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EVALUATING THE ECONOMIC IMPACT OF SMALL-SCALE AGRICULTURE ON POVERTY ALLEVIATION IN ABAKAKILI: A CASE STUDY IN IKWO.

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ABSTRACT

This study investigates the economic impact of small-scale agriculture on poverty alleviation in Beaklike, with specific emphasis on Ikwo Local Government Area of Ebonyi State, Nigeria. The research aims to assess the extent to which smallholder farming contributes to poverty reduction, identify challenges facing small-scale farmers, and evaluate the significance of various agricultural factors in shaping economic outcomes. A quantitative research design was employed, utilizing primary data obtained through structured questionnaires administered to 204 farmers. The data were analyzed using descriptive statistics and multinomial logistic regression techniques. The findings reveal that farm size and post-harvest loss management exhibit a significant positive relationship with poverty alleviation, indicating that access to land and reduced post-harvest wastage enhance economic outcomes. Conversely, variables such as limited access to improved seeds, vulnerability to climate change, low farm profitability, and food insecurity were found to negatively and significantly affect poverty reduction. The study concludes that while small-scale agriculture remains a critical tool for rural development and poverty alleviation, its potential is undermined by structural and environmental challenges. It recommends targeted policy interventions including access to climate-resilient inputs, expansion of extension services, development of rural infrastructure, and improved market access to enhance the productivity and welfare of smallholder farmers.

Keywords: *Small-scale agriculture; smallholder farmers; poverty alleviation; farm size; post-harvest losses; agricultural productivity.*

JEL Classification: *Q12, I32, Q18, O13*

1. INTRODUCTION

Poverty remains one of the most persistent socioeconomic challenges confronting Nigeria and other Sub-Saharan African countries. It extends beyond inadequate income to include limited access to essential services such as healthcare, education, nutrition, housing, and other necessities. The National Bureau of Statistics (NBS, 2022) reported that about 63% of Nigeria's population, representing approximately 133 million people, were multidimensionally poor, with poverty particularly widespread in rural areas. Since agriculture remains a major source of livelihood for rural households, small-scale agriculture is potentially an important pathway for improving income, employment, food security and household welfare.

Agriculture has historically played a central role in Nigeria's economic development by providing food, employment, raw materials and income. Although its relative contribution to national output has changed over time, agriculture continues to maintain strong linkages with rural livelihoods and other sectors of the economy. Smallholder farmers make a substantial contribution to domestic food production and are therefore important to both food security and rural economic development (Chiaka et al., 2022). Increased agricultural productivity can contribute to poverty reduction by increasing farmers' incomes, improving food availability and reducing food prices. It can also stimulate employment and local economic activity through agricultural processing, marketing, transportation and other related activities (Hemathilake & Gunathilake, 2022).

Small-scale agriculture is generally characterised by relatively small farm holdings, limited capital, simple production technologies and considerable dependence on family labour. Despite these constraints, smallholder farmers remain important contributors to agricultural production and rural employment in Nigeria (Chiaka et al., 2022). The development of this sector can therefore have significant implications for poverty alleviation. Higher farm productivity and improved access to productive resources can enable rural households to generate higher income and food surpluses, while stronger agricultural value chains can create additional employment and income opportunities. Agricultural development can consequently influence poverty through both direct effects on farmers' earnings and indirect effects on rural markets and employment.

However, the capacity of small-scale agriculture to alleviate poverty is constrained by several structural and environmental challenges. Smallholder farmers often face limited access to improved inputs, agricultural finance, modern technologies, extension services, infrastructure and reliable markets. Technological and institutional constraints can reduce productivity and limit farmers' ability to move from subsistence production to commercially oriented agriculture (Dhillon & Moncur, 2023). In addition, inadequate access to agricultural credit can restrict farmers' ability to purchase improved seeds, fertiliser, machinery and other productive inputs. Ozdemir (2024) emphasises the importance of agricultural credit in strengthening agricultural production, particularly where farmers face capital constraints.

These challenges are particularly relevant in Ebonyi State, where agriculture constitutes an important component of rural livelihoods. Small-scale farmers engage in the production of crops and livestock, while rice production is especially prominent in the state's agricultural economy. Evidence from Ebonyi State indicates that access to improved farming techniques and agricultural interventions can influence the productivity of smallholder farmers (Chima et al., 2024). Nevertheless, farmers continue to face constraints that can reduce productivity and profitability. Poor infrastructure, limited access to modern technologies, inadequate financing, climate-related risks and weak market linkages can collectively undermine the ability of rural households to derive sufficient income from agriculture.

Ikwo Local Government Area provides an important setting for examining this relationship because of its predominantly agrarian economy and dependence on small-scale farming. For many rural households, agriculture provides employment, food and a major source of household income. However, the existence of agricultural potential does not necessarily imply that farming households are able to escape poverty. The economic benefits of agriculture depend on factors such as farm size, productivity, access to inputs and credit, post-harvest management, market access and the profitability of agricultural activities. Where these conditions are inadequate, increased participation in agriculture may not generate sufficient income to substantially improve household welfare.

Post-harvest losses also represent an important challenge to the poverty-reducing potential of small-scale agriculture. Losses arising from inadequate storage, transportation, processing and marketing can reduce the quantity and value of agricultural products available to farmers for sale. Consequently, farmers may experience lower revenues even when their production levels are relatively high. Improving post-harvest management can therefore increase the effective returns from agricultural production and strengthen the contribution of farming to household income and poverty reduction.

The relationship between agricultural productivity and poverty reduction has received considerable attention in the literature. Increased agricultural productivity can raise household income, improve food consumption and generate employment opportunities, thereby contributing to poverty reduction (Amare & Manda, 2021; Hemathilake & Gunathilake, 2022). However, the extent to which these benefits reach smallholder households depends on their access to productive resources and their ability to participate in agricultural markets. Adeyonu et al. (2022), for instance, demonstrate the importance of farmers' entrepreneurial capabilities in understanding household poverty outcomes among rural farming households in Nigeria. This suggests that agricultural participation alone may not be sufficient to alleviate poverty unless farmers possess the resources and capabilities necessary to convert agricultural activities into sustainable economic returns.

Despite the importance of small-scale agriculture to rural livelihoods, there remains limited localised evidence on its actual contribution to poverty alleviation among farming households in Ikwo Local Government Area. Existing studies provide important evidence on agricultural productivity, food production and rural poverty in Nigeria, but findings at the national or broader regional level may not adequately reflect the socioeconomic and agricultural conditions of individual rural communities. Furthermore, the challenges faced by small-scale farmers may differ across locations depending on access to land, credit, inputs, markets, infrastructure and climate conditions. A location-specific assessment is therefore necessary to understand whether small-scale agriculture is effectively improving the welfare of households in Ikwo.

Against this background, this study evaluates the economic impact of small-scale agriculture on poverty alleviation among rural households in Ikwo Local Government Area of Ebonyi State, Nigeria. It focuses on the extent to which participation in small-scale agriculture contributes to poverty reduction and examines the major constraints that may limit farmers' ability to derive sustainable economic benefits from agricultural activities. The study is expected to provide evidence that can support the development of more targeted agricultural and poverty-reduction interventions for smallholder farmers in Ikwo and similar rural communities in Ebonyi State.

Research Objectives

The general objective of this study is to evaluate the economic impact of small-scale agriculture on poverty alleviation among rural households in Ikwo Local Government Area of Ebonyi State, Nigeria.

The specific objectives are to:

- a) Assess the extent to which small-scale agriculture affects poverty levels among rural households in Ikwo.
- b) Identify the major challenges facing small-scale farmers in Ikwo and examine how these challenges affect their capacity to alleviate poverty.

Research Questions

The study seeks to answer the following research questions:

- a) To what extent does small-scale agriculture affect poverty levels among rural households in Ikwo?
- b) What are the major challenges facing small-scale farmers in Ikwo, and how do these challenges affect their capacity to alleviate poverty?

2. LITERATURE REVIEW

2.1 Conceptual Literature

Concept of Agriculture in Poverty Alleviation

Agriculture is broadly defined as the cultivation of land and the rearing of animals for food and other economic purposes. It has evolved from traditional subsistence activities into a major contributor to economic growth, employment, food security and industrial development (Mueller, 2021; Gowdy, 2020; Chirwa, 2024). Agricultural development also generates wider economic multiplier effects by increasing farmers' incomes, creating employment and stimulating demand for goods and services in non-agricultural sectors (Manu & Adam, 2020).

Poverty is multidimensional and involves not only inadequate income but also deprivation in health, education, nutrition, security, opportunities and living conditions (Thain, 2024; World Bank, 2000). Agriculture can contribute to poverty reduction because most poor rural households depend substantially on farming for their livelihoods. Increased agricultural productivity can raise farm income, improve food security, create employment and stimulate rural economic activity. However, the poverty-reducing impact of economic growth depends partly on how widely the benefits of growth are distributed (Djoumessi et al., 2020; Hamann et al., 2024).

Agriculture contributes to poverty alleviation through direct and indirect channels. Direct effects include increased household income, improved food security and greater resilience to economic shocks. Indirect effects include employment creation, increased demand for non-agricultural goods and services, market expansion and social empowerment. Thus, improvements in agricultural productivity can generate broader benefits throughout rural economies. Small-scale agriculture is particularly important because smallholder farmers provide a substantial proportion of food in developing countries. In Abakaliki, small-scale farmers produce crops such as cassava, rice, yam and vegetables, generating food, household income and employment, particularly for women and youth (FAO, 2014; Danji & Zubairu, 2024).

Despite these contributions, small-scale farmers face significant constraints, including high labour costs, inadequate finance, limited market access, climate change, poor infrastructure and restricted access to modern agricultural technologies. These challenges reduce productivity and profitability and may limit agriculture's capacity to alleviate poverty. Nevertheless, farming and related activities such as processing, transportation and marketing continue to generate employment and strengthen rural livelihoods (Okunola, 2024; Urugo, 2024).

Overall, the literature indicates that small-scale agriculture can serve as an important pathway for poverty alleviation and rural development, but its effectiveness depends on farmers' access to productive resources, technology, finance, markets and agricultural infrastructure. Improving these conditions can enhance productivity, household income, food security and employment, thereby strengthening the contribution of small-scale agriculture to poverty reduction.

2.2. Theoretical Literature Review

Agricultural Transformation Theory

The Agricultural Transformation Theory was proposed by W. Arthur Lewis, John Mellor, and Theodore Schultz. Agricultural transformation is the process by which an economy transitions from being largely agricultural to having a decreasing percentage of agriculture in GDP and employment as per capita income grows, owing to variables such as increasing productivity, market integration, and labor mobility. According to Mpundu and Bopape (2022), small-scale agriculture can boost economic growth and alleviate poverty by increasing agricultural productivity. According to this hypothesis, increased agricultural productivity provides surplus production that can be traded or reinvested in other sectors of the economy, hence promoting economic growth. For regions, increasing agricultural output can result in higher farmer incomes and greater food security, which in turn helps to lower poverty in areas like Abakaliki where agriculture is the main economic activity.

Bopape and Mpundu (2022). Emphasize how increases in agricultural productivity can help rural economies diversify by generating new business ventures and employment opportunities. This is especially crucial in places like Abakaliki, where agricultural output frequently serves as the main source of income. Small-scale farmers in Abakaliki can grow higher-value crops as productivity rises, which benefits households by increasing household income, improving health, and expanding educational opportunities.

Sustainable Livelihoods theory (SL)

Robert Chambers and Gordon Conway, who co-authored a seminal working paper on "Sustainable Rural Livelihoods" in 1992, are most closely linked to sustainable livelihood theory. The Brundtland Report in 1987 popularized the idea of sustainable development in general, but Chambers and Conway's work focused on the definition and structure of sustainable livelihoods. Their work, especially the 1992 paper, is credited with helping define what a livelihood and a sustainable livelihood are. It focuses on the skills, resources, and activities necessary for a way of life that can withstand and bounce back from shocks and stress while also offering opportunities for future generations. Later, groups like the UK Department for International Development expanded on this framework and incorporated it into development initiatives.

The Institute of Development Studies (IDS) created the Sustainable Livelihoods Framework (SLF), which provides a thorough method for comprehending how rural communities use different types of capital to maintain their standard of living. This framework states that households' capacity to access and manage five types of capital human, natural, social, physical, and financial is essential to reducing poverty (Wang,2021). The SLF emphasizes the value of these capitals for Abakaliki's small-scale farmers in raising agricultural output and reducing poverty. Natural capital is the land and natural resources that farmers have access to; social capital is the networks and social ties that can help farmers access resources and markets; physical capital is the infrastructure, such as roads and storage facilities, that is necessary for agricultural success; financial capital is the ability to obtain credit and financial services; and human capital is improved

through agricultural education and training. Together, these capital sources enhance small-scale farmers' financial performance and capacity to reduce poverty.

The Dual Economy theory

The dual economy theory was famously introduced by Sir Arthur Lewis in 1954 as a framework for comprehending economic development and rural-urban migration in developing nations. It describes the coexistence of two distinct economic sectors within a country, typically a modern capitalist sector and a traditional subsistence sector. Lewis's model is particularly known for its emphasis on a dual-sector economy where labor moves from agriculture to industry, driving growth, even though Julius Herman Boeke also developed the idea of "dualism" earlier to explain underdevelopment in colonial economies, particularly in Asia and Africa. Lewis asserts that the expansion of the industrial sector depends on labor from the agricultural sector, which has the potential to spur economic growth and eventually lower poverty. The traditional agricultural sector in Abakaliki is represented by small-scale farming. The agricultural sector can make a more significant contribution to the economy and ease the shift to a more diversified economic structure by raising the productivity and income levels of small-scale farmers. According to this model, more agricultural productivity can help rural communities like Abakaliki, which are primarily dependent on agriculture. This can result in labor migration to non-farm sectors, higher household incomes, and a decrease in poverty.

2.3. Empirical Literature Review

Empirical studies have examined the contribution of small-scale agriculture to poverty alleviation through agricultural productivity, income generation, access to finance, value addition, food security, and climate adaptation. The evidence generally indicates that agriculture can improve rural livelihoods, although the magnitude of its impact depends on farmers' access to productive resources and the constraints affecting agricultural activities. Ejechi et al. (2024) examined the contributions and challenges of rural youth within the cassava value chain in Ebonyi State using data from 180 youth cassava farmers. Descriptive statistics and OLS regression were employed. The study found substantial youth participation in cassava production, processing and marketing, with processing and marketing significantly influencing cassava output. However, inadequate finance, high labour costs, expensive processing equipment and land-tenure problems constrained participation. The study recommended improved financial and technical support, resources and infrastructure to enhance agricultural productivity and food security. Ogbari et al. (2024) investigated the effect of social empowerment on poverty alleviation among women agricultural entrepreneurs in Nigeria using data from 355 respondents. Using Structural Equation Modelling with Partial Least Squares (SEM-PLS), the study found a significant positive relationship between social empowerment and poverty reduction. The findings suggest that improving women's access to resources and support systems can strengthen the poverty-reducing capacity of agricultural activities.

Itam et al. (2024) examined bee farming as a poverty-alleviation strategy among rural households in Obanliku Local Government Area of Cross River State. Using data from 85 bee farmers, the study applied Foster-Greer-Thorbecke (FGT) poverty indices and logistic regression. The findings showed that bee farming contributed to poverty alleviation, leading the authors to recommend improved access to credit and rural infrastructure. Although the study focused on bee farming rather than conventional crop production, it demonstrates the potential of small-scale agricultural activities to improve rural household welfare.

Nwankwo and Okoro (2023) investigated constraints to agricultural productivity among small-scale farmers in Abakaliki Metropolis. Using primary data from 200 farmers, descriptive statistics, ANOVA and

Welch tests, the study identified high mechanisation costs, inadequate capital, limited land access, low education, pest infestation and climate change as major constraints. The study recommended improved irrigation, farm tools, pest-control measures and access to farmland. These findings indicate that addressing productivity constraints is essential if small-scale agriculture is to generate sufficient income for poverty reduction. Olubunmi-Ajayi and Amos (2023) examined poverty status and scale economies among maize-based farmers in Southwest Nigeria using FGT poverty indices and probit regression. The study found a high incidence of poverty among small-scale farmers, while larger farm sizes and access to credit were associated with lower poverty levels. The authors recommended farm expansion and improved access to credit as mechanisms for strengthening poverty alleviation.

Similarly, Oyim and Osayi (2023) examined the socioeconomic contribution of small-scale agriculture to poverty alleviation in Ebonyi State. Using questionnaires administered to 200 small-scale farmers and ANOVA and Welch tests, the study found that rice and vegetable production and value-added activities such as milling and processing generated income for farmers. Access to improved seeds, fertiliser and irrigation was associated with higher yields and income, supporting the role of improved agricultural practices in poverty reduction. Egenti and Dinbabo (2022) evaluated the development impact of the Fadama III project on smallholder farmers in Ebonyi State using a quasi-experimental design and Propensity Score Matching (PSM). Based on data from 300 farmers, the study found that the programme reduced food insecurity and increased farmers' income and crop yields. The findings demonstrate that targeted agricultural interventions can improve the economic welfare of smallholder farmers and contribute to poverty alleviation.

Emaziye and Inoni (2021) examined small-scale food-crop production as a tool for poverty alleviation among rural households in South-South Nigeria. Based on 384 respondents and descriptive analysis, the study found that food-crop production contributed about 31% of total annual household income. However, inadequate finance and flooding remained major constraints. The study concluded that greater attention to food-crop production could strengthen its contribution to poverty reduction. Mbam et al. (2021) examined the role of microfinance institutions in supporting smallholder farmers in Abakaliki, Ebonyi State. Using descriptive statistics and regression analysis, the study found that access to microfinance improved farmers' ability to finance agricultural inputs and technologies, thereby increasing productivity and income. The study recommended expanding microfinance services in rural areas as a means of strengthening agricultural livelihoods.

Okpokiri et al. (2021) analysed the use and determinants of climate-smart agriculture among farmers in Ebonyi State using descriptive statistics and Heckman's two-stage selection model. The study found that farmers adopted practices such as resistant varieties, mulching and nitrogen management, but inadequate finance and limited knowledge constrained adoption. The study recommended stronger extension services and farmer education to improve climate-smart agricultural practices. Ubokudom et al. (2021) examined factors influencing credit acquisition among rice-based small-scale farmers in Ebonyi State. Using OLS regression, the study found that education, farm size, and repayment period positively influenced credit acquisition, while household size, credit source, and interest rate had negative effects. The model explained 73.4% of the variation in credit acquisition. The study recommended strengthening agricultural lending institutions and simplifying credit-access procedures for farmers.

At the national level, Umar et al. (2021) investigated the relationship between agricultural productivity and poverty alleviation in Nigeria from 1981 to 2020 using the ARDL model. The study found that increased agricultural output improved per-capita income and contributed to poverty reduction. The findings support

policies aimed at strengthening agricultural productivity as a means of addressing poverty. Eze et al. (2020) examined the role of value-chain development in improving the economic outcomes of small-scale agriculture in Abakaliki. Using descriptive statistics and regression analysis, the study found that farmers involved in value-added activities such as garri processing and cassava flour production generated higher incomes. The study therefore recommended strengthening agricultural value chains to promote income diversification and poverty reduction.

Okorie (2020) examined the effects of climate change on smallholder farming in Abakaliki, focusing on changing rainfall patterns, soil erosion and flooding. The study found that climate-related risks reduced crop yields and farmers' incomes, while limited access to climate-resilient technologies and institutional support restricted adaptation. The findings underscore the importance of climate-smart agricultural practices and access to reliable weather information. Okulegu and Nweze (2020) evaluated agriculture as a sustainable tool for poverty reduction in Abakaliki Urban using descriptive statistics and multiple regression analysis. The study found that urban agriculture contributed to household food security and income, while socioeconomic factors significantly influenced farm income. The authors recommended cooperatives, basic infrastructure, and credit facilities for urban farmers.

Finally, Amaza et al. (2006) examined the determinants of food-crop production and technical efficiency in the Guinea Savannas of Borno State using a stochastic frontier production function. The study found that farm size, fertiliser and hired labour significantly increased crop output, while education, credit, extension services and crop diversification contributed to differences in technical efficiency. The findings highlight the importance of productive resources and farmer support services in improving agricultural performance.

3. METHODOLOGY

Research Design

This study uses a multinomial logistic regression analysis to assess the economic impact of small-scale agriculture on poverty reduction in Abakaliki: a case study of Ikwo. The quantitative technique is consistent with the study's goal of quantifying the relationship between the economic impact of small-scale agriculture on poverty alleviation in Ikwo LGA, Ebonyi State, and its consequences, utilizing numerical data collected through structured questionnaires.

The multinomial logistic regression is particularly suitable for policy-oriented investigation because it allows the researcher to capture a broad range of information from a representative sample without manipulating the study environment. It also enables the researcher to quantify variables such as the effects of small-scale agriculture on poverty alleviation and challenges facing small-scale farmers.

Theoretical Framework of the Study.

The dual economy theory, as proposed by Lewis (1954), suggests that economies are often divided into two sectors: a modern industrial sector. According to Lewis, the growth of the industrial sector relies on labor from the agricultural sector, which can drive economic growth and reduce poverty in the long run.

The dual economy theory describes an economic system with two distinct sectors: a modern, capital-intensive sector and a traditional, labor-intensive sector. This model often highlights the coexistence of a developed, often industrial, sector alongside a less developed, typically agricultural or informal, sector. The model explores how economies transition from a predominantly agricultural state to a more industrialized one, focusing on the movement of labor and capital between these sectors.

There are two sectors: a traditional agricultural sector and a modern industrial sector.

The agricultural sector has a low or zero marginal product of labor due to an oversupply of workers, while the modern industrial sector has a higher marginal product of labor.

The dual economy theory function can be expressed as:

$$Y_tA = F(A_tA, R, E_tA)$$

Where:

Y_tA = Y_tA is total agricultural output.

A_tA = total factor productivity in agriculture.

R = land (or other fixed factors).

E_tA = labor input in agriculture

This model implies that rural areas like Abakaliki, which are heavily reliant on agriculture, can benefit from greater agricultural productivity, which in turn can lead to labor migration to non-farm sectors, increased household incomes, and reduced poverty.

Population and Study Area

The study is situated in Ikwo in Ebonyi State, one of the 36 states in Nigeria, located in the southeastern region of the country. Created in 1996 from parts of Enugu and Abia States, Ebonyi State has its capital in Abakaliki. The state comprises 13 Local Government Areas (LGAs) and is predominantly inhabited by the Igbo ethnic group. Its population is estimated to be over 3 million people as of 2023, with a majority living in rural areas (National Population Commission, 2023). The study area was conducted in Ikwo Local Government Area of Ebonyi State. Ikwo is predominantly rural, with agriculture serving as the major occupation of its inhabitants. The area was selected due to its high involvement in small-scale farming and the prevalence of poverty-related issues.

The target population comprises all small-scale farmers residing in Ikwo LGA. The population of Ikwo is estimated to be approximately 320,000 in 2022. However, the actual study population focuses on farmers engaged in small-scale agricultural production.

Sample Size Determination

Various sample specialists hold different views on whether a sample is adequate. However, although some academics believe that the sample size should be 5% of the population, others argue that it should be at least 10%. Manunza (2025) recommends using the largest population sample size available. Because the larger the percentage of the population used as a sample, the greater the probability that the sample will be a true reflection of the population. However, in this regard, Cai et al. (2025) maintained that no hard and fast rule can be established and that sample size should be 2.5 percent, 5 percent, 10%, or 25% of the universe size. However, Gumpili et al. (2022) argued that a large sample size does not single-handedly guarantee a better result. The determination of sample size as specified by Yamane (1967) and Cochran (1977), also as cited in Ojike (2016), will be adopted and will be stated below.

$$S = \frac{N}{[1 + N(e^2)]} \dots \dots \dots 1$$

Where;

N = population of the informal sector

S = sample size

e = level of significance (7%, in this case, indicating 93% level of confidence)

Hence, N from the population of the study given is 320,000 persons (respondents), and the level of significance 'e' is 0.07 (7%), then the sample size 'S' for the study is determined thus;

$$S = \frac{320,000}{[1+320,000(0.07^2)]} = 204.$$

Equation 1 above clearly indicates that the sample size for this study at a 0.07% level of confidence is 204 respondents.

Sampling Technique and Research Instrument

This study will adopt a multi-stage sampling technique to capture a diverse subset of the enrolled population across various occupational groups. In the first stage, purposive sampling will be employed to categorize the population based on farmers, namely the employed, self-employed, unemployed, and farmers actively involved in small-scale agricultural activities. In the second stage, random sampling will be used to select individuals within each stratum, thereby enhancing representativeness and reducing sampling bias. To obtain responses from participants, the study will use a structured 204-item questionnaire as its primary research instrument. The questionnaire is designed to collect quantitative data that aligns with the study's objectives. The questionnaire is divided into sections which section A focuses on respondents' demographic characteristics, for B on the effects of small-scale Agriculture on poverty alleviation, and for C on challenges facing small-scale farmers. The questionnaire will be self-administered, but in cases where literacy is a barrier, trained research assistants will guide participants through the process without influencing their responses. This approach ensures the reliability and validity of the data collected. The instrument will also undergo pretesting to refine question clarity and eliminate ambiguities.

Validation of the Instrument of The Study

Face validity was addressed through a pilot test involving a small subset of participants evaluating the economic impact of small-scale agriculture on poverty in Abakakili, a case study in Ikwo, a local government area not included in the main sample. This ensured that the questions were understandable, culturally appropriate, and capable of capturing meaningful responses. The results of the pilot informed further revisions to improve question structure and sequencing.

Reliability of the Instrument

Reliability, on the other hand, refers to the consistency and stability of the measurement instrument over time. To assess this, the study employed the Cronbach's Alpha method to measure internal consistency of the items within key sections of the questionnaire, particularly those related to perceptions of health improvement and cost reduction. A Cronbach's Alpha coefficient of 0.70 or above was considered acceptable, indicating that the items have relatively high internal consistency (Ramírez et al., 2023).

The Cronbach's Alpha Coefficient of the Reliability test is given as:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma^2}{\sigma_x^2} \right) \dots \dots \dots 2$$

Where:

α = Cronbach's Alpha Coefficient of Reliability

k = No of questions in the questionnaire

σ_x^2 = The variance of the observed total test scores

$\sum \sigma^2$ = The sum of the variance of the components.

A pilot study was carried out, and according to the Cronbach's Alpha Coefficient Reliability test, a value below 0.5 is deemed insignificant, while a value of 0.5 and above is considered significant. Therefore, the instrument is considered reliable since the obtained values are 0.5 and higher.

Given that;

$k = 25$ (i.e., number of questions in the questionnaire)

$\sigma_x^2 = \frac{k}{k-1}$ (The variance of the observed items)

$\Sigma\sigma^2 =$ since there are 23 items. $\sum_{i=1}^{25} \binom{2}{1}$

$\alpha = \sigma_x^2 - \Sigma\sigma^2$

$\alpha = \frac{25}{25-1} - \sum_{i=1}^{25} \binom{2}{1}$

$\alpha = 1.04 - [1 - \frac{24}{25}]$

$\alpha = 1.04 - 0.04$

$\alpha = 1.00$

Therefore, the instrument is considered significant and reliable since it is above 0.5

Method of Data Analysis.

The data collected from respondents will be coded and entered into the Statistical Package for Social Sciences (SPSS), version 25, for statistical analysis. Multinomial logistic regression analysis will be employed to address the study's objectives and research questions. This research work utilizes a Multinomial logistics regression, measuring various variables within the chosen sample during a specific timeframe. To achieve this goal, a meticulously designed questionnaire was given to the participants for completion. In this research, a variety of analytical tools were utilized. Specifically, the data gathered from the questionnaire will be analyzed using SPSS for this study. The first objective of this study is to assess the extent to which small-scale agriculture has affected poverty levels in Ikwo over time, while the second objective is to identify the major challenges facing small-scale farmers in Ikwo and how these challenges affect their ability to alleviate poverty. Hence, logistic regression will be employed to accomplish the two objectives of this research work.

Model specification

One of the objectives of this study is to assess the extent to which small-scale agriculture has affected poverty levels in Ikwo over time, while identifying the major challenges facing small-scale farmers in Ikwo and how these challenges affect their ability to alleviate poverty.

The objectives will be achieved using the logit regression model.

The Logit model is adopted from Gujarati (2013) and specified as:

$$Pi = \frac{1}{1+e^{-Zi}} = \frac{e^Z}{1+e^Z} \quad (3)$$

Where, $Zi = \beta_1 + \beta_2 X_i + \beta_3 X_j$

Equation 2 represents the cumulative logistic distribution function. We can verify that as Pi ranges between 0 and 1, Zi ranges from $-\infty$ to $+\infty$ and Pi is linear in parameters but non-linear when related to Zi .

If P_i is the probability that respondents who prefer the informal sector are 1 and respondents who do not prefer the informal sector are $(1-P_i)$, then the probability of the perception is given as

$$1 - P_i = \frac{1}{e^Z + 1} \quad (4)$$

We rewrite the equation as

$$\frac{P}{1-P_i} = \frac{e^Z}{e^Z + 1} * \frac{e^Z + 1}{1} = e^{Z_i} \quad (5)$$

$\frac{P}{1-P_i}$ This is the odds ratio in favor of the small-scale farmers

Taking the natural log of equation (4), we have

$$Li = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i \quad (6)$$

Z_i remains defined as above. Z_i = function of N explanatory variables. For the sake of this study, the logit model will be run for two regressions, which are “effect of small-scale agriculture on poverty alleviation,” which is used to proxy poverty alleviation, while “challenges facing small-scale farmers,” which is used to proxy challenges differences, thus

$$Li \text{ (Poverty alleviation)} = \ln \frac{P_i}{1-P_i} = \beta_1 + \beta_2 X_i + \beta_3 X_j + \mu_i \quad (7)$$

$$Li \text{ (Challenges differences)} = \ln \frac{P_i}{1-P_i} = \beta_1 + \beta_2 X_i + \beta_3 X_j + \mu_i \quad (8)$$

The models will be explicitly stated as:

$$\text{Poverty alleviation} = \beta_0 + \beta_1 \text{Poverty} + \beta_2 \text{External assistances} + \beta_3 \text{Food security} + \beta_4 \text{Afford basic needs} + \mu_i \quad (9)$$

For the above parameters, where β_0 is the intercept

$$\beta_1 = \text{Poverty}$$

$$\beta_2 = \text{External assistances}$$

$$\beta_3 = \text{Food security}$$

$$\beta_4 = \text{Afford basic needs}$$

$$\mu_i = \text{Error term}$$

$$\text{Challenges difference} = \beta_0 + \beta_1 \text{Improved seeds} + \beta_2 \text{Post-harvest losses} + \beta_3 \text{Climate changes} + \beta_4 \text{Farm size} + \beta_5 \text{Farm profitability} + \mu_i \quad (10)$$

For the above parameters, where β_0 is the intercept

$$\beta_1 = \text{Improved seeds}$$

$$\beta_2 = \text{Post-harvest losses}$$

$$\beta_3 = \text{Climate changes}$$

$$\beta_4 = \text{Farm size}$$

$$\beta_5 = \text{Farm profitability}$$

$$\mu_i = \text{Error term}$$

4. RESULTS AND DISCUSSION OF FINDINGS

DEMOGRAPHIC ANALYSIS

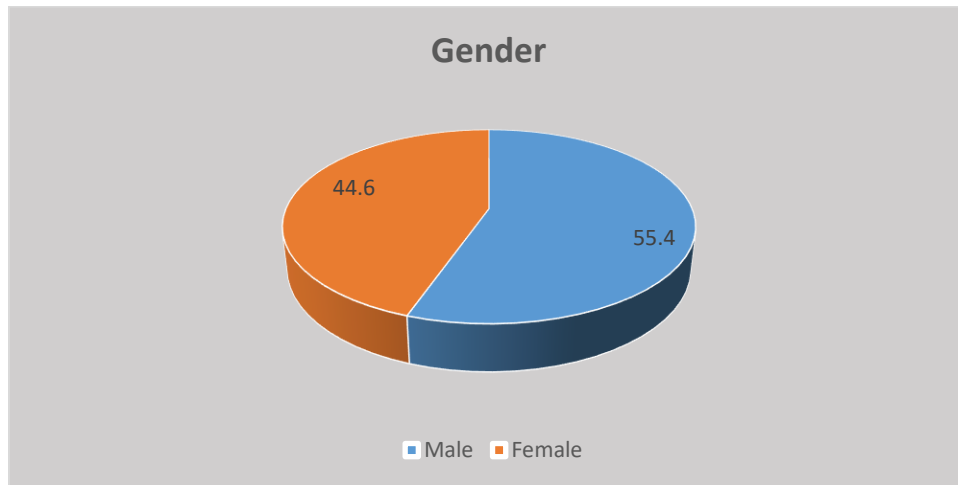


Fig. 1: Gender Distribution of Respondents

The pie chart above depicts the genders of the respondents. It shows that 55.4 percent of the respondents were female, while the remaining 44.6 percent were male.



Fig.2:

Age Range of the Respondents

This chart depicts the age groups of the respondents. The majority of respondents are between the ages of 26 and 35, with a percentage of 31.4; 36 and 45, with a percentage of 28.9; 18-25, with a percentage of 27; 46-55, with a percentage of 11.3; and 55 and up, with a percentage of 1.5. According to this chart, 26-35 had the biggest reaction.

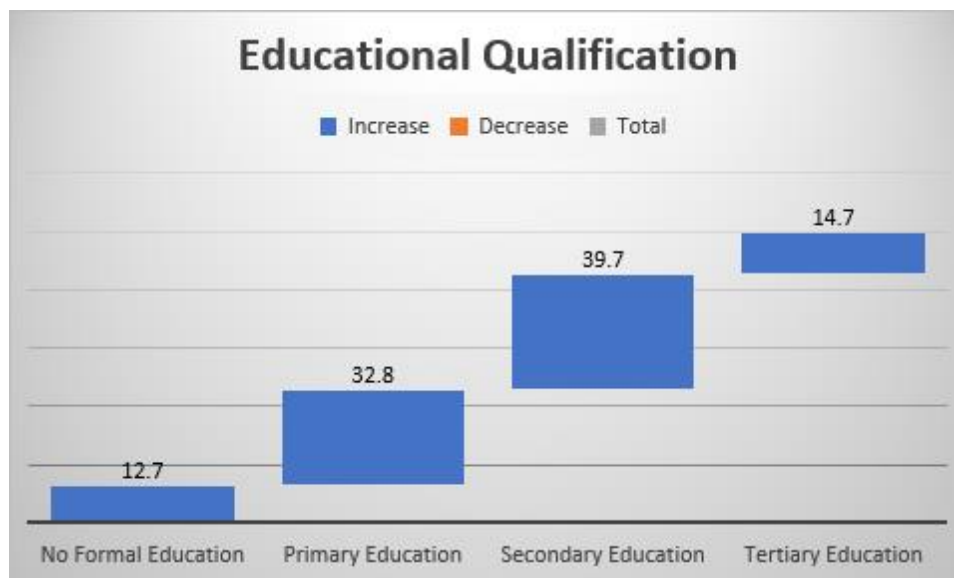


Figure 3: Educational Qualification

This chart depicts the age groups of the respondents. The majority of respondents have received secondary schooling. There are 12.7 percent without formal education, 32.8 percent with primary education, 39.7 percent with secondary education, and 14.7 percent with university education. This graphic demonstrates that secondary education receives the most responses.

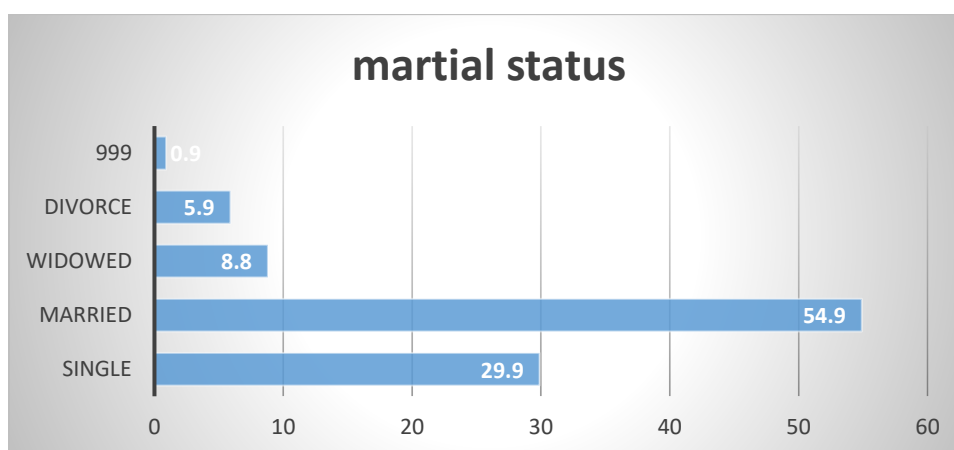


Figure 4: Marital status

This chart illustrates the respondents' marital status categories. The majority of respondents are married. Single has 29.9 percent, married has 54.9 percent, widowed has 8.8 percent, divorced has 5.9 percent, and 999 indicates that the missing variable is 0.9 percent. The graphic reveals that married people had the highest response.

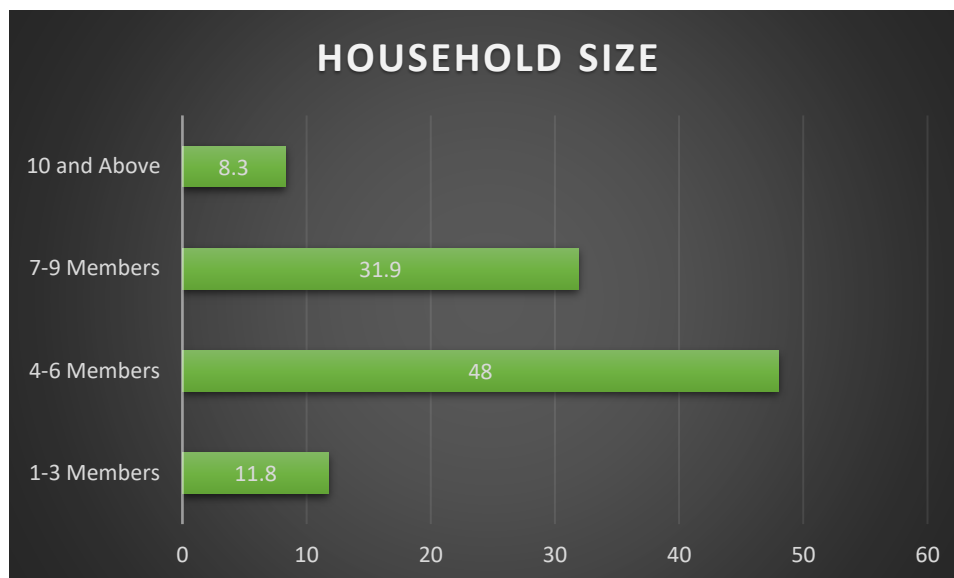


Figure 5: Household size of the family

This chart displays the household categories of the respondents' families. The majority of replies are 4-6 members. 1-3 members have 11.8 percent, 4-6 members have 48 percent, 7-9 members have 31.9 percent, and 10 or more members have 8.3 percent. According to this chart, 4-6 members had the highest response.

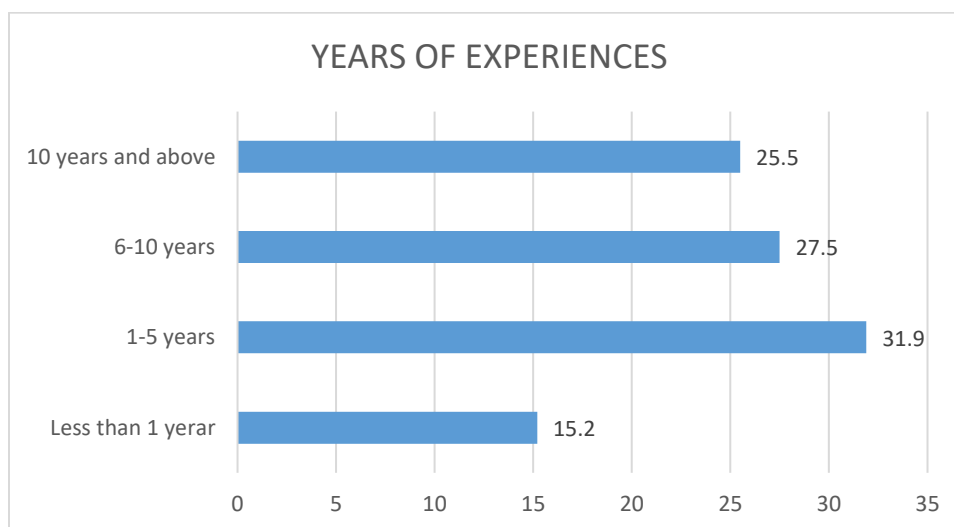


Figure 6: Years of Experience in Farming

This chart displays the household categories of the respondents' families. The majority of respondents are aged 6 to 10 years. Less than one year: 15.2 percent; one to five years: 31.9 percent; six to ten years: 27.5 percent; and ten years and older: 25.5 percent. This graph demonstrates that 31.9 percent has the highest reaction.

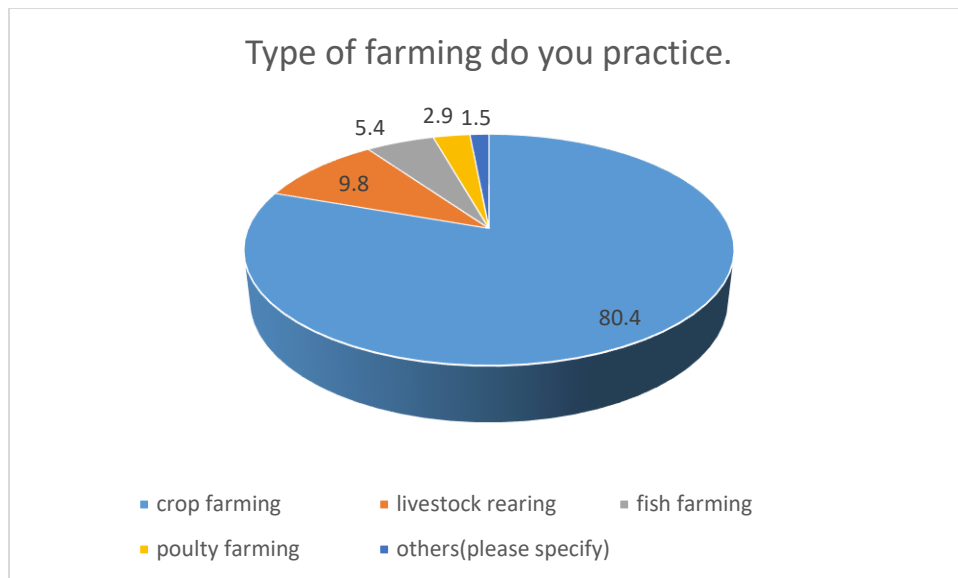


Figure 7: What type of farming do you practice?

This chart categorizes the types of farming that you do. The majority of respondents are crop growers. Crop farming accounts for 80.4%, cattle rearing for 9.8%, fish farming for 5.4 percent, poultry farming for 2.9 percent, and other activities for 1.5 percent. This graph demonstrates that crop producers, at 80.4 percent, have the highest response.

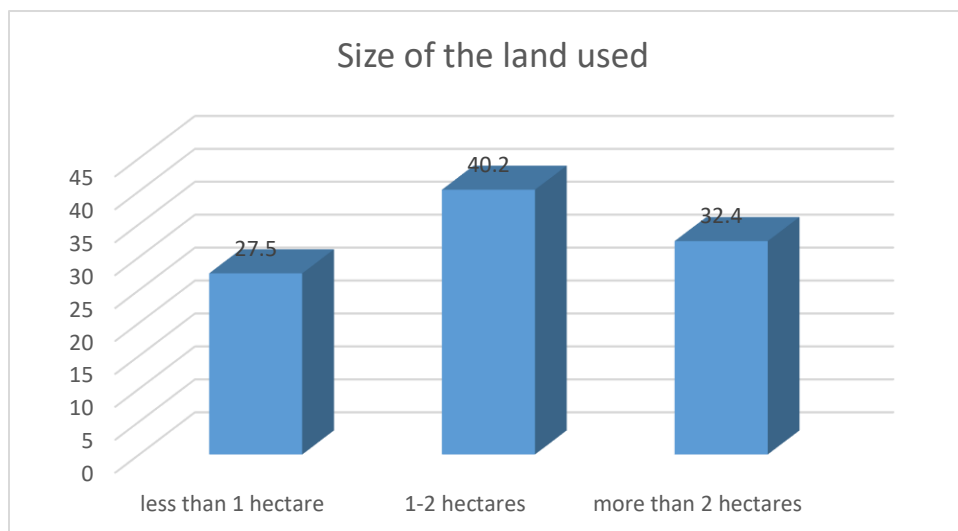


Figure 8: What is the size of the land used for farming

This figure categorizes the size of farmland. The majority of the responses have 1-2 hectares. Less than 1 hectare has 27.5 percent, 1-2 hectares have 40.2 percent, and more than 2 hectares have 32.4 percent. This graph demonstrates that 1-2 hectares have the highest percentage.

Figure 9: Average Monthly Income

This chart depicts the categories of average monthly income from farming operations. The majority of respondents earn between #30,000 and #50,000. #30,000-#50,000 has 31.9 percent, #10,000-#20,000 has 31.4 percent, above #50,000 has 19.1 percent, less than #10,000 has 17.2 percent, and 999 indicates a missing variable of 0.5 percent. This graphic reveals that 31.9 percent, or #30,000-#50,000, have the highest response.

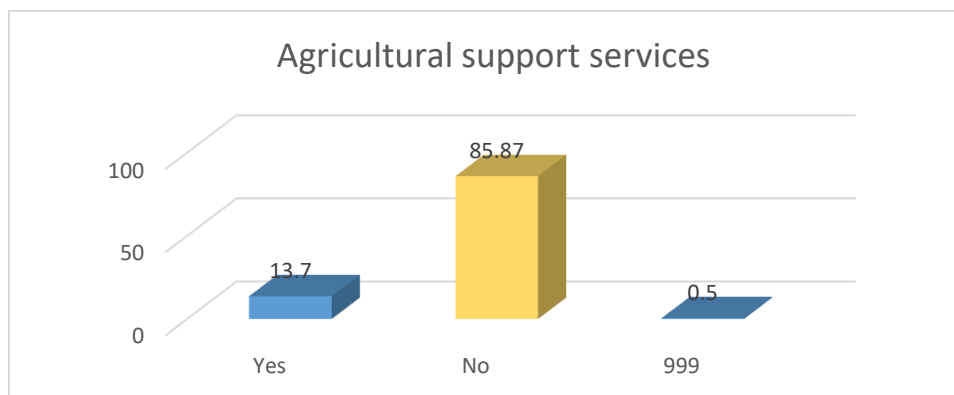


Figure 10: Do you have access to any agricultural support services?

According to this data, the majority of farmers do not have access to agricultural support services. Yes has 13.7 percent, No has 85.87 percent, and 999, which indicates missing variables, has 0.5 percent. This graph demonstrates that 85.87 percent has the highest reaction.

Farmers' performance.

This section of this chapter will be concerned with interpreting the results of the multinomial regression analysis conducted for the second model to achieve the first objective.

The First objective of the study

To assess the extent to which small-scale agriculture has affected poverty levels in Ikwo over time.

Table 1
Multinomial Logistic Regression Result;

	Number of		204				
	Obs =						
	LR χ^2 =		12				
	Prob > χ^2 =		0.000				
	-2 Log Likelihood =		292.235		Nagelkerke R^2 =		
	Small-scale on household income	Coef,	Std. Err,	Z	Prob	[95% Conf. Interval]	
Strongly disagree Responses						Lower	Upper
	External assistance	-0.034	0.291	0.966	0.907	0.546	1.711
	Afford basic needs	-1.313	0.349	0.269	0.012	0.136	0.533
	Food security	-0.480	0.319	0.619	0.133	0.331	1.157
Disagree Responses							
	External assistance	-0.493	0.363	0.611	0.175	0.300	1.245
	Afford basic needs	0.073	0.562	1.075	0.897	0.358	3.234
	Food security	-1.051	0.438	0.349	0.016	0.148	0.825
Neutral Responses							
	External assistance	-0.811	0.237	0.444	0.001	0.279	0.707
	Afford basic needs	-0.720	0.327	0.487	0.028	0.256	0.924
	Food security	-0.030	0.301	0.970	0.920	0.538	1.750
Agree Responses							
	External assistance	-0.127	0.160	0.881	0.427	0.644	1.204
	Afford basic needs	-0.349	0.234	0.705	0.135	0.446	1.115
	Food security	-0.207	0.210	0.813	0.324	0.539	1.227

Statistics show that the model is a good fit with a deviation value of 0.596. That means the model has 56.7% goodness of fit. The pseudo-R-square measures are Cox and Snell, Nagelkerke, and McFadden, with values of 0.313, 0.339, and 0.149, respectively. As a result, the model explains 33.9% to 14.9% of the variation and has relatively large effects.

The first set of coefficients represents the comparison between respondents who strongly disagree (coded 1) and those who strongly agree (coded 5). For external assistance (Coefficient= -0.034, S.E.= 0.291, $p < 0.907$), the effect is negative (-0.034) but not statistically significant at $p < 0.907$. This implies that external assistance by small-scale farmers negatively affects their household income, though the effect is not significant.

For affording basic needs (Coefficient= -1.313, S.E.= 0.349, $p < 0.012$), the effect is negative (-1.313) and statistically significant at $P < z = 0.012$. The odds ratio of 0.269 indicates that for every unit increase in the ability to afford basic needs, the odds of a respondent choosing “strongly disagree” rather than “strongly agree” decrease by a factor of 0.269, showing a significant impact on small-scale farmers’ household income ($P > z = 0.012$). Food security (Coefficient= -0.480, S.E.= 0.319, $p < 0.133$), the effect is also negative (-0.480) but not statistically significant at $P < z = 0.133$. Therefore, although food security negatively affects small-scale farmers’ household income in this comparison, the effect is not significant.

The second coefficient represents comparisons between the Disagree responses (coded 2) and Strongly Agree (coded 5). External assistance (Coefficient= -0.493, S.E.= 0.363, $p < 0.175$) has a negative coefficient (-0.493) and is not statistically significant at $P < z = 0.175$. Therefore, external assistance is found to negatively affect small-scale farmers’ household income, but this effect is not significant. The ability to afford basic needs (Coefficient= 0.073, S.E.= 0.562, $p < 0.897$) shows a positive coefficient (0.073) but is also not significant as the $P < z = 0.897$. This suggests that the ability to afford basic needs has a positive effect on small-scale farmers, but the effect is not statistically significant. Food security (Coefficient= -1.051, S.E.= 0.438, $p < 0.016$) has a negative coefficient (-1.051) and is statistically significant at $P < z = 0.016$. Therefore, food security negatively affects small-scale farmers’ household income, and this effect is significant.

The third coefficient represents comparisons between the neutral responses (coded 3) and strongly agree (coded 5). External assistance (Coefficient= -0.811, S.E.= 0.237, $p < 0.001$), affording basic needs (Coefficient= -0.720, S.E.= 0.327, $p < 0.028$), and food security (Coefficient= -0.030, S.E.= 0.301, $p < 0.920$). External assistance (Coefficient= -0.811, S.E.= 0.237, $p < 0.001$) has a negative coefficient (-0.811) and is not significant as $P < z = 0.001$. This means external assistance negatively affects small-scale farmers’ household income in this category, but the effect is not statistically significant. Afford basic needs (Coefficient= -0.720, S.E.= 0.327, $p < 0.028$) also shows a negative coefficient (-0.720) and is statistically significant at $P < z = 0.028$. This indicates that the ability to afford basic needs has a significant negative effect on small-scale farmers’ household income. Food security (Coefficient= -0.030, S.E.= 0.301, $p < 0.920$) has a negative coefficient (-0.030) and is not significant at $P < z = 0.920$. Therefore, while food security negatively affects small-scale farmers’ household income, the effect is not statistically significant.

The fourth coefficient represents comparisons between the agree responses (coded 4) and strongly agree (code 5). External assistance (Coefficient= -0.127, S.E.= 0.160, $p < 0.427$) shows a negative coefficient (-0.127) and is not significant as $P < z = 0.427$. This means external assistance negatively affects small-scale farmers’ household income, but the effect is not statistically significant. Affording basic needs (Coefficient= -0.349, S.E.= 0.234, $p < 0.135$) also has a negative coefficient (-0.349) and is not significant at $p < 0.135$. Therefore, the ability to afford basic needs has a negative effect on small-scale farmers, but this effect is not significant. Food security (Coefficient= -0.207, S.E.= 0.210, $p < 0.324$) is likewise negative (-0.207) and not significant as $P < z = 0.324$. This suggests food security negatively affects small-scale farmers’ household income, but again, the effect is not significant.

The Second Objective of the Study

Identify the major challenges facing small-scale farmers in Ikwo and how these challenges affect their ability to alleviate poverty; we interpret the result.

Table 2

Multinomial Logistic Regression Result;

	Number of Obst =		204				
	LR χ^2 =		20				
	Prob > χ^2 =		0.000				
	-2 Log Likelihood =		500.725		Nagelkerke R^2 =		
	Farming knowledge		Coef,	Std. Err,	Z	Prob	[95% Conf. Interval]
Strongly disagree Responses							
						Lower	Upper
	Improved seeds	-0.002	0.292	0.998	0.995	0.563	1.770
	Post-harvest losses.	0.298	0.219	1.347	0.175	0.876	2.071
	Climate change	-1.029	0.289	0.357	0.000	0.203	0.629
	Farm size	-0.941	0.335	0.390	0.005	0.202	0.752
	Farm profitably	-0.007	0.319	0.993	0.982	0.531	1.856
Disagree Responses							
	Improved seeds	-0.116	0.248	0.891	0.641	1.547	1.449
	Post-harvest losses.	0.305	0.219	1.356	0.164	1.883	2.084
	Climate change	-0.454	0.233	0.635	0.051	1.402	1.003
	Farm size	-0.671	0.245	0.511	0.006	1.316	1.827
	Farm profitably	0.148	0.278	1.159	0.594	1.673	1.998
Neutral Responses							
	Improved seeds	0.231	0.195	1.259	0.238	0.859	1.847
	Post-harvest losses.	0.009	0.163	1.009	0.954	0.734	1.389
	Climate change	-0.418	0.156	0.659	0.007	0.485	0.894

	Farm size	-0.086	0.185	0.918	0.643	0.638	1.319
	Farm profitably	-0.004	0.216	0.996	0.985	0.652	1.521
Agree Responses							
	Improved seeds	0.208	0.186	1.231	0.263	0.855	1.771
	Post-harvest losses.	0.075	0.156	1.078	0.631	0.793	1.464
	Climate change	0.004	0.010	1.004	0.707	0.985	1.023
	Farm size	0.352	0.188	1.422	0.061	0.984	2.054
	Farm profitably	-0.264	0.207	0.768	0.203	0.512	1.153

Using the deviance value of 0.925, statistics prove that the model is fit. That is, the model shows 92.5% goodness of fit. The Pseudo R-square measures are Cox and Snell, Nagelkerke, and McFadden, and their values are 0.237, 0.252, and 0.095, respectively. Therefore, the model accounts for 25.2% to 9.5% of the variance and represents relatively decent-sized effects. The first set of coefficients represents comparisons between the Strongly Disagree responses (coded 1) and Strongly Agree (coded 5). The items include Improved seeds (Coefficient= -0.002, S.E.= 0.292, $p < 0.995$), post-harvest losses (Coefficient= -0.298, S.E.= 0.219, $p < 0.175$), climate change (Coefficient= -1.029, S.E.= 0.289, $p < 0.000$), farm size (Coefficient= -0.941, S.E.= 0.335, $p < 0.005$), and farm profitability (Coefficient= -0.007, S.E.= 0.319, $p < 0.982$).

The coefficient for improved seeds is negative (-0.002) and not significant at $P < z = 0.995$. Therefore, improved seeds are found to negatively affect farming knowledge, but the effect is not statistically significant. Post-harvest losses also have a negative coefficient (-0.298) and are not significant at $P < z = 0.175$. This suggests that post-harvest losses negatively affect farming knowledge, though not significantly. Climate change has a negative coefficient (-1.029) and is statistically significant at $P < z = 0.000$. The odds ratio of 0.357 indicates that for every unit increase in climate change perception, the odds of strongly disagreeing rather than strongly agreeing decrease by a factor of 0.357, confirming a significant effect on farming knowledge ($P > z = 0.000$).

Farm size is also negative (-0.941) and significant at $P < z = 0.005$. The odds ratio of 0.390 suggests that for every unit increase in farm size, the odds of strongly disagreeing change by a factor of 0.390, indicating a significant effect on farming knowledge ($P > z = 0.982$).

Farm profitability shows a negative coefficient (-0.007) and is not significant at $P < z = 0.982$. Therefore, farm profitability negatively affects farming knowledge, but the effect is not statistically significant.

The second set of coefficients represents comparisons between the disagree responses (coded 2) and strongly agree (coded 5). The items include Improved seeds (Coefficient= -0.116, S.E.= 0.248, $p < 0.641$), post-harvest losses (Coefficient= 0.305, S.E.= 0.219, $p < 0.164$), climate change (Coefficient= -0.454, S.E.= 0.233, $p < 0.051$), farm size (Coefficient= -0.671, S.E.= 0.245, $p < 0.006$), and farm profitability (Coefficient= 0.148, S.E.= 0.278, $p < 0.594$). The coefficient for improved seeds is negative (-0.116) and not significant at $P < z = 0.641$. Therefore, improved seeds negatively affect farming knowledge, but the effect is not statistically significant. Post-harvest losses have a positive coefficient (0.305) and are not significant at $P < z = 0.164$. This suggests post-harvest losses positively affect farming knowledge, though the effect is not

statistically significant. Climate change shows a negative coefficient (-0.454) and is significant at $P < z = 0.051$. The odds ratio of 0.635 indicates that for every unit increase in climate change perception, the odds of a respondent choosing “disagree” rather than “strongly agree” decrease by a factor of 0.635, indicating a significant effect on farming knowledge ($P > z = 0.051$). Farm size is negative (-0.671) and significant at $P < z = 0.006$. The odds ratio of 0.511 means that for every unit increase in farm size, the odds of disagreeing rather than strongly agreeing change by a factor of 0.511, showing a significant effect on farming knowledge ($P > z = 0.006$).

Farm profitability has a positive coefficient (0.148) and is not significant at $P < z = 0.594$. This indicates that farm profitability positively affects farming knowledge, but the effect is not significant.

The third set of coefficients represents comparisons between the neutral responses (coded 3) and strongly agree (coded 5). The items include Improved seeds (Coefficient= 0.231, S.E.= 0.195, $p < 0.238$), post-harvest losses (Coefficient= 0.009, S.E.= 0.163, $p < 0.954$), climate change (Coefficient= -0.418, S.E.= 0.156, $p < 0.007$), farm size (Coefficient= -0.086, S.E.= 0.185, $p < 0.643$), and farm profitability (Coefficient= -0.004, S.E.= 0.216, $p < 0.985$).

Improved seeds have a positive coefficient (0.231) but are not significant at $P < z = 0.238$. Therefore, improved seeds positively affect farming knowledge, though the effect is not statistically significant. Post-harvest losses also show a small positive coefficient (0.009) and are not significant at $P < z = 0.954$, suggesting a positive but insignificant effect on farming knowledge.

Climate change has a negative coefficient (-0.418) and is statistically significant at $P < z = 0.007$. The odds ratio of 0.659 indicates that for every unit increase in climate change perception, the odds of choosing “neutral” rather than “strongly agree” decrease by a factor of 0.659, showing a significant effect on farming knowledge ($P > z = 0.007$). Farm size is negative (-0.086) and not significant at $P < z = 0.643$, meaning it has a negative but insignificant effect on farming knowledge. Farm profitability has a negative coefficient (-0.004) and is not significant at $P < z = 0.985$. Therefore, farm profitability negatively affects farming knowledge, but the effect is not significant.

The fourth set of coefficients represents comparisons between the agree responses (coded 3) and strongly agree (coded 5). The items include Improved seeds (Coefficient= 0.208, S.E.= 0.186, $p < 0.263$), post-harvest losses (Coefficient= 0.075, S.E.= 0.156, $p < 0.631$), climate change (Coefficient= 0.004, S.E.= 0.010, $p < 0.707$), farm size (Coefficient= 0.352, S.E.= 0.188, $p < 0.061$), and farm profitability (Coefficient= -0.264, S.E.= 0.207, $p < 0.203$). Improved seeds have a positive coefficient (0.208) and are not significant at $P < z = 0.263$. Therefore, improved seeds positively affect farming knowledge, but the effect is not statistically significant. Post-harvest losses also show a positive coefficient (0.075) and are not significant at $P < z = 0.631$, suggesting a positive but insignificant effect on farming knowledge. Climate change has a very small positive coefficient (0.004) and is not significant at $P < z = 0.707$, indicating a positive but not significant effect on farming knowledge. Farm size has a positive coefficient (0.352) and is significant at $P < 0.061$. The odds ratio of 1.422 suggests that for every unit increase in farm size, the odds of a respondent choosing “agree” rather than “strongly agree” increase by a factor of 1.422, reflecting a significant effect on farming knowledge ($P > z = 0.061$). Farm profitability has a negative coefficient (-0.264) and is not significant at $P < z = 0.203$. Therefore, farm profitability negatively affects farming knowledge, but the effect is not significant.

4.2 Discussion of Findings

The findings revealed that socio-demographic parameters such as farm size have a positive impact on farmers in Ikwo. A multinomial logistic regression study demonstrated that farm size has a favorable and substantial effect on poverty alleviation among Ikwo's small-scale farmers. This means that farmers with greater farm sizes are more likely to have positive economic outcomes and lower poverty rates. Larger agricultural holdings typically result in more production capacity, more marketable surplus, and possibly higher income. This is consistent with economic theory, which holds that when handled correctly, size may increase production and profitability.

This finding is consistent with Okulegu and Nweze's (2020) empirical study, which examined the effect of urban agriculture in poverty reduction in Abakaliki, Ebonyi State. Their findings revealed that farm size had a major impact on agricultural revenue and thereby poverty alleviation. Farmers who planted more land were better able to provide food security and a secure income for their families. The study indicated that urban agriculture, when supported by sufficient farm size, plays an important role in poverty alleviation. As a result, raising farm size or making more land available to smallholder farmers could serve as a strategic method to combat rural poverty. To optimize production, land access should be accompanied by support systems such as loans, infrastructure, and extension services.

The climate change of the respondents has a significant negative effect on farmers in Ikwo. The findings of this study revealed that climate change has a detrimental and significant impact on poverty alleviation among small-scale farmers in Ikwo. This suggests that climate-related difficulties such as unpredictable rainfall, soil erosion, and flooding reduce agricultural output and income creation, exacerbating poverty. This finding is congruent with the study undertaken by Okorie (2020) in Ebonyi State, which studied the effects of climate change on smallholder farmers in Abakaliki. The study indicated that small-scale farmers were increasingly sensitive to climate-related risks, including altered rainfall patterns and frequent flooding, leading to reduced crop yields and poorer income. Okorie further stated that these farmers lacked access to climate-resilient technologies and enough institutional assistance, restricting their ability to adapt effectively. This research implies that climate change will continue to harm rural farmers' livelihoods unless focused intervention and climate-smart agricultural methods are implemented. The government and development partners must boost farmers' access to adaptation tools, including drought-resistant seeds, early weather alerts, and sustainable land management methods.

The respondents' food security has a negative and considerable impact on farmers in Ikwo. This study found that food security has a negative and significant effect on poverty alleviation among small-scale farmers in Ikwo. This suggests that while some households may have access to food or be food secure, this does not always convert into economic empowerment or poverty alleviation. In many cases, small-scale farmers consume a large portion of their goods, leaving little or no surplus for market sales or income generation. This is consistent with the paradox in which food-secure households remain financially poor due to little commercialization and value addition. This finding is reinforced by Nwibo et al. (2018), who investigated the role of homestead agriculture in food security in the Abakaliki metropolitan area. They discovered that, whereas 52.5% of urban households were food secure, an additional 47.5% were food insecure. Even for food-secure households, obstacles such as weak tenure systems, limited access to inputs, and institutional hurdles hindered their capacity to increase productivity or produce income above subsistence levels.

This suggests that food security alone is not a sufficient indicator of poverty reduction, especially when it is not backed by market access, financial inclusion, or value-added infrastructure. Farmers may be able to

feed their households, but they still struggle to meet other essential needs such as education, healthcare, and housing due to limited cash income.

The improved seeds of the respondents have a negative major impact on farmers in Ikwo. Improved seeds were discovered to have a negative, significant effect on poverty alleviation among small-scale farmers in Ikwo. This means that, despite the availability or distribution of better seeds, the farmers questioned have not yet experienced tangible poverty reduction. This could be due to a variety of issues, including a lack of effective seed usage training, the high cost of improved seeds, limited availability of supplementary inputs such as fertilizers and irrigation, or seed varieties that are unsuitable for the local climate and soil conditions. This finding contrasts with Oyim and Osayi's (2023) study of small-scale agriculture in Abakaliki metropolis, Ebonyi State, which discovered that farmers who had access to improved agricultural inputs, including seeds, had higher yields and higher income levels. Their findings demonstrated that when used correctly, enhanced seeds greatly contribute to higher agricultural productivity, which raises household income and lowers poverty.

The present study's negative results may reflect contextual gaps such as inadequate extension services, lack of awareness, or input mismanagement, indicating that simply providing improved seeds without training or supporting infrastructure may not yield the desired poverty alleviation outcomes.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study evaluated the economic impact of small-scale agriculture on poverty alleviation among farming households in Ikwo Local Government Area of Ebonyi State, Nigeria. Using primary data and logistic regression analysis, the study examined the effects of external assistance, affordability of basic needs, food security, improved seeds, farm size, climate change, post-harvest losses, and farm profitability on poverty alleviation. The findings indicate that although small-scale agriculture contributes to household livelihoods and food supply, its poverty-reducing potential is constrained by several socioeconomic, structural, and environmental factors. This finding is consistent with the broader literature, which identifies agriculture as an important pathway for poverty reduction while emphasising the constraints confronting smallholder farmers (Abdulrahman et al., 2025; Emaziye & Inoni, 2021).

The results showed that external assistance, affordability of basic needs, and food security had significant negative effects on poverty alleviation. This suggests that the availability of assistance and food does not automatically translate into sustained poverty reduction among small-scale farming households. The finding may reflect weaknesses in the effectiveness and distribution of support, limited market opportunities, and inadequate agricultural returns. Adeyonu et al. (2022) similarly demonstrate that farmers' socioeconomic and entrepreneurial conditions influence household poverty outcomes, while Emaziye and Inoni (2021) found that although food-crop production contributed substantially to household income, poverty persisted among rural households. These findings reinforce the view that agricultural participation alone may not be sufficient to overcome poverty without complementary socioeconomic and institutional support.

Similarly, climate change and improved seeds exhibited negative effects, indicating that environmental instability and inadequate access to or effective utilisation of improved agricultural inputs can constrain poverty reduction. This finding is consistent with Okorie (2020), who reported that climate-related challenges such as irregular rainfall, erosion and flooding reduced agricultural yields and farmers' incomes in Abakaliki. It also agrees with Okpokiri et al. (2021), who found that inadequate finance and limited knowledge constrained the adoption of climate-smart agricultural practices among farmers in Ebonyi State.

More broadly, Dhillon and Moncur (2023) identify technological, infrastructural and institutional constraints as important challenges limiting the productivity of small-scale farmers.

In contrast, farm size and post-harvest management recorded positive effects on poverty alleviation. The positive effect of farm size suggests that farmers with greater access to productive land may have better opportunities to increase agricultural output and household income. This is consistent with evidence from Ubokudom et al. (2021) and Amaza et al. (2005), which identifies farm size as an important factor influencing farmers' economic and production outcomes. Effective post-harvest management can also reduce losses and increase the quantity and value of agricultural produce available for sale and consumption. This is particularly important given the significant role of food loss reduction in improving the economic returns from agricultural production (FAO, 2019).

With respect to the first objective, which assessed the extent to which small-scale agriculture has affected poverty levels in Ikwo, the study concludes that small-scale agriculture contributes to household income and food supply but does not, by itself, guarantee poverty reduction. The significant effects of external assistance, affordability of basic needs, and food security indicate that agricultural outcomes are influenced by wider socioeconomic and institutional conditions. This is consistent with the findings of Egenti and Dinbabo (2022), who showed that targeted agricultural intervention through the Fadama III programme improved income, food security and crop yields among smallholder farmers in Ebonyi State. Similarly, Umar et al. (2021) found that agricultural productivity was positively associated with per-capita income and poverty reduction in Nigeria.

Regarding the second objective, which identified the major challenges facing small-scale farmers and their implications for poverty alleviation, the study concludes that climate change, limited access to improved seeds, and low farm profitability constitute important constraints to the poverty-reducing capacity of small-scale agriculture in Ikwo. These findings are supported by Nwankwo and Okoro (2023), who identified inadequate capital, high mechanisation costs, limited land access, pests and climate change as major constraints to agricultural productivity among small-scale farmers in Abakaliki. Ejechi et al. (2024) similarly identified inadequate finance, high labour costs, limited equipment and land-tenure problems as important constraints to rural agricultural activities in Ebonyi State.

Overall, the study concludes that small-scale agriculture remains an important pathway for poverty alleviation in Ikwo, but its full potential is constrained by structural, financial, environmental and productivity-related challenges. The positive contribution of farm size and post-harvest management demonstrates that better access to productive resources and improved management practices can strengthen agricultural outcomes. This is consistent with the broader evidence that improving agricultural productivity, access to finance, technology, value addition and institutional support can enhance the contribution of small-scale agriculture to rural welfare and poverty reduction (Eze et al., 2020; Mbam et al., 2021; Chima et al., 2024).

This conclusion supports the need for targeted agricultural policies that improve farmers' access to productive land, improved inputs, agricultural finance, climate-resilient technologies, extension services, storage facilities, and markets. Such interventions would help transform small-scale agriculture from a predominantly subsistence activity into a more productive and profitable source of rural livelihood and poverty reduction.

5.2 Recommendations

Based on the findings of the study, the following recommendations are made:

- a) Government and relevant development agencies should strengthen programmes that improve the productivity and profitability of small-scale agriculture in Ikwo. Particular attention should be given to farm expansion, improved production practices and better post-harvest management, given their positive contribution to poverty alleviation.
- b) Government and agricultural development agencies should improve farmers' access to improved seeds, fertilisers and extension services through affordable input programmes, subsidies and farmer-oriented credit schemes. This would help address the negative effects associated with inadequate access to improved seeds and enhance agricultural productivity.
- c) Climate-smart agricultural practices should be promoted among farmers in Ikwo through training, extension services and access to climate-resilient technologies, including drought- and disease-resistant crop varieties. This is necessary to reduce the negative effects of climate change on agricultural productivity and poverty alleviation.
- d) Investment should be made in affordable storage, processing and transportation facilities for small-scale farmers. Farmer cooperatives should also be encouraged to facilitate collective storage, processing and marketing. Improved post-harvest management would enable farmers to retain a greater proportion of their output for sale and consumption.

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