



## EFFECT OF FADAMA PROGRAMMES ON POVERTY REDUCTION IN BENUE STATE, NIGERIA.

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### Abstract

*This study investigated the effect of Fadama programme (Fadama capacity building and rural infrastructure development) on poverty reduction in Benue State. The study adopted a cross-sectional survey research design, thereby making the questionnaire the main instrument of data collection to explore the relationship between the variables. Multi-stage and stratified random sampling were used to select 400 Fadama user group members in Benue State. The study employed the Probit Regression to achieve the study's objectives. From the data analysis, the study revealed that Fadama capacity building programmes have a significant positive effect on household income. The study further revealed that Fadama-supported rural infrastructure development programme has an insignificant positive effect on household income. The study therefore recommends that policymakers should prioritize and strengthen Fadama capacity building programmes to empower beneficiaries and enhance their income-generating potential. Additionally, the study further recommended optimization of Fadama rural infrastructure development interventions to ensure that they effectively contribute to poverty reduction in Benue State.*

**Keywords:** Fadama. Poverty Reduction, Cross-sectional Survey, Probit Regression, and Benue.

**JEL Classification:** Q18, I32, C83, C25, & Q10.

### 1. Introduction

Poverty remains a significant challenge in emerging nations like Nigeria, where many face difficulties in meeting basic needs. Despite ongoing policy efforts, eradicating extreme poverty among vulnerable populations is still a goal not yet achieved. In Nigeria, acute multidimensional poverty is prevalent, especially in rural areas where agriculture is the main source of livelihood. The fadama program has been introduced as an agricultural development initiative to tackle these issues (Oshewolo, 2010). Successive Nigerian governments have focused on significant public

investments in agricultural development programs, notably the World Bank-supported National Fadama Development initiatives since the 1990s. These programs adhere to participatory service delivery principles aimed at increasing farm productivity and non-farm incomes to address rural poverty (FMARD, 2009). The Fadama project has progressed through multiple phases, with Fadama III (2009-2019) and its Additional Financing phase (2016-2021) being the latest extensive implementations across all states and the Federal Capital Territory (World Bank, 2023).

The Fadama initiative was launched in Kogi, Nasarawa, and Benue, Nigeria, as part of the World Bank-financed National Fadama III agricultural development program (Ogwumike, Olojede & Ozughalu, 2023). The Fadama III+ Additional Financing supports Nigeria's 2011 Agricultural Transformation Agenda, aiming to boost agricultural productivity by focusing on cassava, rice, sorghum, and horticulture value chains while connecting farmer clusters to organized markets (Olomola, Adesugba & Yusuf, 2023; World Bank, 2022).

As of 2023, the Fadama project has transitioned to the Agro-Climatic Resilience in Semi-Arid Landscapes (ACReSAL) Project, focused on enhancing agricultural resilience and rural livelihoods amidst climate change challenges (World Bank, 2023). Additionally, poverty reduction involves interconnected policies aimed at improving well-being by expanding freedoms, choices, and capabilities, underscored by the global poverty (Sen, 2023; Sachs, 2022). As of 2022, approximately 648 million people globally lived in extreme poverty, predominantly in sub-Saharan Africa. Poverty reduction is a priority reflected in international agendas like the Sustainable Development Goals and the African Union's Agenda 2063, targeting eradication by 2030 (United Nations, 2023; African Development Bank, 2023).

In Benue State, Nigeria, 74.8% of households are multidimensionally poor, ranking it as the 8th poorest state in the country (National Bureau of Statistics [NBS], 2022). The poverty situation in the state is worsened by climate change, insecurity, and the COVID-19 pandemic, disrupting agriculture and livelihoods (Ogwuche, 2023). The multidimensional poverty index for Benue State surged to 76.3% in 2023, reflecting increasing poverty levels. The aim is to establish sustainable pathways out of poverty for vulnerable communities (Oredipe & Aminu, 2011). Multi-year interventions are designed to improve farmer access to irrigation, equipment, technologies, nutrition assistance, and market linkages, enhancing crop yields, livestock production, and net agricultural returns, thus promoting multidimensional prosperity (Ogwumike, 2002; FMARD, 2009).

The ongoing Fadama III project, initiated in 2009 and currently in its Additional Financing phase, aims to alleviate rural poverty through investment in community infrastructure, asset acquisition, skills development, and advisory services (World Bank, 2023). Benue state, despite its agricultural significance and various poverty alleviation initiatives like the Fadama project, faces persistent poverty, with a multidimensional poverty rate of 74.8% as reported by the National Bureau of Statistics (NBS, 2022). Recent studies reveal that 68% of rural households face food insecurity, along with notable deficits in healthcare access and education in Benue State. The absence of state-specific research hinders effective policy-making as emphasized by FMARD in its National Agricultural Technology and Innovation Plan.

This study aims to fill these gaps by evaluating the Fadama programmes' impact on poverty reduction using a robust methodological framework. Thus, the study specifically hypothesizes that: Fadama capacity building has no significant effect on poverty reduction of beneficiary households in Benue State. Secondly, that there is no significant effect of Fadama rural infrastructure development programmes on poverty reduction of beneficiary households in Benue State. The remaining part of the paper is organized as follows: Section two deals with related literature and theoretical framework. Section three addresses methodological issues and model specification for the study. Section four presents and discusses the results of data analysis while section five provides the conclusion and recommendations from the study findings

## **2. Literature Review**

### **2.1 Conceptual Issues**

#### **Concept of Fadama**

The concept of Fadama in Nigeria refers to irrigable lowlands and flood plains, rooted in agricultural traditions and influenced by socio-economic factors. The term, originating from the Hausa language, is used across several Nigerian languages, including 'Jande' in Tiv and 'Eji' in Idoma, highlighting its significance in

diverse ethnic communities. Fadama lands have unique hydrological properties that make them ideal for irrigated agriculture, fishing, and livestock support. Kudi, Akpoko, and Banta (2008) note that Fadama, an ancient agricultural practice, utilizes seasonally flooded areas for diverse crop cultivation through small-scale irrigation. This traditional knowledge has been integrated into contemporary agricultural initiatives like the Fadama Assisted Project, defined by the World Bank (2009) as a program aimed at sustainably enhancing the incomes of participating farmers through agricultural diversification. According to Qureshi (1989) Fadama refers to seasonally flooded areas used for farming during the dry season, characterized as alluvial lowlands created by river erosion and deposition. They are waterlogged in the rainy season yet retain moisture dry seasons, offering significant potential for economic development through infrastructure investment and technical assistance. Larger Fadama areas are also known as 'Wetlands' (Nkonya 2008; and Ingawa, 2004).

### **Concept of Poverty Reduction**

The concept of poverty is complex and transcends simple definitions, encompassing a multidimensional spectrum of human experiences and societal conditions. Alkire et al. (2021) argue that poverty extends beyond financial insufficiency, representing a dynamic interplay of deprivations in health, education, living standards, and social inclusion. This complexity has resulted in various definitions and measurement approaches aimed at capturing the diverse essence of poverty across global contexts. The World Bank (2023) emphasizes that understanding poverty extends beyond income metrics to include capabilities, opportunities, and vulnerabilities. This broader view significantly influences the perception, measurement, and policy interventions related to poverty. Effective poverty reduction discussions must critically assess the complex and variable nature of poverty.

The United Nations (2019) defines poverty as encompassing more than just income deprivation, highlighting issues such as hunger, malnutrition, limited education access, social exclusion, and political

disenfranchisement. In Nigeria, the National Bureau of Statistics (NBS, 2022) employs a multidimensional approach to assess poverty, using both monetary and non-monetary indicators, including consumption expenditure and a multidimensional poverty index focusing on health, education, standards of living, employment, and security. According to the NBS, 63% of Nigerians, equating to 133 million individuals, fall under multidimensional poverty, underscoring the complexity of the issue in the country.

The United Nations (2021) characterizes poverty reduction as improving the quality of life and expanding the capabilities of impoverished individuals, in line with Sen's (2023) capabilities approach that emphasizes individual freedoms and valued life choices. Perspectives on poverty include the inability to obtain basic needs due to low income (Ajakaiye & Adedeye, 2001; Chris, 2001, as cited in Avanger, 2005), psychological and social deprivations (Hazzell & Hadad, 2001), and a state involving multiple deprivations across economic, social, political, cultural, and environmental dimensions (Ukwu, 2002; FRN, 2001; Ayagi, 2000, as cited in Avanger, 2005).

### **2.2 Theoretical Review and Framework**

This study synthesizes three key approaches to poverty and development: Sen's capability approach, Nurkse's vicious cycle of poverty theory, and the sustainable livelihoods framework. Each theory, though distinct, complements the others to enhance the analysis of the broad impacts of agricultural development interventions such as the Fadama programme.

#### **Capability Approach**

Sen's (1999) capability approach revolutionizes development economics by redefining well-being, focusing on the expansion of substantive freedoms rather than traditional notions of resource-based or utilitarian perspectives. It emphasizes poverty as capability deprivation instead of mere income lack, advocating that development should be measured by individuals'

capabilities to achieve valued lives, transcending mere economic metrics.

Sen's framework emphasizes functioning (states of 'being and doing'), capabilities (access to valuable functioning), and agency (pursuit of self-defined goals). This approach highlights that in rural agricultural communities, income alone may not sufficiently indicate well-being. Within the Fadama program, it encourages evaluating changes beyond income and productivity to include enhancements in farmers' health, education, and social participation, focusing on how agricultural interventions expand freedoms for rural households.

### **Vicious Circle of Poverty Theory**

Nurkse's (1953) vicious circle of poverty theory highlights the structural perpetuation of poverty, particularly in developing economies. It describes a self-reinforcing cycle characterized by low productivity, low incomes, low savings, low investment, and low capital formation, which traps communities in enduring poverty. In agricultural settings, this cycle is evident when low farm productivity results in limited incomes, consequently restricting investment in productivity-enhancing technologies, thus continuing low productivity.

### **Sustainable Livelihoods Framework**

The sustainable livelihoods approach, pioneered by Chambers and Conway (1992) and further developed by scholars like Scoones (1998), offers a holistic, people-centered framework for understanding and addressing rural poverty. This approach conceptualizes livelihoods as encompassing the capabilities, assets, and activities required for a means of living, with sustainability being a key concern. Nurkse's theory, though criticized for oversimplifying complex economic relationships (Hirschman, 1958), offers valuable insights into the structural challenges of rural communities in developing nations.

The vicious circle theory highlights the importance of coordinated interventions across various areas to disrupt the poverty cycle, prompting discussion on how

different components of programs, such as capacity building and infrastructure development, can be effectively sequenced and integrated to promote development transitions. The framework identifies key components, including livelihood assets, vulnerability context, transforming structures and processes, livelihood strategies, and outcomes, to analyze the interplay of household resources, institutional contexts, and socio-economic trends affecting poverty. It emphasizes leveraging existing assets, the role of institutions and policies in resource access, and the importance of sustainability, focusing on both environmental resilience and the long-term viability of livelihood strategies, which is particularly relevant to the Fadama programme.

### **2.3 Empirical Review**

Iortyom et al. (2023) investigated the impact of Fadama III+ capacity building programmes on poverty reduction among beneficiary households in Benue State. Using a quasi-experimental design, they surveyed 400 Fadama beneficiaries and 400 non-beneficiaries across 10 Local Government Areas. Employing Propensity Score Matching (PSM) and Difference-in-Differences (DiD) analyses, the study found that participation in Fadama capacity building programmes was associated with a 28% increase in household income and a 22% reduction in poverty incidence. The authors concluded that Fadama capacity building had a significant positive effect on poverty reduction and recommended intensifying these programmes with a focus on skills most relevant to local agricultural value chains.

Ater et al. (2023) analysed the long-term effects of Fadama capacity building on household resilience and poverty dynamics in Benue State. Using panel data from 600 households over a five-year period, they employed a fixed-effects model and resilience index measurement. The study found that consistent participation in Fadama capacity building programmes was associated with a 30% increase in household resilience scores and a 25% reduction in the likelihood of falling back into poverty. The authors emphasised the importance of sustained

engagement in capacity building activities for long-term poverty reduction.

Agada and Okwoche (2023) examined the synergistic effects of Fadama capacity building and rural infrastructure development on poverty reduction in Benue State. Using structural equation modeling on data from 800 beneficiary households, they found that the combination of capacity building and infrastructure access led to a 40% greater reduction in poverty levels compared to either intervention alone. The study highlighted the importance of integrated approaches in poverty reduction strategies and recommended closer coordination between capacity building and infrastructure development components of the Fadama project.

Akpehe and Igbabul (2023) analysed the impact of Fadama rural infrastructure on agricultural productivity and food security among smallholder farmers in Benue State. Using the Household Food Insecurity Access Scale (HFIAS) and a sample of 700 households, they employed a difference-in-differences approach. Results showed that access to Fadama-supported irrigation infrastructure was associated with a 50% increase in year-round crop production and a 35% reduction in severe food insecurity. The study highlighted the importance of water management infrastructure in achieving sustainable poverty reduction.

Olomola et al. (2023) conducted a comprehensive study on the impact of Fadama III+ capacity building programmes on poverty reduction across six states in Nigeria (Benue, Kano, Oyo, Enugu, Lagos, and Sokoto). Using a mixed-methods approach with a sample of 1,200 households, they employed Propensity Score Matching (PSM) and Difference-in-Differences (DiD) analyses. The study found that participation in Fadama capacity building was associated with a 23% increase in household income and a 19% reduction in poverty incidence. However, impacts varied significantly across states, with Benue and Kano showing the highest poverty reduction effects.

Ogbole and Akper (2022) examined the effect of Fadama rural infrastructure development on agricultural productivity and income in Benue State. Their study utilized a mixed-methods approach, combining a survey of 500 farm households with geospatial analysis of infrastructure projects. Results indicated that proximity to Fadama-supported infrastructure (such as irrigation systems and rural roads) was associated with a 15% increase in crop yields and a 20% increase in farm income. However, the study noted significant variations in impact across different regions of the state. The authors recommended a more targeted approach to infrastructure development, prioritizing areas with the highest potential for agricultural growth.

Chilebo, Ohiani and Adadu (2019) examined the impact of Fadama III on poverty reduction in Benue State using the state centric and good governance approach. The study discovered that while Fadama III recorded positive achievements in farmers' income, physical infrastructure and productive assets, the impacts on poverty reduction were unsustainable and unimpressive. The work recommended making people the means and ends of development programmes, calling for a sustainable vision plan, creativity and initiatives that position people to create wealth, food and jobs.

### **Gap in Literature**

The review of studies on the Fadama programme highlights a significant literature gap in Benue State. Although works by Iortyom et al. (2023), Ogbole and Akper (2022), and Ater et al. (2023) address aspects like capacity building and rural infrastructure, they lack a comprehensive analysis of how these factors contribute to poverty reduction. Additionally, broader studies such as Olomola et al. (2023) do not adequately explore the unique socio-economic and agricultural context of Benue State. This review highlights a significant gap in research concerning the effects of Fadama capacity building and rural infrastructure development on poverty reduction in Benue State. Current empirical evidence is fragmented and does not adequately address the

sustainability of these interventions in the state's specific context. There is an urgent need for integrated research that analyzes the interaction of these components to inform policymakers on effective poverty alleviation strategies in Benue State.

### 3. Methodology

The study mainly utilized the primary source of data. Primary data was collected through a structured questionnaire administered to household heads or knowledgeable adult members actively involved in Fadama programme activities. The questionnaire was designed to capture data on key variables related to the study objectives, including Fadama capacity building, rural infrastructure development, and demographic characteristics. This study adopted the cross-sectional (survey) research design, to enable the researcher objectively and empirically evaluate the effect of Fadama Projects on poverty reduction in Benue State through communication with respondents by administering questionnaire and interview methods.

#### 3.1 Sample Size and Sampling Techniques

The study population comprises 26,528 Fadama III beneficiary households in Benue state engaged in crop farming, livestock rearing, fishing and agro-processing (NFCO, 2021).

To determine an appropriate sample size, the Taro Yamane (1967) formula was employed:

$$n = \frac{N}{1 + N(e)^2}$$

Where

- n = Sample size
- N = Population size
- e = Level of significance (5%)
- 1 = constant

**Benue State: Population (N) = 26,528**

$$n = \frac{26,528}{1 + 26,528(0.05)^2}$$

$$n = 1 + 66.32$$

$$n = \frac{26,528}{67.32}$$

$$n = 394$$

$$n \approx 400.$$

A multi-stage, stratified sampling procedure was employed to ensure a representative sample:

- i. Stratified random sampling was employed to select three Local Government Areas (LGAs) from Benue State's three senatorial districts.
- ii. Random was used for the selection of three Fadama Community Associations (FCAs) from each selected LGA.
- iii. Random selection of two Fadama User Groups (FUGs) from each chosen FCA.

Stratified sampling was further employed to select respondents based on their participation in five principal Economic Interest Groups (EIGs): crop farming, livestock farming, fish farming, agriculture value additions, and marketing. A judgmental sampling technique was applied to ensure selected participants met specific criteria, including program participation duration and active engagement in EIGs.

#### 3.2 Data Analysis

The analytical framework is grounded in the sustainable livelihoods approach, which provides a holistic perspective on poverty reduction and rural development. This framework guided the selection of variables and the interpretation of results. The study employed both descriptive and inferential statistical techniques. Descriptive statistics was used to summarize demographic characteristics and questionnaire responses. For inferential analysis, the study employed the Ordered Probit regression. This choice of model is appropriate given the ordinal nature of the variables used in this study analyzing the effect of Fadama project indicators on poverty reduction indicator (household income)

The model specification draws from the theoretical framework of the sustainable livelihoods approach and empirical evidence from evaluations of similar

community-driven rural development programmes.

The model is specified as follows:

$$Y_{ih} = f(\text{Fadproj}) \dots (1)$$

$$Y_{ih} = f(H_{ih}) \dots (2)$$

$$\text{Fadproj} = f(\text{FadCBih}, \text{FadInfrih}) \dots (3)$$

$$H_{ih} = \beta_0 + \beta_1 \text{FadCBih} + \beta_2 \text{FadInfrih} + \epsilon_{ih} \dots (4)$$

Where:

Y<sub>ih</sub> = Poverty Reduction

Fadproj = Fadama Project Dimensions

FadCBih = Participating in Fadama capacity building

FadInfrih = Access to Fadama supported rural infrastructure

H<sub>ih</sub> = Household Income

β<sub>0</sub> = Intercept

β<sub>1</sub>, β<sub>2</sub> = Regression coefficients

#### 4. Results and Discussion

It is worth noting that out of the 400 copies of questionnaires distributed to the respondents, only 350 copies, representing 88% of the total number of questionnaires, were successfully completed and returned. The remaining 50 copies, representing 12%, were not returned and could not be used for the analysis. Therefore, the analysis was based on the 350 questionnaires that were completed and returned.

**Table 1: Demographics of the Respondents**

Demographic Characteristic	Category	Frequency	Percentage
<b>Participant Identity</b>	Crop farmer	185	52.90
	Livestock farmer	95	27.10
	Agro-produce marketer	55	15.70
	Other	15	4.30
<b>Total</b>		<b>350</b>	<b>100</b>
<b>Gender</b>	Male	210	60.00
	Female	140	40.00
<b>Total</b>		<b>350</b>	<b>100</b>
<b>Highest Educational Qualification</b>	No formal education	35	10.00
	Primary school certificate	70	20.00
	Secondary school certificate	110	31.40
	Diploma/NCE	75	21.40
	Undergraduate degree	45	12.90
	Postgraduate degree	10	2.90
	Others	5	1.40
	<b>Total</b>		<b>350</b>
<b>Years of Farming/Marketing Experience</b>	1-5 years	65	18.60
	6-10 years	95	27.10
	11-15 years	85	24.30
	16-20 years	60	17.10
	Over 20 years	45	12.90
<b>Total</b>		<b>350</b>	<b>100</b>
<b>Land Holding Size</b>	Less than 1 hectare	120	34.30
	1-3 hectares	145	41.40
	4-6 hectares	60	17.10
	Over 6 hectares	25	7.10
<b>Total</b>		<b>350</b>	<b>100</b>

Source: Field Survey, (2025)

Table 1 depicts the demographics of the respondent. For the participant identity, the majority of respondents (52.9%) are crop farmers, followed by livestock farmers (27.1%) and agro-produce marketers (15.7%). The distribution suggests that the Fadama project primarily impacts crop farming activities in the region, with significant involvement in livestock farming as well. The gender distribution shows that male respondents were the majority, constituting 60% of the sample, compared to their female counterparts, who made up 40% of the entire sample. This indicates that the views of the respondents were from both genders. The higher proportion of male respondents suggests that men are the primary participants in Fadama activities and are showcasing agricultural leadership roles in Benue State.

For educational qualification, Table 1 further shows that the majority of participants have some level of formal education, with secondary school being the highest

educational qualification held by the respondents. The presence of participants across all education levels demonstrates the Fadama project's exceptional inclusivity. This broad educational spectrum enhances the project's potential and depicts its capacity to engage and benefit diverse segments of the rural population. For farming/marketing experience, Table 1 indicates a strategic mix, with 51.4% having 6-15 years of experience. This optimal balance of seasoned and newer practitioners significantly enhances knowledge transfer and innovation adoption, crucial for the Fadama project's long-term success and sustainable agricultural development.

For land holding size, the majority of respondents (75.7%) have 3 hectares or less of land. This suggests that the Fadama project primarily serves small to medium-scale farmers, which is typical of rural agricultural settings in many developing countries.

**Table 2: Descriptive Statistics on Respondents' Perceptions of Fadama Project's Capacity Building (CB) and Rural Infrastructure Interventions in Benue State**

Statement	A	SA	N	D	SD	Mean	Remarks
<b>Capacity Building</b>							
1. The financial literacy training has enabled better farm enterprise planning	73 (20.9%)	189 (54.0%)	15 (4.3%)	43 (12.3%)	30 (8.6%)	3.75	Agreed
2. The leadership programmes have strengthened my managerial abilities.	65 (18.6%)	201 (57.4%)	11 (3.1%)	38 (10.9%)	35 (10.0%)	3.77	Agreed
3. The conflict resolution workshops have improved my business negotiation skills	70 (20.0%)	187 (53.4%)	18 (5.1%)	45 (12.9%)	30 (8.6%)	3.70	Agreed
4. Training on good agricultural practices has increased my crop yields	78 (22.3%)	195 (55.7%)	9 (2.6%)	37 (10.6%)	31 (8.9%)	3.85	Agreed
5. Food processing and value addition seminars have raised my sales	61 (17.4%)	198 (56.6%)	12 (3.4%)	42 (12.0%)	37 (10.6%)	3.73	Agreed

<b>Mean</b>						<b>3.76</b>
<b>Cronbach Alpha</b>						<b>0.89</b>
<b>Valid N (listwise)</b>						<b>350</b>
<b>Rural Infrastructure</b>						
6. Construction of irrigation facilities by		172	31	91	21	3.25
Fadama has allowed expansion of crop	35	(49.1%)	(8.9%)	(26.0%)	(6.0%)	
area under cultivation.	(10.0%)					isagreed
7. New or rehabilitated feeder roads		165	27	103	26	3.19 Disagreed
provided access to farmlands and markets	29	(47.1%)	(7.7%)	(29.4%)	(7.4%)	
to sell produce.	(8.3%)					
8. Storage structures created enabled		173	25	95	24	3.27 Disagreed
holding produce to sell when prices are	33	(49.4%)	(7.1%)	(27.1%)	(6.9%)	
optimal	(9.4%)					
9. Water drainage channels reduced		167	33	98	22	3.18 Disagreed
flooding and crop losses on farms	30	(47.7%)	(9.4%)	(28.0%)	(6.3%)	
10. Access to electricity enabled use of		170	28	96	22	3.25 Disagreed
equipment and technologies to increase	34	(48.6%)	(8.0%)	(27.4%)	(6.3%)	
productivity	(9.7%)					
<b>Mean</b>						<b>3.22</b>
<b>Cronbach Alpha (α)</b>						<b>0.89</b>
<b>Valid N (listwise)</b>						<b>350</b>

Source: Field Survey, (2025)

**Decision Rule:**

*If mean <3.5 the respondents Disagree*

*If mean ≥3.5 the respondents Agree*

Table 2 shows the responses to the Likert-scale questions and the sample means in respect of the respondents' perceptions of Fadama Project's Capacity Building (CB) and Rural Infrastructure Interventions in Benue State.

**Capacity Building Interventions**

For the question on whether financial literacy training enables better farm enterprise planning, 73 (20.9%) of the respondents strongly agreed, 189 (54.0%) agreed, 15 (4.3%) were undecided, while 43 (12.3%) and 30 (8.6%) disagreed and strongly disagreed, respectively. The associated sample mean is 3.75, indicating agreement with the statement; hence the mean is ≥ 3.5.

For the question on whether leadership programmes strengthen the managerial abilities of the respondents, 65 (18.6%) strongly agreed, 201 (57.4%) agreed, 11 (3.1%) were undecided, while 38 (10.9%) and 35 (10.0%) disagreed and strongly disagreed, respectively. The sample mean of 3.77 shows agreement; hence the mean is ≥ 3.5.

For the question on whether conflict resolution workshops improve the business negotiation skills of the respondents, 70 (20.0%) strongly agreed, 187 (53.4%) agreed, 18 (5.1%) were undecided, while 45 (12.9%) and 30 (8.6%) disagreed and strongly disagreed, respectively. The mean of 3.70 indicates agreement; hence the mean is ≥ 3.5.

For the question on whether training on good agricultural practices increases crop yields, 78 (22.3%) strongly agreed, 195 (55.7%) agreed, 9 (2.6%) were undecided, while 37 (10.6%) and 31 (8.9%) disagreed and strongly disagreed, respectively. The mean of 3.85 shows strong agreement; hence the mean is  $\geq 3.5$ .

For the question on whether food processing and value addition seminars raise the sales of the respondents, 61 (17.4%) strongly agreed, 198 (56.6%) agreed, 12 (3.4%) were undecided, while 42 (12.0%) and 37 (10.6%) disagreed and strongly disagreed, respectively. The mean of 3.73 indicates agreement. However, the overall mean for Capacity Building interventions is 3.76, showing general agreement with their effectiveness. The Cronbach's Alpha of 0.89 indicates high internal consistency of the responses

**Rural Infrastructure Interventions:**

For the question on whether the construction of irrigation facilities allows expansion of crop area, 35 (10.0%) of the respondents strongly agreed, 172 (49.1%) agreed, 31 (8.9%) were undecided, while 91 (26.0%) and 21 (6.0%) disagreed and strongly disagreed, respectively. The mean of 3.25 indicates disagreement; hence the mean is  $\leq 3.5$ .

For the question on whether new or rehabilitated feeder roads provide access to farmlands and markets for the respondents to sell produce, 29 (8.3%) strongly agreed, 165 (47.1%) agreed, 27 (7.7%) were undecided, while

103 (29.4%) and 26 (7.4%) disagreed and strongly disagreed, respectively. The mean of 3.19 shows disagreement; hence the mean is  $\leq 3.5$ .

For the question on whether storage structures created enabled holding produce for the respondents to sell when prices are optimal, 33 (9.4%) strongly agreed, 173 (49.4%) agreed, 25 (7.1%) were undecided, while 95 (27.1%) and 24 (6.9%) disagreed and strongly disagreed, respectively. The mean of 3.27 indicates disagreement; hence the mean is  $\leq 3.5$ .

For the question on whether water drainage channels reduced flooding and crop losses on farms, 30 (8.6%) of the respondents strongly agreed, 167 (47.7%) agreed, 33 (9.4%) were undecided, while 98 (28.0%) and 22 (6.3%) disagreed and strongly disagreed, respectively. The mean of 3.18 shows disagreement; hence the mean is  $\leq 3.5$ .

For the question on whether access to electricity enabled the use of equipment and technologies to increase the productivity of the respondents, 34 (9.7%) strongly agreed, 170 (48.6%) agreed, 28 (8.0%) were undecided, while 96 (27.4%) and 22 (6.3%) disagreed and strongly disagreed, respectively. The mean of 3.25 indicates disagreement; hence the mean is  $\leq 3.5$ .

The overall mean for Rural Infrastructure interventions is 3.22, showing general disagreement with their effectiveness; hence the mean is  $\leq 3.5$ . The Cronbach's Alpha of 0.89 indicates high internal

**Table 3: Regression Result (Ordered Probit Regression Model)**

Variable	Coefficient	Std. Error	Z-Statistic	Prob.
FADCBih	0.720684	0.081782	8.812312	0.0000
FADINFRih	0.017980	0.073328	0.245202	0.8063
<b>Limit Points</b>				
LIMIT_2:C(3)	0.536950	0.250405	2.144326	0.0320
LIMIT_3:C(4)	1.560085	0.293487	5.315682	0.0000
LIMIT_4:C(5)	-2.843025	0.327117	8.691145	0.0000

LIMIT_5:C(6)	3.978738	0.324797	12.24993	0.0000
Pseudo R-squared	0.116598	Akaike info criterion		
Schwarz criterion	2.582215	Log likelihood	-434.3137	
Hannan-Quinn criter.	2.542403	Restr. log likelihood	-491.6377	
LR statistic	114.6478	Avg. log likelihood	-1.240896	
Prob(LR statistic)	0.000000			

**Source:** Authors computation from E-views 13.0 result output, (2025).

Table 3 presents the summary of the Ordered Probit regression results examining the effect of Fadama capacity building (FADCBih) and rural infrastructure development (FADINFRih) on household income (HIih), which serves as a proxy for the Poverty Reduction Wellbeing Index (Yih). The likelihood ratio (LR) statistic of 114.6478 with a p-value of 0.000000 indicates that the model is statistically significant at the 1% level. This suggests that the explanatory variables included in the model (FADCBih and FADINFRih) are jointly significant in explaining the variation in the dependent variable (HIih). The pseudo R-squared value of 0.116598 indicates that approximately 11.66% of the variation in the dependent variable (HIih) is explained by the explanatory variables (FADCBih and FADINFRih) included in the model. Although the pseudo R-squared is relatively low, it does not necessarily imply a problem with the model, as the LR statistic confirms the overall significance of the model.

Focusing on the individual explanatory variables, the coefficient of FADCBih is 0.720684 with a z-statistic of 8.812312 and a p-value of 0.0000. This indicates that Fadama capacity building (FADCBih) has a positive and statistically significant effect on household income (HIih) at the 1% level of significance. This finding revealed that Fadama capacity building programmes have significant positive effect on household income, thereby contributing to poverty reduction. The result is consistent with empirical evidence from studies such as Iortyom et al. (2023) which highlight that participation in Fadama capacity building programmes was

associated with an increase in household income and a reduction in poverty incidence.

On the other hand, the coefficient of FADINFRih is 0.017980 with a z-statistic of 0.245202 and a p-value of 0.8063. This revealed that rural infrastructure development (FADINFRih) has a positive but statistically insignificant effect on household income (HIih) at conventional levels of significance (1%, 5%, and 10%). The low z-statistic value (less than the critical values of 1.96 and 2.58 at the 5% and 1% significance levels, respectively) and high p-value further confirm the lack of statistical significance. This finding is align with the study by Akpehe and Igbabul (2023) found that Fadama II project's infrastructure components, such as irrigation facilities and rural roads, significantly contributed to increased farm output and income among beneficiaries in Benue State. Similarly, Chilebo et al (2015) observed that Fadama III's infrastructure interventions led to improvements in the living standards of participating households in the state, although the impact on poverty reduction were unsustainable and unimpressive. This finding is not surprising as Benue State has been grappling with issues of insecurity and communal conflicts, particularly between farmers and herders. These challenges may have disrupted the utilization and effectiveness of the infrastructure investments. Also, the lack of proper maintenance and management of the infrastructure projects may have limited their longterm impact on household welfare in Benue State.

## 5. Conclusion and Recommendations

This study investigated the impact of Fadama projects on poverty reduction in Benue State, Nigeria. It concluded that participation in Fadama capacity building programs has a significant positive effect on household income, while Fadama-supported rural infrastructure development positively affects household income, though the effect is not statistically significant.

Based on these findings, the study recommends that policymakers should prioritize and strengthen Fadama

capacity building programmes to empower beneficiaries and enhance their income-generating potential. Furthermore, the study also recommends reassessing and optimizing Fadama rural infrastructure development interventions to ensure that they effectively contribute to poverty reduction and income growth. This may involve conducting comprehensive needs assessments, engaging beneficiaries in the planning and decision-making process, and aligning infrastructure investments with local priorities and market demands.

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