The Contributions of Rice Processing and Marketing to Poverty Reduction in Gboko Local Government Area of Benue State, Nigeria

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Abstract

This study analysed the contributions of rice processing and marketing to poverty reductions in Gboko Local Government Area of Benue state. Data were collected on access to income and employment generated from rice processing and marketing activities. Indicators related to access to healthcare, educational level, access to basic amenities such as food, clothing, shelter and living standards in communities involved in rice activities. In this study, random sampling techniques were employed to select the respondents. A total of 368 respondents were randomly selected. Data for this study were collected using structured questionnaire and oral interview. Descriptive statistics such as simple percentages, tables and charts were used to analyse the data. Also, to analyse the poverty levels among the various groups, the Foster, Greer and Thornbecke (FGT) index and a logit regression model were used. The result shows that there is a positive and statistically significant relationship between quantities of rice processed and marketed and the income of the processors. A 1% increase in the quantity of rice processed and marketed will increase the income of the processors by 0.33%. Also, the result shows that there is a positive and statistically significance relationship between the price of rice and the income of the processors. A 1% increase in the price of rice processed lead to 0.45% increase in the income of the processors. Also, rice processing and marketing have improved access to basic needs such as access to food, healthcare, clothing, education and housing. The study concludes that rice processing and marketing play a significant role to poverty reduction in the area by improving incomes, creating employment opportunities, and enhancing food security. The study recommends targeted interventions from both the government and private stakeholders. In order to improve the livelihoods of those involved in rice processing and marketing but also contribute to the broader socio-economic development of the Area.

Keywords

Rice processing, Marketing, Poverty, Value chain, Benue state

Introduction

Rice is a staple food and a critical component of the agricultural sector in many parts of the world. According to Akighir et al (2011) it is an important food crop, consumed as healthy and staple food by more than half of the world population. That is, rice is consumed by over 40 million people in Africa and 150.3 million people in America (FAO, 2018). Nigeria's rice consumption in 2022 was estimated at 7 million metric tons annually according to the Central Bank of Nigeria (CBN and NBS, 2022). On a per capita basis, rice consumption in Nigeria has risen to 40-50 kg per person per year due to the growing population and changing dietary preferences (FAO,2023). This trend is consistent in rice-producing states like Benue, where rice is a staple food. Although specific consumption figures for Benue State are not separately documented, the state, being both a producer and consumer of rice, reflects the national pattern. As a significant rice producer, there is a high local demand for rice, driven by both urban and rural consumption.

Reports from Rice Farmer Cooperatives (2021) in Benue indicate that local rice consumption has increased, with the majority of the population consuming locally produced rice due to price competitiveness and availability compared to imported rice. Benue State has become a notable hub for rice milling and processing, contributing to local economies and employment. Processing is mostly carried out by small to medium-scale rice mills. The Anchor Borrowers' Programme (ABP), launched in 2015, has stimulated rice production and processing in the state. According to a 2022 report by the Central Bank of Nigeria (CBN, 2022), the ABP has significantly increased the number of rice millers and processors in Benue State, providing inputs and financial support to rice farmers. As of 2023, there are over 50 small and medium-sized rice mills operated in Benue State, particularly in rice-producing LGAs like Gboko, Guma, kwande, Otukpo and Logo. Some of these mills are equipped with modern milling technologies that reduce post-harvest losses and improve rice quality.

Benue State also hosts some larger rice processing mills, including the Gboko Rice Mill, which processes a significant quantity of rice for both local consumption and distribution to other parts of the country. Benue rice is sold within the state and to neighbouring regions. According to the BNARDA (2023), about 60-70% of rice produced in the state is sold in local markets, with the rest transported to markets in Abuja, Lagos, and other states. A 2021 market report by the Federal Ministry of Agriculture noted that Benue State rice has a competitive edge in local markets due to its quality, especially in regions where imported rice has become very expensive due to government policies restricting rice imports. Despite local marketing successes, challenges persist in exporting rice outside Nigeria due to insufficient processing infrastructure and certification standards. Efforts to establish rice as an export commodity from Benue have faced logistical hurdles, but programmes like ABP and others are gradually addressing these issues.

Recent Developments and Government Interventions indicates that some of the programmes like the Anchor Borrowers' Programme (ABP) of 2015-2023 has been instrumental in enhancing rice production, processing, and marketing. By 2023, over 100,000 smallholder rice farmers in Benue had benefited from the programme, receiving inputs, credit facilities, and training. According to the CBN (2022), rice production in Benue under the ABP increased by over 40% between 2019 and 2022, with improved yields and market access being key drivers. Benue State Government Initiatives (2020-2023) through its agricultural empowerment initiatives, invested in additional rice processing facilities and training for local rice millers. Public-private partnerships, such as those with companies like Olam Nigeria, have also supported the marketing of Benue rice to larger markets outside the state. Despite the growth in rice consumption, processing, and marketing, Benue State still faces challenges which include Poor Road networks and limited access to electricity in rural areas which affect the processing and marketing of rice from farms to urban markets. Many small-scale rice processors lack the necessary funding to upgrade their mills and expand production, limiting the region's full processing Potential. Also, insufficient storage facilities lead to post-harvest losses, which reduce the overall quantity of rice available for marketing. Rice consumption, processing, and marketing in Benue State continue to grow, supported by both government programmes and private sector investments. The state plays a crucial role in Nigeria's rice production, with significant potential for further expansion in processing and market access.

The growing disparity between the rich and poor remains one of the most significant threats to globalization and economic integration. Today, nearly half of the world's population survives on less than two dollars a day. For many, poverty has become a vicious cycle, both a cause and consequence of their situation, leaving few opportunities for

escape. In Nigeria and Benue state in particular, successive governments have made various attempts to address poverty through different programmes and policies, though most have fallen short of their objectives due to recurring challenges.

For instance, the National Poverty Eradication Programme (NAPEP), launched in 2001, sought to reduce poverty by empowering youth, improving rural infrastructure, and providing microcredits to farmers and small businesses. However, poor targeting, mismanagement, and bureaucratic delays undermined its success. Similarly, the Benue State Rural Development Programmes (BSRDP) operated between 2002 and 2010 to reduce rural poverty by enhancing agricultural productivity and access to social services, but failed due to lack of political commitment, mismanagement, and insufficient community involvement. The FADAMA III Project (2008-2013), backed by the World Bank, also struggled with infrastructural limitations, poor supervision, and inadequate maintenance of provided facilities.

More recent initiatives, such as the YouWin Programme (2011-2015), aimed to foster entrepreneurship among young Nigerians through grants and mentorship. However, poor business management skills among recipients, corruption, and limited market access in places like Benue State weakened its impact. Similarly, the Conditional Cash Transfer (CCT) Programme introduced in 2016 struggled with poor targeting, delayed payments, and reports of ghost beneficiaries. The Benue State Agricultural Empowerment Programme (2012-2017) faced problems with resource distribution, corruption, and political interference, while the Anchor Borrowers' Programme (2015-Present) has been hampered by delayed input provision, poor rural infrastructure, and high loan default rates. Programmes like N-Power (2016-Present) and TraderMoni/MarketMoni (2018-Present) have provided temporary relief but faced issues of limited rural access, insufficient funding, logistical difficulties, and poor monitoring. The National Social Investment Programme (NSIP) and Youth Empowerment and Social Support Operations (YESSO) have also seen limited success due to irregular funding, political favouritism, and short-term focus. The Benue State Microfinance Loan Scheme, while helping some farmers and traders, still faces repayment challenges and limited outreach. Many of these poverty alleviation initiatives have fallen short due to poor implementation, lack of transparency, weak infrastructure, and limited local participation.

The list of poverty reduction programmes in the country is endless but poverty depth, severity and incidence seem to worsen. For instance, poverty rate in Nigeria increased from 28.1% in 1980 to 46.3% in 1985, and from 42.8% in 1992 to 65.6% 1996 and from 54% in 2004 to 67% in 2005 where it rose to 70.6% in 2007 (NBS, 2018). Benue State as the food basket of the nation with agriculture as the predominant livelihood strategy, and Gboko local government as the headquarter of the Tiv Nations requires an agricultural oriented approach to poverty reduction. This is justifiable by the popular Ricardian theory of comparative cost advantage. Benue state has enormous agricultural resources and is also endowed with an overwhelming proportion of the population that engages in agricultural production. The estimated 2024 population of Benue State is around 6.14 million people. This projection is based on data from Nigeria's National population Commission and other sources out of which 70 to 80% live in rural areas while agriculture accounts for over 75% of their economic activities.

Akighir et al, (2011) opined that to be result oriented, poverty reduction schemes in Benue state should be agriculture-based, and this depends on the linkage effects as well as the commodity value chain of the crops in question. Rice has this value chain and is also of considerable significance for food security, income of household and expenditure. Ajegi (2002) observed that Nigeria's ethnic, social-cultural and geographical heterogeneity demand that different approaches be employed to solve the problem of poverty in different groups. This is important because, the cause and nature of poverty differ from place to place therefore; a uniform system which succeeds in one area might not succeed in another. In addition to total commitment, the success of poverty alleviation schemes depends a lot on the suitability of such schemes to the specific needs of the target groups. The region's favourable agricultural conditions provide a solid foundation for a thriving rice industry.

Rice processing and marketing have the potential to transform the local economy by creating employment opportunities, increasing household incomes, improving access to basic needs, and fostering economic diversification. However, these activities are currently underdeveloped, and it thus seem poverty among the population involved in rice processing and marketing is on the increase. According to the United Nations (2015) Global Multi-Dimensional poverty measurement revealed that, the overall incidence of poverty in Benue State is 77%, but in rural areas of the

State, 88% of people are poor and 67% are extremely poor and a large segment of the rural population has extremely limited access to basic services. Only 10% have access to electricity and less than 8% have access to drinking water. The principal activities in rural areas are agriculture and commerce, which together employ more than 85 per cent of the economically active rural population.

Furthermore, the NBS (2023). Report of the Nigerian multi-dimensional poverty index of 2022 in Benue State showed the MPI of 0.312 with 88% of people in the rural area being poor and 67% extremely poor and a large segment of the rural population having extremely limited access to basic services. This suggests that poverty level in Benue state remains high despite the huge potential of rice industry in the state. Conversely, empirical studies in other parts of Nigeria have shown that rice value chain is profitable and viable to enhance the standards of living of the key actors in the rice chain, for instance, Omotayo, et al (2020) found that rice milling industry among value chain processors in Northwest of Nigeria is profitable. Also, Ayuba, (2023) found that paddy rice marketing in Kebbi state is profitable; Again, Keghter, et al (2023) found rice farming in Quanpan local government area of Plateau state, Nigeria is profitable. In the same vein, Filli, et al (2023) found rice production in Ibi local government area of Taraba state Nigeria profitable. From the foregoing coupled with the fact that the FAO (2024) report showed that Benue state is ranked the 5th state in rice production in Nigeria with 1,500,000 metric tonnes.

Despite the significant potential for rice production in Gboko Local Government Area (LGA) of Benue State, the full benefits of rice processing and marketing seems not to be fully realized by local farmers and processors. The region's favourable agricultural conditions provide a solid foundation for a thriving rice industry. Therefore, Understanding the dynamics of rice processing and marketing in Gboko LGA is essential for formulating effective policies and interventions that can harness the full potential of this sector. By addressing existing barriers and leveraging opportunities within the rice value chain, stakeholders can significantly improve the livelihoods of local communities, thereby contributing to broader efforts aimed at poverty alleviation in the region.

Materials And Method

Study area

Gboko Local Government Area (LGA) is located in the North-Central region of Nigeria in Benue State. It lies between latitude 7°35'-7°13'N and longitude 8°30' -'9 03'E. Gboko is bordered by Tarka LGA to the North, Buruku LGA to the South, Ushongu LGA to the south west and Konshisha LGA to the southeast. The town of Gboko serves as the administrative headquarters of the LGA. The area is well connected by road, with major highways linking it to other parts of Benue State and nearby states. Gboko is strategically located on the Makurdi-Gboko-KatsinaAla road, making it a hub for trade and transportation. It is a key hub for transportation and trade in the region, with major roads linking it to other parts of Benue State and neighbouring states. The town of Gboko, the administrative centre of the LGA, is a major commercial and cultural hub for the Tiv people.
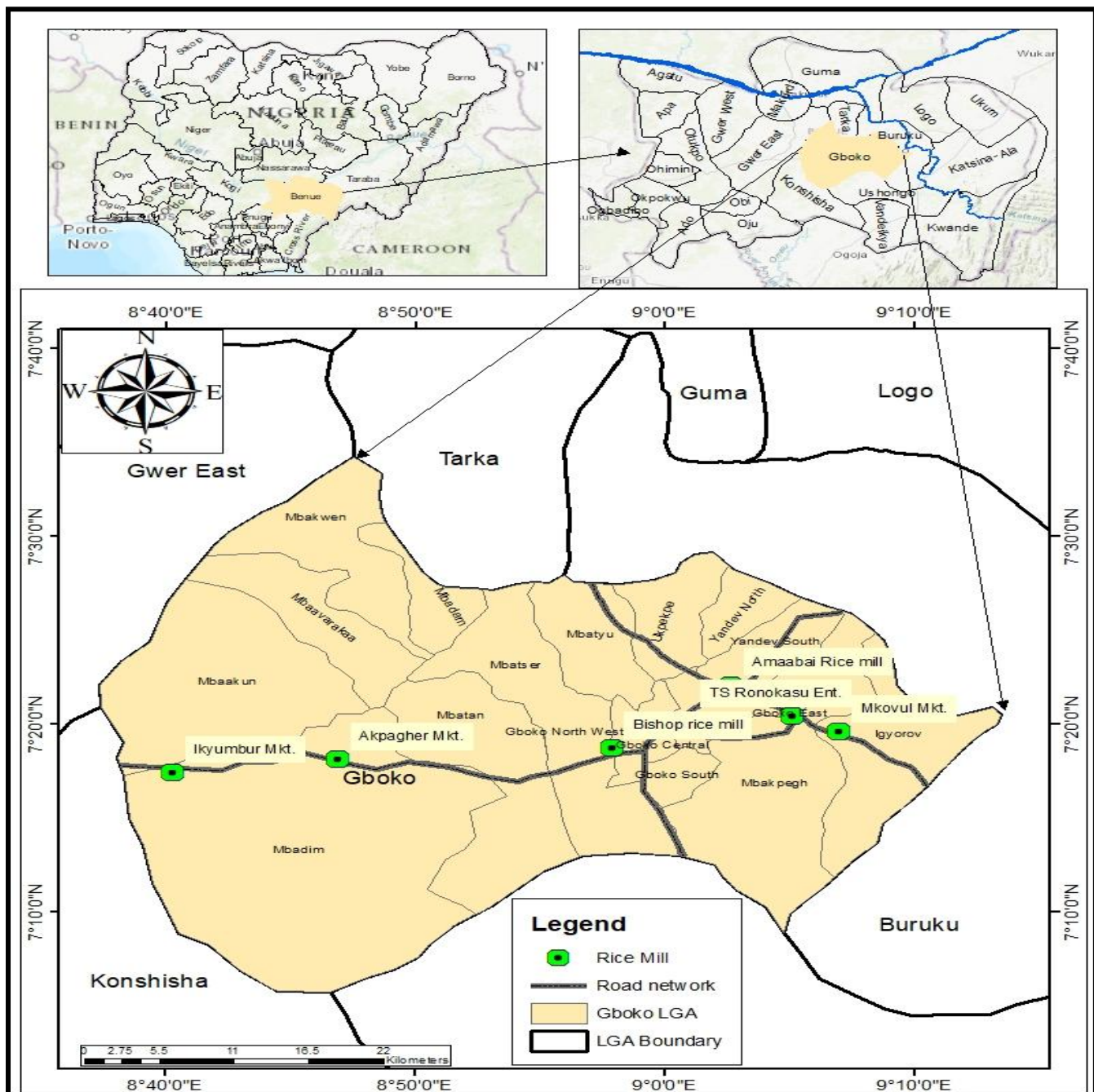
Figure1: Map of Gboko Local Government Area showing the major Rice Mills
Source: Benue State University Makurdi GIS Lab 2025

The relief of Gboko LGA is relatively flat, with some undulating plains and low hills. The elevation ranges from about 150 to 300 meters above sea level, contributing to the area's agricultural viability. The relatively flat terrain makes it suitable for farming, allowing for easy mechanization and irrigation in some areas. The landscape is generally flat, with some low hills and elevated areas scattered across the region. The hills are not particularly steep and do not significantly obstruct agricultural activities. The region has fertile soil, primarily derived from the underlying sedimentary rocks, which is conducive to agriculture. The soil types vary, with alluvial soils found along riverbanks being particularly fertile for crop production.

The area is drained by several streams and rivers that flow into larger rivers like the Katsina-Ala River. These water bodies play a crucial role in agriculture, providing water for irrigation and supporting local fishing activities. The drainage system also helps prevent flooding during the rainy season, although some areas may experience temporary water logging. The drainage pattern is generally dendritic, with streams branching out like tree limbs. This pattern is typical for regions with uniform geological structures and varying vegetation cover. During the rainy season, some areas

may experience temporary flooding or water logging, especially in low-lying regions. However, the natural drainage system helps mitigate prolonged water accumulation. The availability of rivers and streams offers potential for irrigation, enabling farmers to supplement rainfall during the dry season, thus enhancing agricultural productivity.

Gboko LGA is part of the Guinea savanna ecological zone, characterized by a mixture of grasses and scattered trees. Common tree species include baobab, Shea butter trees, locust beans, acacias, and various shrubs. The vegetation is typically dense during the rainy season, but it thins out in the dry season due to reduced rainfall and human activities like farming and logging. The natural vegetation has been significantly altered by agriculture, particularly due to the clearing of land for farming. This has led to some level of deforestation, especially in areas close to human settlements. However, small patches of natural vegetation can still be found in less developed areas. The landscape is primarily covered by grasses that dominate the savanna ecosystem. These grasses thrive during the rainy season and dry out during the dry season, contributing to the seasonal changes in the area. Much of the natural vegetation has been altered due to agricultural activities. Farmers clear land for crops such as rice, yams, maize, and cassava, significantly impacting the natural vegetation cover. During the rainy season (April to October), the vegetation is lush and green, supporting various wildlife species and agricultural activities.

Gboko is one of the most populous LGAs in Benue State, with an estimated population of over 400,000 people. The population is predominantly rural, although the town of Gboko itself is more urbanized. Gboko is primarily inhabited by the Tiv people, one of the largest ethnic groups in Nigeria. The Tiv people are known for their strong agricultural traditions and communal lifestyle. Other minority groups, such as the Igbo, Yoruba, Etulo and Hausa, also reside in the area, mainly for trade and business. The Tiv language is the primary language spoken in Gboko. However, English is widely understood, especially in educational institutions and government offices. The Tiv people have a rich cultural heritage, with traditional festivals such as the Kwagh-Hir (a theatrical performance) and Swem Karagbe (a ritual for justice). The Tiv are also known for their traditional attire, particularly the black and white striped cloth worn during special occasions. Music, dance, and oral traditions are integral parts of Tiv culture.

Agriculture is the primary economic activity in Gboko. The area is known for the cultivation of rice, yams, cassava, maize, millet, soybeans, and groundnuts. Rice farming, in particular, plays a significant role in the local economy, with many households engaged in rice processing and marketing. Gboko is a major commercial centre in Benue State. The town has vibrant markets, including the Gboko Main Market, where agricultural products, textiles, and household goods are sold. Rice processing and marketing are major activities, with local and regional markets benefiting from this trade. Many residents engage in livestock farming, including cattle, goats, sheep, pigs, and poultry. Livestock serves as both a source of income and food security for many families. Small-scale industries such as rice milling, weaving, and pottery also contribute to the local economy. Traditional craft-making, such as the weaving of A'nger (Tiv traditional cloth), is common in Gboko. Although agriculture dominates the economy, Gboko has some mineral resources, including limestone, which supports a few small-scale mining activities.

Methods

This study employs a survey research design. The mixed-methods approach which combines both qualitative and quantitative research methods. The data that will be needed and their sources for this study includes the following;

i. The rice processing and marketing activities in Gboko Local Government Area such as, cleaning, milling, parboiling, drying, sorting, packaging, marketing, pricing, strategies, distribution channels, branding and promotion and also years of experience in rice processing and marketing

ii. Data on income and employment generated from rice processing and marketing activities

iii. Information on market prices, demand-supply trends, and market integration for rice products and the quality of rice produced.

iv. Indicators related to access to healthcare and educational level of the respondents and opportunities among households engaged in rice processing and marketing. Data on housing quality, access to basic amenities such as food, clothing, shelter and living standards in communities involved in rice activities.

The population of the study comprises the Engine owners, marketers, rice millers, parboilers, winnowers and sewers/porters. Based on the records of Gboko Rice Millers Association (2024), the number of the registered members including the processors, marketers, rice millers, parboilers, winnowers and sewers/porters is given in the following table.

Table 1: The Study Population

Groups	Number
Engine Owners	700
Marketers	1,100
Millers	160
Parboilers	96
Winnowers	76
Sewers/Porters	32
Total	**2,164**

Source: Records from Gboko Rice Millers Association 2024

From the above table, there are 700 Engine owners, 1,100 Marketers, 160 Millers, 96 parboilers, 76 winnowers, 32 sewers/porters which summed up to 2,164 persons who constitute the population of the study.

In this study, random sampling techniques was employed to select the respondents. The choice of random sampling techniques is based on the fact that it offers the opportunity to select every member of the population in the sample thereby avoiding selection bias. Under this sampling technique, the respondents will be selected to provide the relevant information for investigation. Under this technique, 117 Engine owners, 184 marketers, 27 millers, 16 parboilers, 13 winnowers, 5 sewers/porters will be randomly selected.

Using the above population, the Taro Yamene's formula was used to determine the sample size for the investigation. The formula is stated as:

$n = \frac{N}{1+N(e^2)}$ 3.1

Where N is the population of the study
n is the sample size to be determined
e is the error term at 0.05 level of significance

$$n = \frac{2164}{1 + 2164(0.05^2)}$$
$$n = \frac{2164}{1 + 5.41}$$
$$n = \frac{2164}{6.4}$$
$$n = 368$$

Using the proportionate sampling approach, the 368 respondents can be apportioned among the engine owners, marketers, rice millers, parboilers, winnowers and sewers/porters as shown in the following table

Table 2: Sample Size Distribution

ROUPS	WORKING	SAMPLE SIZE
Engine owners	700/2164X368	119
Marketers	1100/2164X368	187
Millers	160/2164X368	27
Parboilers	96/2164X368	16
Winnowers	76/2164X368	13
Sewers/porters	32/2164X368	6
TOTAL		368

From the above table, it shows that, 119 engine owners, 187 marketers, 27 millers, 16 parboilers, 13 winnowers, 6 sewers/porters were sampled given the determined sample size.

This study used both descriptive and econometric techniques to analyse the data collected. Descriptive statistics such as simple percentages, tables and charts will be used to analyse the data. Also, to analyse the poverty levels among the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, the Foster, Greer and Thornbecke (FGT) index and a logit regression model will be used. While multiple regression models will be used to ascertain the impact of rice processing and marketing on income and employment in Gboko Local government

To ascertained the impact of rice processing and marketing on income and employment, two models will be specified, one for income and one for employment

For impact of rice processing and marketing on income generation, the model is specified as follows

$$in = f(qty, price, qual, ac) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3.1$$

Where qty is the quantity produced, price is the price of rice sold or the price of services offered, qual is the quality of rice and ac is the access to credit. The econometric form of model 3.1 is expressed as

$$in = \alpha_0 + \alpha_1 qty + \alpha_2 price + \alpha_3 qual + \alpha_4 ac + \mu - - - - - - - - 3.2$$

α_0= is the intercept of the mode;

α_1- α_4 = are the estimated parameters of model 3.2

$$Emp = f(Edu, qty, price, pf, ddr) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3.3$$

Where Emp is the employment generated by rice processing and marketing, Edu is the educational level of the respondents, qty is the quantity employed, price offered, pf is the production factors and ddr is the demand for rice. The econometric form of model 3.3 is expressed as

$$Emp = \alpha_0 + \alpha_1 edu + \alpha_2 qty + \alpha_3 price + \alpha_4 pf + \alpha_4 ddr + \mu - - - - - - - - 3.4$$

α_0= is the intercept of the mode;

α_1- α_5 = are the estimated parameters of model 3.4

To analyse the poverty dynamics among the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, the Foster, Greer and Thornbecke (FGT) index and a logit regression model will be used to ascertain whether or not engaging in rice processing and marketing has the probability of reducing poverty among the Engine owners, rice marketers, millers, parboilers, winnowers, and sewers/porters in Gboko LGA.

The FGT Index: This index was brought to limelight by Foster, Greer and Thornbecke. The index incorporates the poverty headcount ratio, poverty gap and the depth of poverty.

The headcount ratio which measures the proportion of people below the poverty line is given as:

$$H = \frac{Q}{N} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3.5$$

Where H is value of the headcount ratio to be computed. It is expected to range from 0 to 1; the closer H to 1, the higher the number of engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, are below the determined poverty line.

Q is the number of engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, below the poverty line, and N is the total number of engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, investigated in the study.

Poverty gap which measures the dispersion of the peoples' mean income level from the poverty line is expressed as:

$$P_\alpha = \frac{1}{N} \sum_{j=1}^{N} (\frac{Z - Y_I}{Z})^\alpha \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3.6$$

Where P_α is the poverty gap, Z is the determined poverty line for the study, Y_i is income level of the ith engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, in poor category, α the FGT parameter

value which is expected to range from 0, 1 and 2 and, N denotes the number of engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, studied.

Furthermore, a logit regression model will be used to measure the effect of rice processing and marketing on poverty level among the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters in Gboko LGA, A logit model is a qualitative binary regression type that is widely used for poverty investigations. Studies such as Yusuf,et al (2008), Imran, et al (2009) and Akighir, et al (2011) have used this model to investigate various poverty related issues. Traditionally, the endogenous variable is binary in nature, "1" connotes that the household is poor and "0" connotes that household is not poor.

The general form of the logit regression model is expressed as;

$$ln\left[\frac{P_i}{1-P_i}\right] = Z = \alpha + \beta X_i + \mu \text{--3.7}$$

Z = Represents binary qualitative variable classifying households into poor and non-poor;

X_i = Represents the specific characteristic of the households under investigation; and

μ =is the residual of the logit model.

In this study, the logit regression model to measure the effect of rice processing and marketing on poverty level among engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, is specified as

$$pov = f(Edu, exp, in, qty, price, mkts)\text{---3.8}$$

Where

pov= poverty level of the households estimated in line with the World Bank poverty line of 1.9 dollars. Using the average of ₦1,600 per $ per day, any engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, whose income is below N3,040 per day, he/she is considered poor and any engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, whose income is above N3,040 per day is considered non-poor. Thus, for poor engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, the value of "1" is assigned and for non-poor engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, the value of "0" is assigned respectively.

Edu is the educational attainment level of the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, Exp is the years of experience of the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, in is the income of the engine owners, marketers, millers, parboilers, winnowers, and sewers/porters, Qty is quantity of production, price and the market strategy.

The econometric form of model 3.8 is stated in equation as:

$$pov = \alpha_0 + \alpha_1 edu + \alpha_2 exp + \alpha_3 in + \alpha_4 qty + \alpha_5 price + \alpha_6 mkts + \mu ----- 3.9$$

α_0= is the intercept of the mode;

α_1- α_6 = are the estimated parameters of model 3.10 and the model will be estimated using the maximum likelihood estimation technique.

Results And Discussion

Socio-demographic Characteristics of the Respondents

The socio-demographic characteristics of the respondents in Table 3 reveals a fairly balanced gender distribution, with males accounting for 51.1% and females comprising 48.9%. This suggests that both genders were almost equally represented in the study.

Table 3: Socio-demographic Characteristics

Variables	Options	Frequency (n=368)	Percentage
Sex			
	Male	188	51.1
	Female	180	48.9
Age			
	18-25	2	0.5
	26-35	44	12.0
	36-45	100	27.2
	46-55	153	41.6
	56-65	51	13.8
	Over 65	18	4.9
Educational Level			
	No formal education	26	7.1
	Primary education	112	30.4
	Secondary education	201	54.6
	Tertiary education	29	7.9

Source: Field Survey, 2025

In terms of age, the majority of the respondents fall within the middle-aged categories. Specifically, the 46-55 years age group constitutes the largest proportion at 41.6% respondents, followed by the 36-45 years group at 27.2% respondents. The 56-65 years group accounts for 13.8% respondents, while younger participants aged 26-35 make up 12.0% respondents. Only a small fraction of respondents are within the 18-25 years range (0.5%, or 2 respondents) and those over 65 years (4.9%, respondents), indicating limited participation from both the youngest and oldest age groups. Regarding educational attainment, the majority of respondents have secondary education, representing 54.6%, suggesting a relatively high level of basic educational attainment among the population. This is followed by those with primary education, accounting for 30.4% respondents. A smaller proportion of the respondents have attained tertiary education, comprising 7.9% respondents, while 7.1% individuals reported having no formal education at all. The distribution indicates that while a significant number of respondents have completed at least basic education, higher educational attainment remains limited within the population.

Rice Processing and Marketing Activities in Gboko Local Government

The information in Table 4 shows the various roles involved in rice processing and marketing activities, reflecting the complexity and labour division within the rice value chain. Among the respondents, the largest proportion, 36.7%, are engaged in parboiling. This dominant representation suggests that parboiling is a crucial activity in rice processing, likely due to its central role in improving the quality of rice, making it more marketable and acceptable to consumers. The prominence of parboiling also indicate significant involvement of women, as parboiling is often a female-dominated activity in many rural contexts.

Table 4: Nature of Rice Processing and Marketing Activities

Activities	Frequency	Percent
Marketers	32	8.7
Engine Owners	62	16.8
Millers	85	23.1
Parboilers	135	36.7
Winnowers	25	6.8
Sewers / Porters	29	12.9
Total	368	100.0

Source: Field Survey, 2025

Millers constitute the second largest group, representing 23.1% of the respondents. Milling is a critical step that transforms parboiled or raw paddy into consumable rice, which indicate the importance of millers in adding value to the product and preparing it for final consumption or sale. The relatively high percentage of millers suggests a

substantial investment in rice milling equipment and technology, though it may also reflect varying scales of operation ranging from small-scale to more mechanized systems. Following millers are the engine owners, who make up 16.8% of the sample. Engine owners play a supportive but essential role in ensuring the functionality of processing equipment such as milling machines and parboiling facilities. Their presence indicates a level of mechanization within the industry and the need for technical support services to maintain productivity.

On the marketing side, marketers represent 8.7% of the respondents. While relatively smaller in proportion, marketers are vital in facilitating the movement of processed rice from producers to consumers, ensuring market access, price negotiation, and product distribution. The low percentage might indicate that many processors engage in direct selling or that marketing functions are concentrated among a few individuals or entities. At the lower end of the distribution are sewers/porters and winnowers, accounting for 12.9% and 6.8%, respectively. Sewers and porters provide essential labour in packaging and transporting rice, while winnowers perform the task of removing husks and impurities to ensure grain quality. The relatively small percentages of these groups suggest that they may be hired on a casual or seasonal basis, reflecting their supporting roles in the overall rice processing chain. The data demonstrates that rice processing and marketing involve multiple specialized activities, with parboiling and milling emerging as the most dominant. The structure of participation points to opportunities for targeted interventions, such as improving processing technology, enhancing skill development for millers and parboilers, and strengthening market linkages to optimize the value chain. Moreover, the relatively smaller share of marketers and support labour indicates potential gaps in market access and logistics that could be addressed to improve efficiency and income distribution within the sector.

Income Levels of Rice Processors and Marketers

The income distribution among the respondents presented in Table 5 reveals a significant concentration within the middle-income bracket. Majority of the respondents, accounting for 43.4%, earn between N101,000 and N150,000 weekly, indicating that nearly half of the sample falls within this income range. This suggests a relatively moderate earning capacity among most of the respondents, which may reflect the predominant economic activities or employment types within the study area.

Table 5: Weekly Income of the Respondents

Income Level	Frequency	Percent
Less than N50,000	52	14.1
N50,000 – N100,000	67	18.2
N101,000 – N150,000	160	43.4
N151,000 – N200,000	62	16.8
Above N200,000	27	7.3
Total	368	100.00

Source: Field Survey, 2025

A smaller, but notable, proportion of respondents earn between N50,000 and N100,000, representing 18.2% of the respondents. This group, combined with those earning less than N50,000 (constituting 14.1%), indicates that about 32.3% of respondents are earning on the lower end of the income scale. This sizable portion of lower-income earners highlights the presence of a significant segment of the population that may be financially vulnerable or engaged in less lucrative of the rice processing and marketing value chain. On the higher end of the income spectrum, 16.8% of respondents earn between N151,000 and N200,000, while only 7.3% report earning above N200,000 weekly. The relatively small proportion of high-income earners indicate an income gap within the population, with limited representation of wealthier individuals. This disparity points to possible economic inequality, where a smaller group enjoys higher financial security while a larger portion remains within lower and middle-income categories. The income distribution depicted in Table 5 reflects a population where middle-income earners dominate, but with a considerable presence of both lower and higher-income groups. This pattern suggests moderate economic diversity but also hints at underlying income inequality that may warrant policy attention, especially in efforts aimed at poverty reduction and economic inclusivity.

Determinants of Income from Rice Processing and marketing

The regression analysis presented in Table 6 explores the factors influencing income from rice processing. The model shows a strong overall fit, with an R-squared value of 0.8196, indicating that approximately 81.96% of the variation in income from rice processing is explained by the independent variables in the model. The Adjusted R-squared of 0.7900 confirms the model's robustness after adjusting for the number of predictors. The high F-statistic (12.43364) and its corresponding probability (Prob(F-statistic) = 0.000000) indicate that the overall model is statistically significant at the 1% level, confirming that the explanatory variables jointly have a significant effect on rice processing income.

Table 6: Income from Rice Processing and marketing

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QTY	0.334523	0.072231	4.631292	0.0000
PRICE	0.449235	0.117862	3.811533	0.0054
QUAL	0.256731	0.115315	2.226350	0.0296
AC	0.823417	0.414767	1.985251	0.0428
C	364277.9	32614.61	11.16917	0.0000
R-squared	0.819631	Mean dependent var		377426.2
Adjusted R-squared	0.790009	S.D. dependent var		192027.1
S.E. of regression	181157.0	Akaike info criterion		27.06550
Sum squared resid	1.20E+13	Schwarz criterion		27.11828
Log likelihood	-5015.651	Hannan-Quinn criter.		27.08646
F-statistic	12.43364	Durbin-Watson stat		2.117954
Prob(F-statistic)	0.000000			

Source: Output of E-Views 10

Examining the individual coefficients, the quantity of rice processed (QTY) has a positive and significant effect on income, with a coefficient of 0.3345 and a highly significant p-value of 0.0000. This suggests that an increase in the quantity processed leads to a substantial increase in income, emphasizing the scale benefits in rice processing operations. The price of processed rice (PRICE) also significantly influences income, with a coefficient of 0.4492 and a p-value of 0.0054, indicating that higher product prices directly contribute to increased income for processors. The quality of processed rice (QUAL) shows a positive and statistically significant impact on income, with a coefficient of 0.2567 and a p-value of 0.0296. This implies that improving the quality of processed rice can enhance market value and income, likely due to better consumer preference for high-quality products. Access to credit (AC) is another important determinant, with a coefficient of 0.8234 and a p-value of 0.0428, suggesting that access to financial resources enables processors to invest in inputs, machinery, or labour, thereby boosting their income levels.

The constant term (C) is significant, indicating a baseline income level independent of the explanatory variables. Other diagnostic statistics such as the Durbin-Watson statistic (2.118) suggest that there is no serious autocorrelation problem in the residuals, enhancing the reliability of the model's estimates.

The analysis demonstrates that quantity processed, price, quality, and access to credit are significant determinants of income from rice processing. The strong model fit suggests that interventions targeting these factors such as improving access to credit, enhancing product quality through training, and supporting price stabilization could effectively increase the income levels of rice processors. However, while the results are statistically significant, attention should also be given to the practical challenges such as market access, input costs, and policy support that may influence the sustainability of income improvements in the sector.

Contributions of Rice Processing and Marketing to Employment Generation

Table 7 presents the regression analysis examining the relationship between rice processing and employment, incorporating various independent variables such as education (EDU), quantity processed (QTY), price (PRICE), production factor (PF), and demand for rice (DDR).

Table 7: Rice Processing and Employment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDU	0.834207	0.065284	12.77817	0.0000
QTY	0.017272	0.006723	2.569091	0.0224
PRICE	0.356819	0.088934	4.012178	0.0013
PF	0.050592	0.062827	0.805267	0.4212
DDR	0.891245	0.356782	2.498006	0.0239
C	-0.063354	0.511307	-0.123907	0.9015
R-squared	0.816578	Mean dependent var		2.398922
Adjusted R-squared	0.807216	S.D. dependent var		1.837271
S.E. of regression	1.529228	Akaike info criterion		3.703444
Sum squared resid	853.5667	Schwarz criterion		3.766779
Log likelihood	-680.9888	Hannan-Quinn criter.		3.728598
F-statistic	33.81538	Durbin-Watson stat		1.961716
Prob(F-statistic)	0.000000			

Source: Output of E-Views 10

The model shows a strong explanatory power with an R-squared value of 0.8166 and an adjusted R-squared of 0.8072, indicating that approximately 81.7% of the variation in employment in rice processing is explained by the variables included in the model. The overall model is statistically significant, as evidenced by the F-statistic of 33.8154 and its corresponding probability value of 0.0000, confirming that the joint influence of the independent variables on employment is highly significant.

Among the variables, education (EDU) has a positive and highly significant effect on employment, with a coefficient of 0.8342 and a t-statistic of 12.7782 (p = 0.0000). This implies that higher levels of education strongly contribute to increased employment opportunities in rice processing, possibly by enhancing workers' skills, productivity, and managerial capabilities. The quantity of rice processed (QTY) also positively influences employment (coefficient = 0.0173, t = 2.5691, p = 0.0224), suggesting that increased processing volumes directly create more job opportunities, likely due to greater labour requirements. The price variable (PRICE) shows a significant positive relationship (coefficient = 0.3568, t = 4.0122, p = 0.0013), indicating that higher rice prices may stimulate employment in the sector, possibly by improving profitability and encouraging expansion of processing operations. The demand for rice (DDR) is also positively associated with employment (coefficient = 0.8912, t = 2.4980, p = 0.0239), suggesting that a higher responsiveness of demand to market conditions can lead to increased production and job creation.

In contrast, production factor (PF) show a positive but statistically insignificant effect (coefficient = 0.0506, t = 0.8053, p = 0.4212), indicating that while processing infrastructure may support employment, its direct impact is not robust within this model.

The diagnostic statistics further confirm the model's reliability. The standard error of the regression is relatively low (1.5292), and the Durbin-Watson statistic (1.9617) suggests no serious autocorrelation problem. The findings suggest that education, quantity processed, price, and demand responsiveness are significant drivers of employment in rice processing, while processing facilities appear to have a weaker direct impact. These results highlight the importance of investing in human capital, expanding processing capacity, stabilizing market prices, and enhancing market responsiveness to promote employment in the rice processing sector.

Contributions of Rice Processing and Marketing to Access to Basic Needs

Information concerning the access of rice processors and marketers to essential services and resources is presented in the Table 8 to 12. These tables provide detailed insights into the extent to which individuals involved in rice processing and marketing are able to obtain critical basic needs.

Table 8: Frequency of Feeding in a Day

Number of Times	Before		During	
	Frequency	Percent	Frequency	Percent
None	7	1.90	2	0.50
Once	37	10.00	12	3.26
Twice	189	51.30	153	41.57
Three Times	135	36.68	201	54.61
Total	368	100.00	368	100.00

Source: Field Survey, 2025

Table 8 presents a comparative analysis of respondents' frequency of feeding before and during the period under study. Before the period, the majority of respondents (51.30%) reported eating twice a day, while 36.68% were able to eat three times daily. A smaller proportion, 10.00%, managed to eat only once a day, and a very minimal 1.90% did not eat at all on some days. This distribution suggests that while a significant number had access to at least two meals per day, a considerable portion of the population faced limitations in meeting their daily nutritional needs.

During the period under consideration, there is a noticeable shift in the feeding pattern. The proportion of respondents eating three times daily increased significantly to 54.61%, indicating an improvement in food access and dietary regularity. At the same time, those feeding twice daily decreased to 41.57%, while the number of respondents who ate only once daily dropped sharply to 3.26%. The proportion of individuals who reported not eating at all on certain days also reduced to 0.50%. These changes reflect a positive trend in the respondents' food security situation, suggesting better economic or social conditions that allowed more people to afford regular meals.

Critically, while the improvement in the frequency of feeding is commendable, the fact that over 40% of respondents still feed only twice a day during the period indicates that food insecurity remains a challenge for a substantial segment of the population. The sharp decline in the proportion of those eating once or not at all suggests that interventions or improved circumstances as a result of engaging in food processing and marketing during the period may have positively impacted household food availability.

Table 9: Frequency of Clothing of Rice Processors and Marketers in a Year

Number of Times	Before		During	
	Frequency	Percent	Frequency	Percent
None	5	1.35	0	
Once	56	15.21	32	8.69
Twice	193	52.44	168	45.65
More	114	30.96	168	45.65
Total	368	100.00	368	100.00

Source: Field Survey, 2025

The data in Table 9 present the frequency of clothing purchases by rice processors and marketers before and during the observed period, indicating notable shifts in consumption patterns. Before joining rice processing and marketing, 52.44% of respondents reported purchasing new clothing twice a year, making this the most common frequency. A further 30.96% indicated that they bought clothing more than twice a year, suggesting that about 83.4% of respondents had some capacity for moderate to frequent clothing purchases. Meanwhile, 15.21% of respondents could only afford to buy new clothing once a year, and a small fraction, 1.35%, reported not purchasing any clothing at all during the year. During the period under study, a significant change is observed. The proportion of respondents purchasing clothing more than twice a year increased to 45.65%, indicating an improvement in disposable income or purchasing

power for many. Interestingly, the percentage of respondents who bought clothing twice a year slightly decreased to 45.65%, suggesting a shift of some individuals from the twice-a-year category into more frequent purchasing behaviour. Conversely, the proportion of respondents buying clothing once a year decreased from 15.21% to 8.69%, and notably, no respondent reported being unable to purchase any clothing during this period.

This transition suggests a general improvement in the welfare and economic conditions of rice processors and marketers, as reflected in increased clothing purchases, a commonly used proxy for household welfare. The elimination of the "none" category indicates that, at minimum, all respondents could afford to purchase new clothing at least once within the year. The rise in higher-frequency clothing purchases may also reflect increased profitability or income stability, potentially linked to improved market conditions, better prices, or more effective processing and marketing strategies. The data illustrate a positive shift in the living standards of rice processors and marketers during the period under review. However, while many respondents experienced increased financial capacity, a significant proportion still remained within the lower and moderate purchasing frequency brackets, highlighting the need for continued efforts to further improve income levels and ensure broader economic benefits across the sector.

Table 10: Sponsorship of Wards/Children of Rice Processors and Marketers in Schools

Sponsorship	Before Frequency	Percent	During Frequency	Percent
Sponsor	83	22.55	314	85.32
Do not sponsor	285	77.44	54	14.67
Total	368	100.00	368	100.00

Source: Field Survey, 2025

Table 10 shows a remarkable shift in the ability of rice processors and marketers to sponsor their wards or children in schools before and during the period under study. Before joining rice processing and marketing activities, only 22.55% of respondents reported being able to sponsor their children's education. This reflects a high level of financial hardship among rice processors and marketers before joining the activities, suggesting limited income stability and financial capacity to meet educational expenses. However, during the period under study, there is a dramatic improvement in school sponsorship. The proportion of respondents who could sponsor their children increased significantly to 85.32%, while those unable to do so dropped sharply to 14.67%. This significant positive change indicates that rice processing and marketing activities had a strong impact on the economic wellbeing of the respondents, enabling many of them to afford their children's education.

Nevertheless, the 14.67% of respondents who still cannot sponsor their children even during the period under review indicates that some level of vulnerability persists. This group may include those who face challenges such as limited production capacity, poor access to markets, or inadequate support services. Their continued inability to support education highlight the need for more inclusive policies and targeted support mechanisms to ensure that all participants in the rice sector can fully benefit from its economic opportunities.

Table 11: Access to Medical Services

Nature of medical services	Before Frequency	Percent	During Frequency	Percent
Traditional	25	6.79	8	2.17
Chemist	79	21.46	58	15.76
Clinics	124	33.69	82	22.28
Hospitals	118	32.06	189	51.35
Specialist Hospitals	22	5.97	22	5.97
Total	368	100.00	368	100.00

Source: Field Survey, 2025

The data on access to medical services in Table 11 shows a significant shift in healthcare-seeking behavior between the periods before and during rice processing and marketing activities. Before joining the rice processing and marketing,

33.69% of respondents accessed clinics for their medical needs, making clinics the most utilized form of healthcare. Hospitals followed closely, with 32.06% of respondents seeking care at these facilities. Chemists were also a fairly common choice for 21.46% of respondents, while traditional medical services and specialist hospitals accounted for 6.79% and 5.97% respectively. However, a remarkable transformation is evident in the period during the period. The proportion of respondents accessing hospitals increased sharply to 51.35%, making hospitals the dominant source of healthcare during this period. This shift suggests that more people turned to formal, better-equipped health facilities, possibly due to the seriousness of health issues encountered or heightened awareness of the need for professional medical care. Conversely, the use of clinics dropped significantly to 22.28%, indicating either a reduced capacity of these facilities to handle the increased demand or a preference shift toward hospitals.

Access to chemists also decreased from 21.46% to 15.76%, suggesting a declining reliance on self-medication or over-the-counter treatments in favour of more comprehensive care. The use of traditional medical services saw the most pronounced reduction, from 6.79% to 2.17%, reflecting a possible loss of confidence in alternative medicine during periods requiring more specialized attention. Interestingly, the use of specialist hospitals remained unchanged at 5.97%, which may imply limited capacity or accessibility of such facilities irrespective of changing healthcare demands. Overall, the pattern reveals a clear movement from informal and semi-formal healthcare providers toward more formal medical institutions during the period in question. This shift indicates the critical role of hospitals in providing healthcare during emergencies or health crises. It also highlights potential areas of weakness in the healthcare system, particularly regarding the capacity of clinics, chemists, and traditional services to respond effectively in times of heightened medical need.

Table 12: House Ownership of the Respondents

Type of Ownership	Before Frequency	Percent	During Frequency	Percent
Personal House	32	8.69	178	48.36
Rented	314	85.32	147	39.94
Others	22	5.97	43	11.68
Total	368	100.00	368	100.00

Source: Field Survey, 2025

The data in Table 12 reflects significant changes in house ownership status among the respondents between the "before" and "during" periods under study. Initially, the vast majority of respondents lived in rented accommodations, with 85.32% of them not owning their homes. This indicates that before the intervention or event being studied, homeownership was very low, and most individuals relied on rental housing, possibly due to financial constraints, limited access to housing finance, or socio-economic instability. However, during the period under consideration, there was a remarkable shift towards homeownership. The proportion of respondents who owned personal houses rose sharply from 8.69% to 48.36%. This significant increase suggests a substantial improvement in the economic capacity or access to housing opportunities for a large segment of the population. Such a change may have been influenced by targeted housing policies, economic empowerment programs, access to credit facilities, or improved income levels that enabled more individuals to acquire personal homes.
Conversely, the proportion of respondents living in rented accommodations decreased substantially during the same period, dropping from 85.32% to 39.94%. This decline directly corresponds with the increase in personal house ownership, indicating a positive shift from rental dependence to homeownership for many households. Despite this improvement, a considerable 39.94% still remained in rented houses, pointing to the persistence of barriers that prevent full transition to homeownership for all respondents. Overall, the data reveals a substantial improvement in personal house ownership over time, marking a positive trend in housing security and economic stability for nearly half of the respondents. However, the continued presence of a sizable renting population and those in "other" housing arrangements highlights ongoing challenges in achieving widespread homeownership and the need for sustained housing support measures.

Hypothesis Testing of the Relationship between Poverty and Rice Processing and Marketing From the model $pov = \alpha_0 + \alpha_1 edu + \alpha_2 exp + \alpha_3 in + \alpha_4 qty + \alpha_5 price + \alpha_6 mkts + \mu$ was estimated and the results are presented in the following table

Table 14: Logit Regression Model Results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
EDU	-0.236151	0.130810	-0.444888	0.6564
EXP	-0.028144	0.072931	-0.385900	0.6996
IN	-0.345237	6.345217	-1.515739	0.1296
QTY	-5.182215	0.023311	-0.002222	0.9982
PRICE	-1.403418	1.252108	-1.116752	0.2641
MKTS	-0.114894	0.528658	-0.217332	0.8279
C	0.742678	0.416711	1.782237	0.0747

McFadden R-squared	0.514109	Mean dependent var		0.652291
S.D. dependent var	0.476886	S.E. of regression		0.476578
Akaike info criterion	1.311540	Sum squared resid		82.67391
Schwarz criterion	1.385431	Log likelihood		-236.2907
Hannan-Quinn criter.	1.340887	Deviance		472.5813
Restr. Deviance	479.3445	Restr. log likelihood		-239.6722
LR statistic	6.763162	Avg. log likelihood		-0.636902
Prob(LR statistic)	0.003306			

Obs with Dep=0	129	Total obs	368
Obs with Dep=1	239		

Source: Output of E-Views 10

The table reveals that, there is an inverse relationship between the level of education and poverty level among the rice processors. This suggests that the level of education of the processors has the probability of reducing poverty in the study area. Also, the table shows that, there is a negative relationship between rice processing and marketing experience and poverty levels among rice processors and marketers. This suggests that, the experience in rice processing and marketing has the probability of reducing poverty among rice processors and marketers. Again, the table shows that, there is an inverse relationship between the income from rice processing and marketing and poverty levels among rice processors in the study area. This suggests that, income from rice processing increase the probability of reducing poverty level among rice processors in the study area.

Furthermore, the table has indicated the existence of negative relationship between quantity of rice processed and marketed and poverty level among rice processors in the study area. This suggests that the quantity of rice processed and marketed has the probability of reducing poverty levels in the study area. Again, the price of processed rice and marketed is shown to have an inverse relationship with poverty level of the rice processors. This implies that, the price of processed rice has the probability of reducing poverty among rice processors in the study. Additionally, the table reveals that, there is an inverse relationship between marketing strategies and poverty levels. This further suggests that, marketing strategies has the probability of reducing poverty levels among rice processors in the study area.

The Mac Fadden R-squared of 0.514109 shows that the explanatory variables of the model have explained the probability of poverty reduction by 51.41% and the F-Statistic value of 6.76316 has indicated strong joint effect of the explanatory variables on poverty reduction due to rice processing and marketing activities in the study area.

Conclusion and Recommendations

Rice processing and marketing play a significant role to poverty reduction in Gboko Local Government Area by improving income, creating employment opportunities, healthcare and enhancing access to food. The sector has empowered local communities, particularly women and youth, and contributed to economic diversification. However, its full potential is hindered by challenges such as financial constraints, infrastructure deficiencies, marketing access and technical know-how. To maximize the sector's contributions, there is a need for targeted interventions from both

the government and private stakeholders. Addressing these challenges will not only improve the livelihoods of those involved in rice processing and marketing but also contribute to the broader socio-economic development of Gboko Local Government Area and Benue State as a whole.

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