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ASSESSING THE ROLE OF RICE PRODUCTION IN ALLEVIATING POVERTY IN KARIM LAMIDO LOCAL GOVERNMENT AREA OF TARABA STATE, NIGERIA

Abstract

The link between rice production and poverty reduction presents a critical challenge, characterized by disparities in access to resources, technology, and markets, which hinder the realization of its full poverty-alleviating potential. This problem necessitates an in-depth examination of the factors that mediate the impact of rice production on poverty reduction, with a focus on equity, sustainability, and rural development. This study assessed the role of rice production in alleviating poverty for sustainable agribusiness in Karim Lamido Local Government Area of Taraba state, Nigeria. The study found that rice production is profitable in the study area. Annual income and the level of education significantly affect poverty. Further, capital, herbicides, labour and farming experience are the factors that affect rice productivity. Pest and diseases attack, high cost of fertilizer, and high cost of transportation, climate change and bad road were the major impediment to the rice farming. It is recommended to promote integrated pest management practices that involve using biological controls, resistant crop varieties, and reduced pesticide use, encourage the use of organic and locally available fertilizers to reduce dependency on expensive chemical fertilizer, improve rural road infrastructure to reduce transportation costs, encourage climate-resilient farming practices and drought tolerant rice varieties.

ПРОЦЕНА УЛОГЕ ПРОИЗВОДЊЕ ПИРИНЧА У УБЛАЖАВАЊУ СИРОМАШТВА У ПОДРУЧЈУ ЛОКАЛНЕ САМОУПРАВЕ КАРИМ ЛАМИДО ДРЖАВЕ ТАРАБА, НИГЕРИЈА

Апстракт

Веза између производње пиринча и смањења сиромаштва представља критичан изазов, који карактеришу диспаритети у приступу ресурсима,

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технологији и тржиштима, који ометају реализацију његовог пуног потенцијала за смањење сиромаштва. Овај проблем захтева дубинско испитивање фактора који посредују у утицају производње пиринча на смањење сиромаштва, са фокусом на правичност, одрживост и рурални развој. Ова студија је проценила улогу производње пиринча у ублажавању сиромаштва за одрживи агробизнис у области локалне управе Карим Ламидо у држави Тараба, Нигерија. Студија је показала да је производња пиринча профитабилна у области истраживања. Годишњи приходи и ниво образовања значајно утичу на сиромаштво. Даље, капитал, хербициди, радна снага и пољопривредно искуство су фактори који утичу на продуктивност пиринча. Напад штеточина и болести, висока цена ђубрива и висока цена транспорта, климатске промене и лош пут били су главна препрека узгоју пиринча. Препоручује се промовисање интегрисаних пракси управљања штеточинама које укључују коришћење биолошких контрола, отпорних сорти усева и смањену употребу пестицида, подстицање употребе органских и локално доступних ђубрива да би се смањила зависност од скупих хемијских ђубрива, побољшање инфраструктуре сеоских путева како би се смањили трошкови транспорта, подстичу пољопривредне праксе отпорне на климу и сорте пиринча отпорне на сушу.

Кључне речи: *пиринач, сиромаштво, фармери, продуктивност, профитабилност, ограничења*

Introduction

The link between rice production and poverty reduction in Nigeria presents a complex challenge, marked by disparities in access to resources, technology, and markets, hindering the realization of rice production's full potential as a poverty alleviation tool. These difficulties necessitate a comprehensive investigation into the factors that influence the effectiveness of rice production in reducing poverty, accounting for socioeconomic disparities. Considering how rice impacts poverty is vital, given its economic importance. This study can provide insights that inform agricultural and poverty reduction policies in Nigeria. It can help government officials make informed decisions to support rice production as a means of poverty alleviation. Eventually, understanding how rice production affects poverty can lead to interventions and programs that directly improve the livelihoods of vulnerable populations in Nigeria. A noticeable knowledge gap in the relationship between rice production and poverty alleviation is the limited focus on the nuanced impact of sustainable agricultural practices on income levels of smallholder farmers in the context of developing countries, including Nigeria. While various studies have explored the general link between agriculture and poverty reduction (Diao et al., 2017), and some have touched on the role of specific crops in this process, such as rice (Zhang & Zhang, 2021), there is a scarcity of comprehensive research that delves into the effectiveness of sustainable rice production practices as a means to alleviate poverty at the household level in Nigeria. Given the country's substantial rice production and the global emphasis on sustainable agriculture as a tool for poverty reduction, further investigation in this area is warranted.

Poverty alleviation is a pressing issue in a country like Nigeria endowed with immense potential and rich resources that paradoxically, harbors a significant portion of its population living below the poverty line. With an estimated population of over two hundred million people, Nigeria is not only the most populated African country but is also marked by persistent and deep-rooted poverty, despite its vast oil wealth and potential for agricultural development (World Bank, 2021). Rice production plays a pivotal role in global agriculture, serving as a staple food for a significant portion of the world's population. Beyond its nutritional importance, rice cultivation has far-reaching socio-economic implications, particularly in the context of poverty alleviation. As the primary food source for over half of the world's population, rice holds a unique position in the battle against poverty, as it directly impacts the livelihoods of millions of smallholder farmers and low-income households (Food and Agriculture organization (FAO), 2021).

In Nigeria, rice production has emerged as a critical driver in the fight against poverty. As the most populous country in Africa, with a rapidly growing population, the significance of rice as a staple food cannot be overstated. Its role extends beyond mere sustenance; rice cultivation holds immense potential to uplift the socio-economic conditions of the rural poor (Ukwuru, 2018). The Nigerian's government prioritized rice production in the past 7 years given its importance as a staple food in Nigeria. According to FAO (2021) significant progress has been recorded so far. For instance, rice production in Nigeria reached a peak of 3.7 million tons in 2017, and was estimated to amount to five million metric tons in 2021. Between 2010 and 2021, rice crop increased overall. In terms of local production, rice is now one of the main cereals produced by Nigerian farmers, and it covers both the upland and the lowland swamps, depending on the variety.

Understanding the multifaceted role of rice production in poverty reduction is essential for aiming to promote sustainable agricultural development and poverty alleviation. This study sets the stage for an exploration of how rice production in Nigeria is serving as a powerful catalyst for poverty alleviation, presenting an opportunity to improve the lives of millions. Specifically, this study assessed the profitable of rice production; ascertains the determinants of poverty, analyse the factors influencing rice production, and identify the constraints faced by rice farmers.

Methodology

The Study Area

This study was carried out in Karim Lamido Local Government Area of Taraba State which is located in North-eastern Nigeria. It is a town bounded to the south by the Benue River and flows through Eastern side of Lau River, it shares boundary with Gombe State to the North, Plateau to the West and Ardo kola Local Government Area to the East. It covers a land mass of approximately 6,620km^2 with a population of 195,844 and lie between latitude 8°33'-10°21'N and longitude 10°21'-11°24'E. It has two distinct seasons namely; rainy which extends from May to October and dry which extends from November to April with an average temperature and precipitation of 28°C and 1058mm respectively.

Figure 1: Map of Karim Lamido Local Government Area
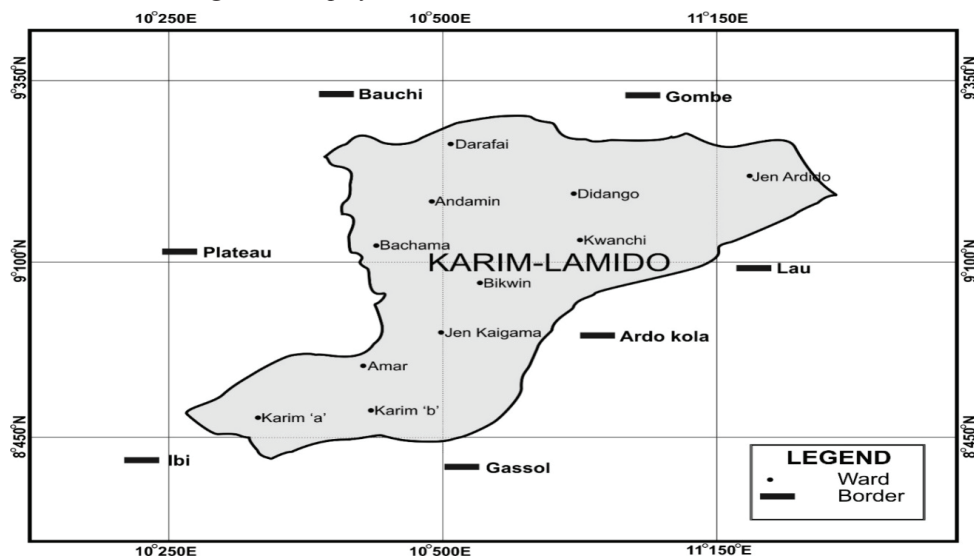
Source: Karim Lamido Local Government Area Secretariat

Sampling Procedure

A multi-stage sampling technique was used to select the rice farmers. Firstly, purposive selection of five wards which are Jen, kwanchi, Didango, Karim 'a' karim 'b' and Didango noted for high production of rice out of the 11 wards, the second stage involved a random selection of four villages were selected from each ward making a total of 20 villages. Thirdly, a random selection of 2% rice farmers was selected from each of the village to make a total of one hundred and twenty (80) rice farmers as the sample size.

Data Collection

Primary data was collected randomly with a well-structured questionnaire. The data collected were the socioeconomic characteristics of rice farmers, cost and return of rice production, determinants of poverty, the factors influencing rice production and the constraints faced by rice farmers in the study area.

Analytical Techniques

Descriptive statistics and inferential statistics were used to analyze the data collected. Descriptive statistics was used to analyze the socioeconomic characteristics and constraints faced by rice farmers. Gross margin was used to analyze assess the profitability of rice production. Logit regression analysis was used to ascertains the determinants of poverty, and ordinary least square was used to assess the factors influencing rice production.

Model specification

Gross Margin Analysis

Gross margin (GM) = TR – TVC -- (1)

TR = Total Revenue

TVC = Total Variable Cost

TR=Q *Py -- (2)

Qy = quantity sold

Py = unit price

Binary Logit Model

Logit (P) =a+ $b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8$ -- (3)

Y= poverty status (poor =0 non poor =1)

b =constant

X_1= annual income (₦)

X_2= quantity of rice (kg)

X_3=number of feeding per day

X_4=quality of house lived in (plastered and roofed= 1, not plastered and roofed = 0)

X_5 = access to clothing (bought clothing in a year=1, not bought in a year = 0)

X_6 = level of education (years)

X_7= dependency ratio (%)

X_8 =access to medical service (access to medical service=1, no access=0)

e= error term

$$\text{Poverty status} = \frac{Average\ annual\ income\ from\ rice\ production}{number\ of\ days\ in\ a\ year\ (365)}$$ -------------------------------------

$$\text{Dependency ratio} = \frac{Total\ number\ of\ peopl\ aged\ between\ 0-4\ and\ above\ 65}{total\ number\ of\ people\ aged\ between\ 15-64} \times 100$$ ---------- (5)

If poverty status is < \$1.90 which is ₦826.84 at the rate of ₦435.18 (Dollar to Naira exchange rate), the farmer is poor and if the poverty status is ≥ \$1.90 then the famer is non poor.

Head Count Index

Poverty was determined by the most widely-used measure which is the headcount index, which simply measures the proportion of the population that is counted as poor, often denoted by P_0. Formally,

$$P_o = \frac{N_p}{N}$$ -- (6)

Where;

N_p = number of poor

N = total population

Multiple Régression Model

$Y=f(X_1,X_2,X_3,X_4,X_5,X_6,X_7,X_8,X_9)$ --- (7)

Where $Y=b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + \mu$

Where Y=Output (in Kg)

b_o=constant

X_1=fertilizer(kg)

X_2=education(years)

X_3=capital (₦)

X_4=farm size(hectares)

X_5=herbicides(kg)

X_6=seed(L)

X_7=labour(man/day)

X_8=experience(years)

X_9=age(years)

μ=Disturbance term assumed to be normally distributed with zero mean and constant variance.

The explicit representation of the model was analysed using four functional forms: the linear, exponential, semi log and double log functions.

    a. linear form: $y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + u$

    b. Exponential form : $Y = b0 + b1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + et$

    c. Semi-log form : $Y = a + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7\log X_7 + b_8\log X_8$

    d. double log form : $\log Y = = a + b_1\log X_1 + b_2\log X_2 + b_3\log X_3 + b_4\log X_4 + b_5\log X_5 + b_6\log X_6 + b_7\log X_7 + b_8\log X_8$

Results and Discussion

Probability of paddy rice production

The profitability of paddy rice farmers in the study area is presented on Table 12. The result shows that total variable cost per hectare was ₦189098.75 and total revenue was ₦687962.5 per hectare. The gross margin obtained was ₦498663.75 per hectare. The return on investment was ₦2.64. This implies that for every ₦1 invested by a farmer in rice production, the farmer is expected to earn ₦2.64 returns. It can be concluded therefore that that paddy rice production in karim lamido Local Government Area in Nigeria was profitable. This result is similar to the findings of Djomo et al. (2020).

Table 12: Gross Margin Per Hectare of Paddy Rice Producers

Item	Cost	Percentage(%)
Variable Cost		
Labour cost	68246.25	43.96
Fertilizer Cost	49475	24.18
Seed Cost	24781.25	16.48
Herbicide Cost	37106.25	8.79
Bag pack Cost	9490	6.59
Total Variable Cost	189098.75	
Revenue		
Total Revenue	687962.5	
Gross Margin(GM)	498663.75	
Return on investment	$\dfrac{GM}{TVC}$	2.64

Source: Authors' computation, 2023

Determinants of poverty

The determinants of poverty are shown in Table 13. The regression in the equation explains 75.93% of the total variation in the household. Annual income and level of education are the two significant variables at 1% and 5% respectively. For a given household, the odds of a farmer being poor decreases with an increase in annual income. This implies that as income increases, farmers may experience improved social standing and participation in decision making processes within their communities, potentially reducing social disparities and exclusion. Also, with a higher income, farmers may find it easier to access credit or loans, which can be used to expand their farming operations or start new income generating activities. This finding agrees with Haanpaa et al. (2019). The odds of a farmer being poor also decreases with an increase in access to education. Education can provide farmers with knowledge and skills to adopt modern and sustainable farming practices, leading to increased crop yields and better farm management, which can help lift them out of poverty. This finding agrees with Hegedus (2018).

Table 13. Logistic Regression of Determinants of Poverty

Poverty status	Odds ratio	Standard error	z ratio
Constant	0.000043	0002566	-1.63
Annual income	-0.000028***	0.00000882	-3.20
Rice quantity	1.003995	0.0082161	0.49
Feeding	0.6773376	1.367364	-0.19
House quality	1.346364	2.292283	-0.17

Clothing	0.8949599	1.262417	-0.08
Level of education	-0.078656**	0.08783335	-2.28
Access to medical service	0.5597052	1.194565	-0.27
Dependency ratio	1.043486	0.0370805	1.20
Pseudo R^2	0.7768		
Chi ^{2}	75.93(0.0000)		

Source: Data analysis result, 2023

Factors Influencing Rice Production

The result of factors influencing rice production in the study area is presented on Table 14. Out of the three functional models, semi-log model was the best as it was observed from the t values as well as appropriateness of their signs with relation to a priori expectation and the coefficient of determination R^2. The findings show that the coefficient of determination (R^2) is 0.679 indicating that 67.9% of the variation in the output of rice is explained by the explanatory variables. Also, this finding shows that capital, herbicides, labour and farming experience significantly affect rice output. Specifically, the coefficient of capital is positive and significant at 10%. This implies that a unit increase in the capital invested will increase rice output by 1311.27kg. This is similar to the findings of Omaore and Oyediran, (2020) revealed that inadequate finance is a significant factor influencing rice productivity. Similarly, the coefficients of herbicides and farming experience are significant at 5%. This implies that a unit increase in the quantity of herbicides and number of years of experience will increase rice output by1663.14kg and 1254kg respectively. The positive relationship between herbicides and rice output is due to the its proper application and the role that its played in control weed infestations, reducing competition for resources and allowing crops to thrive. This is in tandem with Cordelia and Edwin (2022) who revealed that herbicides significantly influence rice productivity. Finally, the coefficient of labour labour is positive and significant at 1%. Increased labour availability especially during peak seasons, can lead to improve crop planting, weeding, and harvesting resulting in higher productivity. This study is in line with the findings of Musaba and Mukwalikulu, (2019). However, the coefficients of seed, fertilizer and farm size were not significant. Therefore, they have no significant effect on rice productivity.

Table 14: Regression result of factors affecting the production of rice in the study area

Variables	Coefficient	Standard error	t-statistics
Constant	-21780.87223	4820.864	-4.518
Fertilizer	477.177	556.923	0.858
Capital	1311.273*	725.221	1.808

Farm size	-2.475	996.707	0.002
Herbicides	1663.142**	726.050	2.291
Seed bags	-51.491	1370.785	0.038
Labour	3298.752***	748.564	4.407
Farming experience	1253.995**	512.052	2.449
Prob > F	0.000		
R^2	0.679		
Adjusted R^2	0.648		

***, **, * significance at 1%, 5% and 10 % respectively
Source: Data analysis result, 2023

Constraints faced by paddy rice farmers

The constraints faced by paddy rice farmers is presented on table 15 in order of their ranking. The result identifies that pest and diseases attacks (88.75%), high cost of fertilizer (72.5%), and high cost of transportation (68.75%) were the major impediment to the rice farming ranking 1st, 2nd and 3rd respectively. This study agrees with the findings of Omoare and Oyediran, (2022) who revealed that pest and disease and corruption ridden fertilizer distribution system affects rice production in Nigeria and it is due to high relative humidity in the rain forest region. This result is also in consonance with the finding of (Ayodele, 2016) who reported that high cost of transportation is a marketing constraint affecting rice production. Poor yield (46.25%) has been attributed to unfavourable climate condition and poor soil quality. This agrees with Abibou et al. (2017). Inadequate financing (41.24%) and nonavailability of quality seeds were other constraints to rice farming. This study is in line with the findings of Akimbeli et al. (2018) who revealed that inadequate funds was one of the constraints to rice production. The least constraints faced by rice farmers in the study area were lack of quality seeds (35%), poor milling equipment (30%), and low market price (18.75%). Similar study was conducted by Yenyinou et al. (2022) who revealed that the lack of a sales market, poor milling equipment, were constraints found only in the north and south of Benin. Low market price caused by poor farm gate price and fluctuation during off season tends to reduce farmer's share and level of profit accruing to them.

Table 15: Distribution of the constraints faced by rice farmers

Constraints	Frequency	Percentages	Rank
Pest and diseases	71	88.75	1st
High cost of fertilizer	58	72.50	2nd
High transportation cost	55	68.75	3rd
Climate change	46	57.50	4th
Bad road network	46	57.50	4th

Inadequate extension services support	44	55.00	6th
Lack of storage facilities	40	50.00	7th
Poor yield	37	46.25	8th
Inadequate finance	33	41.25	9th
Non availability of quality seed	28	35.00	10th
Poor milling equipments	24	30.00	11th
Low market price	15	18.75	12th

Source: Authors' computation, 2023
Note: Multiple responses recorded

Conclusion

This study assessed the role of rice production in alleviating poverty for sustainable agribusiness in Karim Lamido Local Government Area of Taraba state, Nigeria. The study found that rice production is profitable in the study area. Annual income and the level of education significantly affect poverty. Further, capital, herbicides, labour and farming experience are the factors that affect rice productivity. Pest and diseases attack, high cost of fertilizer, and high cost of transportation, climate change and bad road were the major impediment to the rice farming. It is recommended to:

i.   Promote integrated pest management practices that involve using biological controls, resistant crop varieties, and reduced pesticide use.

ii.   Promote the use of organic and locally available fertilizers to reduce dependency on expensive chemical fertilizer.

iii.   Improve rural road infrastructure to reduce transportation costs.

iv.   Promote climate-resilient farming practices and drought tolerant rice varieties.

v.   Advocate for road maintenance and construction projects in rural areas.

vi.   Strengthen agricultural extension services to provide farmers with knowledge and guidance.

vii.   Establish community based and centralized storage facilities to reduce post-harvest losses.

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ЕКОНОМИКА