment of food security. The result is not surprising to the researcher because agricultural extension services provide boost to farmers thereby enhancing food security the result of the findings is in line with that of Ansah, Cornelius & Ihle (2019) conducted a study on "Resilience and household food security: a review of concepts, methodological approaches and empirical evidence", and found that pathways through which resilience capacity affects food security in a microeconomic framework are barely explicitly considered in empirical analyses. Also in support of the findings, Somanje, Mohan & Saito investigated "effectiveness of agricultural extension services in Ghana and Zambia". The study presented current situation and role of agricultural extension services for farmers and indicates the potential solutions for the optimum effectiveness of these services the investigated the vital determinants influencing the farmers attitude towards using agricultural extension services in Ghana and Zambia and found that, the significant factors affecting the association of agricultural extension officers with farmers are regular meetings, demands for services and productivity b and the adoption rate of technology, Notably approaches based on information communication technology indicators include owning cell phones; futher having radio access significantly affects agricultural practices. Their study concluded that understanding the critical determinants will provide potential solutions to national

agricultural research entities and policy makers to scale-up the effectiveness of agricultural extension services, particularly in Ghana and Zambia.

Conclusion

Based on the result of the study, it was concluded that there is a significant influence of land tenure and agricultural extension services on attainment level of food security. There is need for the public to be aware of these land conservation practices in order to ensure a food security attainment.

Recommendations

1. There should be a periodic sensitization on land tenure practice in order to enhance food production in the zone and in the State generally.
2. The government should ensure that agricultural extension is extending to the grassroot to reach out to those in remote villages.

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