ASSESSMENT OF THE EFFECT OF RICE FARMING ON SOCIOECONOMIC DEVELOPMENT OF RURAL SETTLEMENTS AROUND ZOBE DAM, KATSINA STATE, NIGERIA.

Iliyasu Mubarak Umar[1], Olanrewaju Yusuf Yahaya[1]* Andrew Egba Ubogu

[1]Department of Geography, Faculty of Earth and Environmental Sciences, Federal University Dutsin-Ma, Katsina State, 5001, Nigeria.

*Corresponding author's email: yyahaya@fudutsinma.edu.ng

ABSTRACT

This study investigates the socioeconomic effects of rice farming on rural communities in the Zobe Dam area. The study used a multi-stage sampling technique to select four Local government areas that share a boundary with Zobe Dam, where rice cultivation is taking place. A total of 325 questionnaires were administered, and a key informant interview was conducted. Systematic sampling was used to select the respondents. Methods of data analysis include the use of tables, frequency counts, pie charts, bar charts, and horizontal bar charts. The finding reveals an overwhelming presence of male farmers (93.2%), indicating that rice farming in the Zobe Dam area is heavily male-dominated, with the majority of farmers falling within the middle-aged group (40–49 years), comprising 45.5% of the total. The results further show that rice farming is predominantly practised by family-oriented individuals, likely household heads who depend on farming for income, food, and family sustenance. Most (59.6%) of the rice farmers have no formal education, indicating a high illiteracy level among the farming population. The socioeconomic benefits were housing improvements such as roofing sheets (86%), cement plastering (77%), tiled floors (66%), which were upgrades from mud houses, and graded roads (88%). There is high ownership of personal/household appliances, such as mobile phones (92%), radios (83%), and fans (18%), indicating basic connectivity and comfort. Farm equipment, such as pumping machines (76%), was widely used, likely for irrigation, while tractors, planters, and dryers (0%) were not. Therefore, youth-focused interventions that offer youth-friendly training, mechanized tools, credit access, and agribusiness models should be developed to encourage younger people to embrace farming as a viable career.

Keywords: Rice farming, Development, Zobe dam, Rural livelihood, and Irrigation.

INTRODUCTION

Agriculture remains the cornerstone of the Nigerian economy, particularly in rural regions, where it is the primary source of income for most of the population. It represents approximately 23% of Nigeria's Gross Domestic Product (GDP) and employs more than 70% of the rural labour force (National Bureau of Statistics [NBS], 2022). The link between agriculture, rural infrastructure, and farmers' income is crucial, given that agriculture is the main form of economic sustenance and the largest source of employment and income generation for most rural dwellers in Nigeria (World Bank, 2014). Among the crops cultivated globally, rice stands out due to its high demand, significant consumption, and crucial role in global food security and economic development. Rice is a vital food crop that is increasingly preferred over many other foods, such as sorghum and millet, as well as most root and tuber crops, including yams and cassava. Rice was ranked third after wheat and maize in terms of worldwide production. Rice has the potential to improve nutrition, boost food security, foster rural development, and sustain land mass. Rice (Oryza sativa) is the major staple food for half of the human population and serves as the primary food for more than 60% of the world's population (Imolehin & Wada, 2000)."

Rice plays a crucial role in Nigeria due to its versatile applications. The ability to increase rice production has contributed significantly to the growth of various communities. Conversely, its inadequate production has resulted in widespread hunger, fatalities, and political instability in numerous nations, including Nigeria (Seck, Diagne, Mohanty, & Wopereis, 2012; Oludare, 2014). Recently, the acceptance of rice as a dietary staple has increased, making it an important crop in several countries across America and Africa (Seck et al., 2012). With evolving consumption trends and urban growth, rice has become a key staple in Nigeria. The importance of rice as a primary crop has triggered multiple government initiatives to enhance domestic production, which encompass various national agricultural programs, such as the Presidential Initiative on Rice (PIR), the Agricultural Transformation Agenda (ATA), and the Anchor Borrowers' Programme (ABP) initiated by the Central Bank of Nigeria (CBN, 2019).

The Agricultural Transformation Agenda, for instance, focused on improving rice value chains by introducing better varieties, expanding irrigation, and supporting access to inputs (Takeshima, Gaiha, & Imai, 2013). The Anchor Borrowers' Programme, launched in 2015, linked smallholder rice farmers to financing and input supplies, significantly increasing local rice production (CBN, 2019). These programs aim to promote domestic rice production, improve rural livelihoods, and reduce poverty. The success of these policies depends heavily on leveraging key infrastructures such as irrigation dams, which provide water for all-season farming, particularly in northern Nigeria, where rain-fed agriculture is limited by erratic rainfall.

Irrigation is critical in transforming agricultural systems in semi-arid regions such as northern Nigeria. According to

the Food and Agriculture Organization (FAO) (2011), irrigation increases productivity, stabilizes output, and enhances household incomes. The Zobe Dam, located in the Dutsin-Ma Local Government Area of Katsina State, was established in the early 1980s. It was constructed to provide water for multiple uses, including irrigation. In areas like Zobe Dam, irrigation has enabled dry-season farming, reduced seasonal unemployment, and enhanced food availability. The socioeconomic impacts of such interventions are multifaceted, including improved household income, access to education, healthcare, and other social services. For instance, Usman and Arene (2010) found that rice farming in irrigated areas significantly improved livelihoods in rural communities.

In recent years, a growing focus on rice production has revitalized the dam's irrigation potential. Rural communities in the Zobe Dam catchment area have turned to rice farming as a means of economic survival, ensuring food security, and alleviating poverty. Zobe Dam Area refers to catchment communities or villages bordered by the Dam in four (4) Local Government areas of Katsina State. These Local Governments were Dutsin-Ma, Safana, Kankia, and Matazu Local Government Areas (LGAs), with various communities, including Makera village in Dutsin-Ma LGA, Gora village in Safana LGA, Raddawa in Matazu LGA, and Tokarchi in Kankia LGA. Water availability for dry-season farming has enabled multiple cropping seasons, enhanced yields, and generated employment along the rice value chain from cultivation

and harvesting to processing and marketing (Ojehomon, Manyong, Ayoola, & Falola, 2017). However, while the dam supports increased rice cultivation, its broader socioeconomic impacts on the local population remain underexplored. This study, therefore, aims to assess how rice farming facilitated by the Zobe Dam affects income levels, employment, education, and the overall quality of life in surrounding rural communities. Understanding the link between irrigation farming and rural development in the Zobe Dam catchment area is essential for formulating and implementing policies and programs that aim to optimise the benefits of rice farming for rural development in Katsina State.

MATERIAL AND METHODS

Zobe Dam is owned and operated by the Nigerian government under the Federal Ministry of Water Resources and is managed by the Sokoto Rima River Basin Development Authority (SRRBDA). It is located in the Dutsin-Ma LGA of Katsina State on the Karaduwa River (Rima sub-basin) (FMWR, 2013). The study area lies between Latitudes $12^O23'0''N$ to $12^O23'30''N$ and Longitudes $07^O28'0''E$ to $07^O29'0''E$. The dam is bordered by four local government areas: Dutsin-Ma, Safana, Kankia, and Matazu (Figure 1.1). The dam is situated along the Katsina-Kankara road close to Makera and Turare villages.

The Dam is an earth-fill structure with a height of 19m and a total length of 2,750m. The dam has a storage capacity of 179 million cubic meters and an irrigation potential of 8,000 hectares. (Wikipedia contributors, 2024).
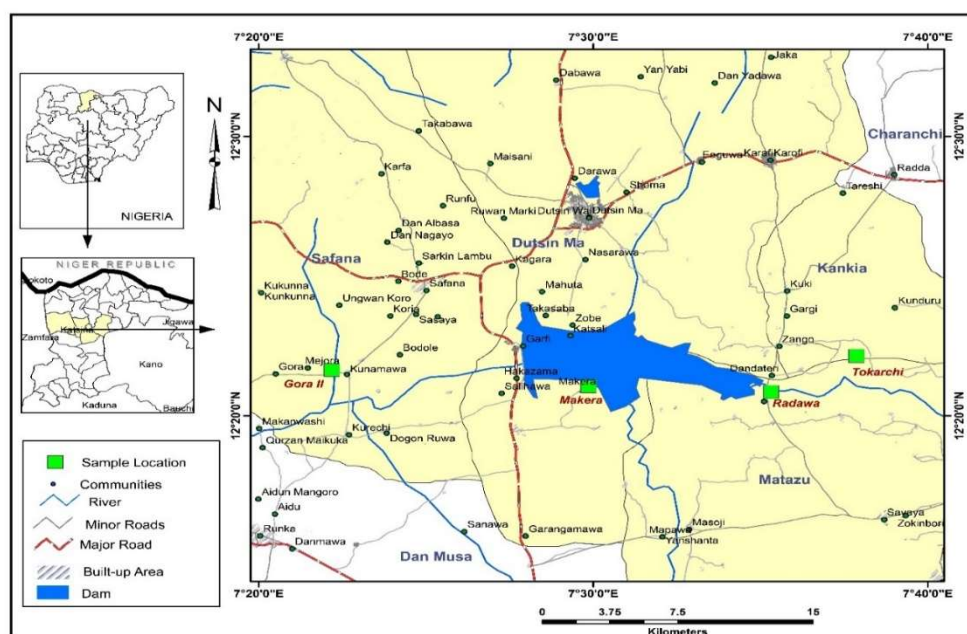

Figure 1: Location of Zobe Dam Catchment in Katsina State.
Source: Department of Geography GIS Lab, FUDMA (2023).

According to Tukur (2010), the climate of the study area can be described as tropical continental, with a mean annual rainfall of approximately 846 mm. The climate varies considerably from month to month and season to season. From December to February is a cool and dry (Harmattan) season. A warm, wet season is experienced from June to September, while the area experiences a hot, dry season from March to May. Generally, the vegetation of the study area combines the characteristic features of the Guinea and Sudan savannah vegetation zones of Northern Nigeria. The Dam is situated on the basement complex rock, which is characterized by highly migmatised gneises that are heavily jointed in its upper parts (Enplan Group, 2013). The southern left side of the dam axis is underlain by laterite originating from the weathering zone, whereas the northern right side is covered with bedrock and sediments consisting mainly of sandy and gravelly loams (Ketare, 2005; Enplan Group, 2013). The construction of Zobe Dam along the River Karaduwa and Bunsuru by the Federal Government in 1983 has significantly boosted irrigation farming and aquatic lives such as fisheries. This has considerably changed the socio-economic life of the people (SRRBD, 1991).

A combination of multi-stage and purposive sampling techniques was employed for this study. The first stage involves the selection of four LGAs that share a boundary with Zobe Dam, where rice cultivation is taking place. In the Second stage, one community/village was purposively selected from each of the four local governments based on the intensity of rice cultivation in the area. The third stage involves selecting sample respondents from the population of rice farmers in each community/village. The four (4) LGAs and villages that use Zobe Dam were selected based on their proximity to the dam and also as a source of water for their rice cultivation for the communities. The areas where rice production is more pronounced were identified and selected. These include Makera village in Dutsin-Ma LGA downstream, Gora community in Safana LGA downstream, Raddawa community in Matazu LGA upstream, and Kunduru village in Kankia LGA upstream (Table 1)

Table 1: Sample Frame and Size with the Distribution of Respondents

Local Govt	Sampled Communities	Number of Registered Farmers	Percentage (%)	Number of Administered	Questionnaire
Dutsin-Ma	Makera	520	30	97	
Safana	Gora	457	26	85	
Matazu	Raddawa	426	24	79	
Kankia	Kunduru	342	20	64	
Total		**1745**	**100**	**325**	

Source: Authors' Fieldwork, 2022.

Following the data collected from the Rice Farmers Association of Nigeria (RIFAN) through the registration process, the number of estimated registered rice farmers in the study area is 1,745. The Yamane (1967) formula was used to determine the sample size. The formula is as follows:

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

Where SS = Sample Size
N = Total Population of Study
e = Level of Significance (error limit) estimated at 5%
A total of 400 respondents was considered the sample size for this study, but only 325 questionnaires were filled out and returned, upon which the analysis was conducted. This indicates a success rate of 81% which is considered adequate for the conduct of the research. Systematic sampling techniques were adopted to administer questionnaires to rice farmers. This was done by systematically selecting the fifth (5th) number of the farmer from the general register of rice farmers, which comprises the names of all registered farmers in the selected communities, as maintained by the Rice Farmers Association of Nigeria. A key informant interview was also conducted to gather essential information from the association's executives. Methods of data analysis include the use of Tables, frequency counts, and charts such as bar, pie, and horizontal bar charts.

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Rice Farmers
The main sociodemographic characteristics considered are age, sex, marital status, gender, educational level, and household size of rice farmers.
The gender distribution of the respondents, as shown in Figure 1, indicates that approximately 93.2% of the respondents were males, while 6.8% were females. The overwhelming presence of male farmers (93.2%) suggests

that rice farming in the Zobe Dam area is heavily male-dominated, which may be attributed to the nature of the farming industry. This reflects traditional gender roles in rural northern Nigeria, where men are typically responsible for field cultivation, land ownership, and decision-making in farming activities. The very low female involvement (6.8%) may be due to limited access to land, financial resources, agricultural inputs, or social restrictions. Women may also be more engaged in subsistence farming, home-based economic activities, or post-harvest roles, such as processing and marketing, rather than in primary cultivation. In an interview, the vice Chairman of the Rice Farmers Association of Nigeria (RIFAN) explained: *"The*

work is tedious; that is why female participation is negligible. He further said that someone can wake up in the morning and move to the farm, and the work can take the whole day, doing one activity out of many on the farm. House commitment of the females and religious limitations have resulted in the poor participation of females in rice farming.'' (Personal communication, 2022). The finding is in agreement with the study by Yahaya and Malik (2021), indicating that farming families in the area are predominantly male-headed households, which reflects the cultural household hierarchy in Katsina State, where females becoming heads of households is very rare and only made possible by the death of the husband.
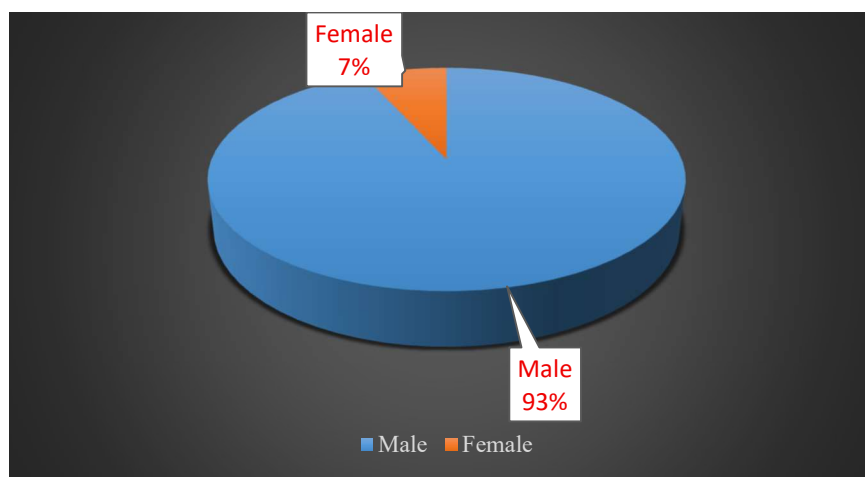

Figure 1: Distribution by Sex of Respondents
Source: Field Survey, 2022.

The age of the respondents used for the study is presented in Figure 2. The dominance of the middle-aged group (40–49 years), comprising 45.5% of farmers in this bracket, indicates that middle-aged individuals predominantly engage in rice farming in the Zobe Dam area. This supports the findings of Olorunfemi, Salami, and Dauda (2021), who argue that middle-aged farmers often dominate agricultural production due to their access to land, resources, and involvement in household decision-making. Their maturity and experience also position them as key adopters of farming responsibilities. Furthermore, individuals in the 30–39 age group (29.2%) also contribute

significantly, likely due to being in their peak productive years and more open to adopting innovations in farming (Adewale & Yusuf, 2020). However, youth participation under (under 30) remains low (15.7%), consistent with studies by Nnadi and Akwiwu (2008), which suggest that young people often migrate to urban centers, prefer white-collar jobs, or view farming as physically demanding and economically unappealing. The older population (50–59 years) represents only 9.5%, likely due to the demanding nature of rice farming, as well as their transition into supervisory or advisory roles (Okeke, Ibeawuchi & Njoku, 2017).
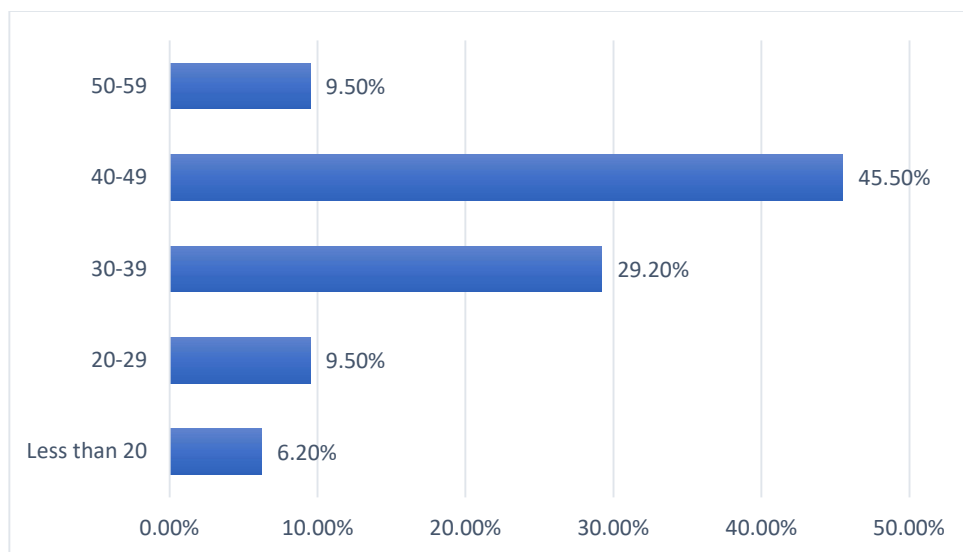
Figure 2: Distribution by Age of the Respondents
Source: Field Survey, 2022.

The result in Figure 3 shows that a vast majority (93.8%) of rice farmers in the Zobe Dam area of Katsina State were married, while only a small fraction (6.2%) was single. It indicates the dominance of married individuals. The high percentage of married farmers suggests that rice farming is primarily engaged in by household heads or individuals with family responsibilities. It also reflects the role of agriculture as a family-sustaining occupation, where farming is not only a livelihood but also tied to long-term stability and income for dependents. The low percentage of single farmers may imply that younger or unmarried individuals are less involved in farming, perhaps due to a lack of interest in non-agricultural jobs or migration to urban areas.
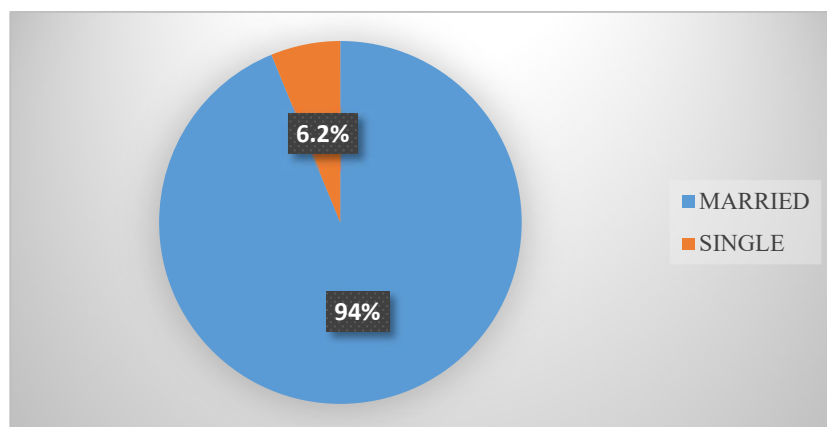

Figure 3: Distribution by Marital Status of the Respondents
Source: Field Survey, 2022.

The educational attainment of respondents, as shown in Figure 4, reveals that 59.6% of the respondents had no formal education, 22.8% had primary education, and 17.5% had secondary education. This indicates a high literacy level in the farming population. This may affect their ability to access agricultural information, adopt modern farming techniques, or understand market dynamics. Only a relatively small proportion of farmers have the basic educational foundation to benefit from extension services or written resources. The data also reflects a narrow spread in educational attainment, with no representation of tertiary or vocational education, which could limit innovation and business orientation in farming. By implication, the low level of education among rice

producers in the study area may hinder their adoption of contemporary innovations that could boost rice production.
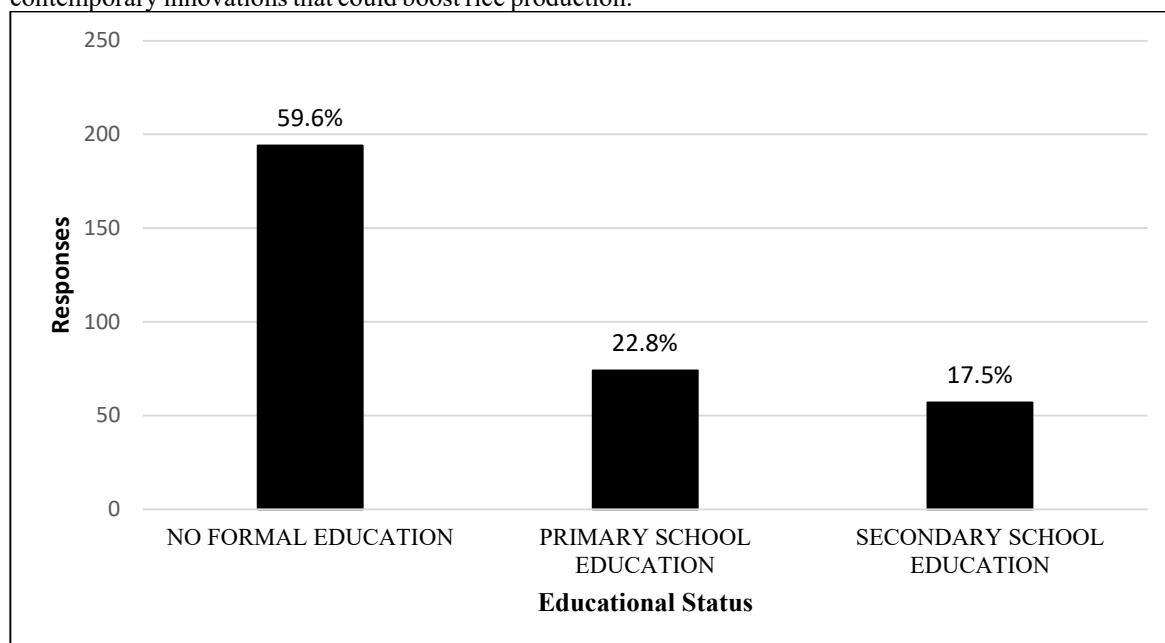

Figure 4: Distribution by Educational Status of the Respondents.
Source: Field Survey, 2022.

Households might serve as an insurance against a shortfall in the supply of farm labour, and the result, as presented in Figure 5, shows that 57.2% of the respondents had a household size of greater than 15. In comparison, 16.9% had fewer than five people as household members. Others were 13.8% and 12% for households with 10-14 and 5-9 persons, respectively. Large households are prevalent, as a majority (57.2%) of rice farmers have households with more than 15 members, indicating that extended family structures were common. This reflects traditional settings where multiple generations or extended family members live and work together, often contributing labour to farming activities. Larger households may provide family labor for farming, reducing the need for hired workers and

increasing productivity during peak seasons, such as planting and harvesting. Conversely, large households may face higher consumption needs, which can strain income from farming — especially when yields are low, or market prices are unfavourable. The result also reveals a low proportion of small households, as only 15.9% have fewer than five members, and 12% have between five and nine. This shows that nuclear family setups are less typical among rice-farming households in the study area. Moderate-sized households (10–14 members), comprising 13.8%, are still large by national and global standards, suggesting high dependency ratios and increased demand on household income.
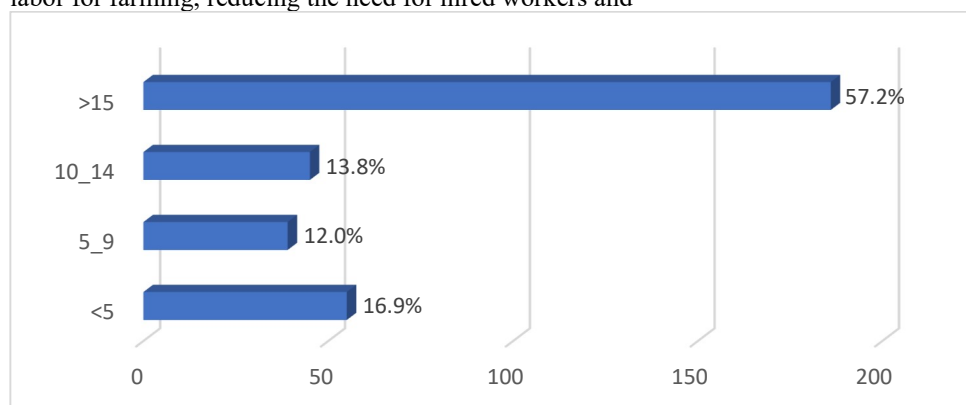

Figure 5: Distribution by Size of Respondents' Household
Source: Field Survey, 2022.

Socioeconomic Benefits of Rice Farming in the Zobe Catchment Area

The socioeconomic benefits of rice farming in the study area include modification of buildings, creation of social facilities (renovation of roads, buildings of school, provision of electricity), sponsoring of children to schools, addition of wives as well as employment generation in the area of repair of pumping machines used for the irrigation purposes, selling of spare parts and accessories of equipment used, craft/wood works, hired labour, and transportation of produce through the distribution channels. The results are presented in Tables 2a, 2b, and 2c. The Tables summarize survey data from 325 households engaged in rice farming, highlighting the benefits and socioeconomic improvements. Among the socioeconomic benefits are housing improvements in the area of roofing sheets (86%), cement plastering (77%), tiled floors (66%), which were upgrades from mud houses. Others are painted houses (21%), serving as few prioritize aesthetics, and the focus is on structural durability. This implies that income is primarily spent on essential housing upgrades, not luxury finishes. Another important benefit is social facilities, which include graded roads (88%), community-led infrastructure development, electricity (6.8%), and Schools (5.2%), representing minimal government/public service investment. By implication, farmers invest in local infrastructure; however, public services often lag behind. Education & employment are reflected in children attending school (84% sponsor 1–5 kids), and income supports education. The result also reveals that 39.7% added wives – possibly linked to higher income, enabling polygamy (cultural or economic status symbol), which implies that economic success may influence social structure.

Table 2a: Benefits of Rice Farming

Modification in Buildings	Frequency for Yes	%	Frequency for No	%	Total	%
Change from mud to bricks	29	9	296	91	325	100
Purchased roofing sheets	280	86	45	14	325	100
Plastered the houses with cement	250	77	75	23	325	100
Floored the houses with tiles	213	66	112	34	325	100
Paint the houses	69	21	256	79	325	100
Build stores for foodstuffs	283	87	42	13	325	100

Source: Authors' Fieldwork, 2022.

Table 2b: Social Benefits

Social Facilities Attracted	Frequency	Percentage
Graded roads	286	88.0
Electricity	22	6.8
School	17	5.2
Total	**325**	**100.0**
Children Sponsored to School	**Frequency**	**Percentage**
1-5	273	84.0
6-10	36	11.1
11-15	16	4.9
Total	**325**	**100.0**
Addition of Wive(s)	**Frequency**	**Percentage**
Yes	129	39.7
No	196	60.3
Total	**325**	**100.0**

Source: Authors' Fieldwork, 2022.

Table 2c: Social Benefits

Employment Generated	Frequency	Percentage
Repair of the pump machine	261	80.3
Craft/woodwork	229	70.5
Hired labour	310	95.4

Source: Authors' Fieldwork, 2022.

Additionally, high levels of hired labor (95.4%) and craftwork (70.5%) indicate that rice farming generates ancillary jobs. This implies that rice farming reduces poverty by funding education and generating employment. The result also reveals that 39.7% added wives – possibly linked to higher income, enabling polygamy (cultural or economic status symbol), which implies that economic success may influence social structure.

Properties/Assets Acquired from Rice Farming in the Zobe Catchment Area
Rice farmers in the study area were able to acquire some properties and assets as part of the benefits provided by engaging in rice farming in the Zobe catchment area. The results are presented in Table 3. Table 3 summarizes survey data from 325 households engaged in rice farming, highlighting the assets they have acquired. Properties/assets acquired from rice farming include household appliances (such as mobile phones, refrigerators, solar energy installations, cable/satellite TV, and washing machines), farm equipment, and vehicles/animals.

Table 3: Properties/Assets Acquired from Rice Farming

Household Personal Appliances	Frequency for Yes	%	Frequency for No	%	Total	%
Refrigerator	16	5	309	95	325	100
Deep freezer	16	5	309	95	325	100
Gas cooker	15	5	310	95	325	100
Television	40	12	285	88	325	100
Solar energy supply	0	0	325	100	325	100
Radio	269	83	56	17	325	100
Fans	60	18	265	82	325	100
Video	55	17	270	83	325	100
Washing machine	0	0	325	100	325	100
Cable satellite	0	0	325	100	325	100
Mobile phone	299	92	26	8	325	100
Farm Equipment/Implements						
Tractor	0	0	325	100	325	100
Pumping machine	246	76	79	24	325	100
Dryer	0	0	325	100	325	100
Planter	0	0	0	0	325	100
Vehicles/Automobiles						
Car	7	2	318	98	325	100
Lorry	0	0	325	100	325	100
Motorcycles	257	79	68	21	325	100
Bicycle	114	35	211	65	325	100
Animal cart	206	63	119	37	325	100
Animals Acquired						
Cows	235	72	90	28	325	100
Sheep/rams	306	94	19	6	325	100
Goats	310	95	15	5	325	100
Donkeys	6	2	319	98	325	100
Chickens	312	96	13	4	325	100

Source: Authors' Fieldwork, 2022.

There is high ownership of household appliances, such as mobile phones (92%), radios (83%), and fans (18%), indicating a basic level of connectivity and comfort. On the contrary, there is low ownership of refrigerators (5%), televisions (12%), and gas cookers (5%), suggesting limited access to high-value appliances. Moreover, zero ownership of solar energy, washing machines, and cable/satellite reflects energy poverty and low adoption of luxury items, which is common in remote rural areas of Nigeria. The finding implies that rice farming income supports basic needs (communication and ventilation), but not yet advanced appliances. Further analysis reveals that farm equipment, such as pumping machines (76%), is widely used, likely for irrigation, while tractors, planters, and dryers (0%) are not. This indicates a low level of mechanization and a reliance on manual labor. This indicates that farmers depend on labor-intensive methods, and limiting productivity and mechanization that could boost output is not within their reach. The possession of vehicles/animals by farmers reveals that motorcycles (79%) and animal carts (63%) are key to their transport logistics. Minimal motorized transport, in the form of cars (2%) and lorries (0%), exists, while there is high ownership of livestock, including goats (95%), chickens (96%), and sheep (94%), indicating diversification into livestock for additional income. The result implies that farmers engage in both rice farming and livestock rearing, but transportation remains a challenge when accessing the market.

CONCLUSION AND RECOMMENDATIONS

Generally, rice farming is an economic activity that offers numerous benefits. These benefits include social or economic benefits derived from association, individual, or government efforts. The individual benefits include: renovation of the house, addition of a new wife, sponsoring children to formal schools, purchasing livestock, and improved mobility to facilitate the conveyance of farm products. Rice farming is a tool for income generation, as it provides job opportunities to unemployed youth, alleviates hunger and poverty in the area, and develops the social well-being of the farmers.

The findings recommend that the youths should focus on interventions such as training, mechanized tools, credit access, and agribusiness models to encourage them to embrace farming as a viable career.

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