EFFECTS OF NIRSAL ON RICE FARMERS' INCOME IN NORTH-CENTRAL NIGERIA

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ABSTRACT
The study assessed the effects of NIRSAL on rice farmers income in North-Central Nigeria. A multi-stage sampling procedure was employed for selection of the 486 respondents. Primary data were collected with the use of well-structured questionnaires and analyzed using net farm income, farmers household income exchange, and quantile regression analysis. The estimate of profitability shows that rice production is a profitable venture in North-Central Nigeria, with beneficiaries and non-beneficiaries making a net farm income of ₦2,508,645.97 and ₦1,628,784.17, respectively. The result revealed a 32% increase in income of beneficiaries, which is attributed to the impact of the NIRSAL credit facilities on farmers' income. The result of quantile regression analysis at 50% revealed that household size and age had a positive coefficient and were significant at a 1% probability level (P<0.01) for non-beneficiaries, beneficiaries, and pooled data. Farming experience had a negative coefficient and was significant (P<0.10) for pooled data. While the results at the 75% quantile revealed that household size had a positive coefficient and was significant at 1% and 5% probability levels for pooled data and non-beneficiaries, respectively. Age had a positive coefficient and was significant (P<0.01) for non-beneficiaries and pooled data. Level of education had a positive coefficient and was significant (P<0.05) for non-beneficiaries. Membership of the Cooperative Society had a positive coefficient and was significant (P<0.05) for beneficiaries. The study hereby concludes that NIRSAL has an impact on the income of smallholder rice farmers in north-central Nigeria and, as a result, recommends that NIRSAL should intensify as well as expand their scope of influence to ensure the impact the scheme has on farmers income reflects or translates to food self-sufficiency.

Keywords: NIRSAL, rice, farmers, income, beneficiaries

INTRODUCTION

Nigerian farmers cultivate many staple food crops like maize, wheat, millet, sorghum, and rice, among others. Globally, Nigeria ranks 16th in rice production, with China leading the way with over 210 million tonnes of paddy rice in 2017, followed by India with milled rice consumption of over 210 million tons. Moreover, it is the most important staple food crop in Nigerian diets because its consumption has no religious, cultural, tribal, or geographical barrier (Rukwe *et al.,* 2023). This makes it an important traditional crop in Nigeria and the country's second-largest grain crop after maize. Nigeria leads in paddy rice production in Africa, producing 6.7 million tonnes with an average yield of 2.2 tonnes per hectare (FAO, 2023). Although rice cultivation extends across all agro-ecological zones in Nigeria, production is concentrated in the northern states.

The diversity of agro-ecological production systems allows Nigeria's food sub-sector to display a wide variety of staple crops. Rice has grown to a position of prominence among the key food crops such as sorghum, millet, maize, tubers, legumes, and others (Vihi *et al.,* 2020). Challenges such as low agricultural investment and limited access to financial processing and marketing difficulties affect Nigeria's rice productivity and negatively impact small-scale rural farmers income (Saheed *et al.,* 2018).

Furthermore, smallholder farmers, who are the major rice producers in Nigeria, face numerous obstacles such as inadequate inputs, outdated production methods, high input costs, land degradation, and inaccessibility to credit (Osanyinlusi and Adenegan, 2016). As a result, as these. In response to the financial gap, the Central Bank of Nigeria (CBN) in 2011 established the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) to de-risk agricultural financing and stimulate investment in the sector (CBN, 2015). As a non-bank financial institution, NIRSAL employs a multifaceted approach encompassing credit risk guarantees, insurance products, technical assistance, and value chain development to enhance agricultural productivity and farmers' income (NIRSAL, 2020).

The impact of NIRSAL on farmers income has been both promising and contested. While many beneficiaries have reported improved access to credit and inputs, challenges persist in areas such as fund disbursement efficiency, accountability, and equitable coverage of farmers across regions. Evaluating NIRSAL effectiveness is essential in understanding its role in transforming agricultural livelihoods, particularly for smallholder farmers who remain at the base of Nigeria's food system.

It's about a decade of intervention, but only a few organizations and educational institutions have researched and made projections on NIRSAL's performance. No particular study has elucidated the impact of NIRSAL on rice farmers income in the study area, thus resulting in a literature gap. This research was carried out to assess NIRSAL's effects on smallholder rice farmers' income in North-Central Nigeria in order to close up the literature gap that exists since there are just a few works, especially in the study area, on the crop of interest (rice). The specific objectives were to:

i. estimate the costs and return of rice production among NIRSAL beneficiaries and non-beneficiaries in the study area;
ii. assess the influence of the NIRSAL scheme on the income of beneficiaries compared to non-beneficiary smallholder rice farmers and
iii. Examine the socio-economic determinants affecting the income of NIRSAL beneficiaries and non-beneficiaries.

METHODOLOGY

The study area

The study was conducted in North-Central Nigeria. The area is made up of Benue, Kogi, Kwara, Niger, Nasarawa, and Plateau States and the Federal Capital Territory (FCT). It is bordered by Northwest Nigeria in the north, Northeast Nigeria in the east, Southwest Nigeria and Southeast Nigeria in the south, and Northwest Nigeria in the west. The zone occupies about 296,898 km² in land area, with a population of about 22,887,250 people as of 2016 (National Bureau of Statistics (NBS), 2016). It is located between longitudes 20°30′ to 10°30′ East and latitudes 6°30′N to 11°20′ North. The zone has the wet season from April to October and the dry season from November to April. The annual rainfall ranges from 1,000 to 1,500 mm, with an average of about 187 to 220 rainy days, and the average monthly temperature ranges from 21°C to 37°C. The

Forest Savannah Mosaic, the Southern Guinea Savannah, and the Northern Guinea Savannah make up the vegetation. The zone is characterized by extensive swampy lowland areas along the valleys of rivers Niger and Benue and large hills, mountains, plateaus, and deep valleys. The vegetation, soil, and weather patterns of the zone favor the cultivation and production of wide varieties of foods and industrial and cash crops of various types. The available rivers and dam enable irrigation farming during the dry seasons. More than 75% of the over 40 ethnic groups who live within the zone are rural dwellers engaged in farming, hunting, fishing, trading, and artisan work (Isonguyo and Adewumi, 2021). Rice, maize, millet, sorghum, yam, potatoes, cassava, cowpea, soybean, and vegetables are the major crops grown in the zone. The ethnic groups, which include the Egbira, Koro, Gade, Idoma, Tiv, Nupe, Kadara, Kambari, Kamuku, Agatu, Basa, Eggon, and Gbagyi ethnic groups, among others.

Sampling Technique and Sample Size

This study employed a multi-stage sampling procedure. In the first stage, Federal Capital Territory, Benue, and Nasarawa States were purposively selected from North-Central Nigeria, based on the high level of involvement in rice production activities across the rice value chain and on the basis of the presence of NIRSAL in the study area. In the second stage, six (6) Local Government Areas, including Abaji, Gwagwalada, Karu, Lafia, Markudi, and Oturkpo, were randomly selected from the three states. In the third stage, three (3) wards were randomly selected from each of the Local Government Area Councils, making a total of eighteen (18) wards. In the fourth and final stage, a proportionate random sampling formula indicated in equation (1) was used to select a total sample size of four hundred and eighty-six (486) respondents comprising two hundred and forty-six (246) NIRSAL beneficiaries and two hundred and forty (240) non-NIRSAL beneficiaries. The sampling frame for the NIRSAL beneficiaries was six hundred and thirty-seven (637), while that for non-NIRSAL beneficiaries was six hundred (600), making a total sample frame of one thousand two hundred and thirty-seven (1237). The study used Yamane (1967) in Otabor and Obahiagbon (2016) for estimating sample sizes, as shown in Table 1.

$$n = \frac{N}{1 + -N(e^2)} = 246 \text{ and } 240$$

Where,

n = Sample Size (Units),

N= Sample Frame/Population size (Units), and

e = Level of Precision (5%).

Table 1: Sampling Procedure and Sample Size of the Respondents in the Study Areas

			Beneficiaries			Non-Beneficiaries		
States	**/Area CouncilsLGA**	**Wards**	**Sample Frame**	**Proportion**	**Sample Size**	**Sample Frame**	**Proportion**	**Sample Size**
FCT	Abaji	Yaba	34	0.05	13	24	0.04	10
		Ebaji	50	0.08	19	49	0.08	20
		Pandaji	29	0.05	11	22	0.04	9
	Gwagwalada	Paiko	23	0.04	9	20	0.03	8
		Gwako	21	0.03	8	43	0.07	17
		Dukpa	37	0.06	14	31	0.05	12
Nassarawa	Karu	Maraba	49	0.08	19	34	0.06	14
		Nunku	40	0.06	15	42	0.07	17
		Angwan Zaria	44	0.07	17	24	0.04	10
	Lafia	Adadu	34	0.05	13	36	0.06	14
		Biye	44	0.07	17	32	0.05	13
		Dare	26	0.04	10	31	0.05	12
Benue	Markurdi	Ugboko	29	0.05	11	45	0.08	18
		Oiji	24	0.04	9	37	0.06	15
		Ojantele	23	0.04	9	25	0.04	10
	Oturkpo	Shorov	47	0.07	18	43	0.07	17
		Etulo	46	0.07	18	39	0.07	16
		Mbaityough	37	0.06	14	23	0.04	9
Total			637	1	246	600	1	240

Source: Authors Computation from NIRSAL and ADP (2023)

Method of Data Collection

Cross-section data was collected from farmers with the use of well-structured questionnaires and used for this study. Trained enumerators from ADP (Agricultural Development Programme) were engaged for data collection using a well-structured questionnaire.

Method of Data Analysis

Net farm analysis (NFI), farmers' household income exchange (FHIE), and quantile regression analysis were deployed for data analysis in this study.

Net farm income analysis is a budgeting tool used in evaluating the costs and returns in rice farming. Net farm income is expressed as follows:

$NI = TR - TC$ ……...……...(1)

Where;

Net farm income (naira),

Total Revenue (Naira), and

Total Cost (Naira).

The fixed costs were rent charges on fixed inputs, and depreciation on fixed costs was calculated using the straight-line method:

Depreciation $\frac{p-s}{N}$ ……...(2)

Where:

P = Purchased Price

S = Salvage Value

N = Number of years of the assets.

To know the strength and financial position of the NIRSAL beneficiaries and non-beneficiaries, the rate of return on investment and the gross and operating ratios were considered.

The rate of returns on investment in a rice farm, which is a measure of financial success or failure of investment, can be estimated using the formula

$$Average\ rate\ of\ return\ on\ investment\ (ARRI) = \frac{Total\ Revenue}{Total\ Cost} \quad (3)$$

Gross ratio shows the profitability or otherwise of a farm by comparing its total revenue to total costs. A higher ratio, greater than 1, indicates profitability of the enterprise, while a lower ratio, less than 1, shows that the enterprise is not profitable.

$$\text{Gross Ratio} = \frac{Total\ Variable\ Cost}{Total\ Revenue} \quad (4)$$

An Operating Ratio (OR), according to Olukosi and Erhabor (2005), is the total variable costs divided by the total revenue, as shown in equation (5).

$$\text{Operating Ratio} = \frac{Total\ Revenue}{Total\ Cost}$$

Operating ratio shows the efficiency of a farm's management by comparing the total operating expense of a farm to net sales. The operating ratio shows how efficient a farm's management is at keeping costs low while generating revenue or sales. The smaller the ratio, the more efficient the company is at generating revenue versus total expenses. An operating ratio of less than 1 therefore indicates that the farmer is efficient in managing costs, while an operating ratio of 1 or greater than 1 indicates inefficiency in cost management.

Farmer Household Income Exchange

Following Kuswanto (2019), farmers' household income exchange (FHIE) was used to analyze the influence of NIRSAL on the income of rice farmers. This was done by comparing the total income received by the farmers with the total household expenditure. An FHIE>1 shows that the farm households' incomes are sufficient to cover their expenditure and even save to reinvest. However, if FHIE is less than 1, it shows that the farm households are not able to cover their expenditures. Thus, farmers with FHIE > 1 are more likely to meet their consumption and business needs. The formula for FHIE is presented in the equation as

$$FHIE\ \frac{Y}{E} \quad 6$$

Where;
FHIE = Farmer Household Income Exchange,
Y = Total Income, and
E = Total Expenditure.

Rice farmers' revenue is derived from rice cultivation as well as other farming and non-farming activities. Mathematically the income is formulated as seen in equation (7).

$$Y = Y_{sf} + Y_{of} + Y_{nfa} \quad 7$$

Where;

Y = Farmers Income,
Y_{sf} = Income from Rice Farming,
Y_{of} = Income from Other Agric businesses, and
Y_{nfa} = Income from non-farm activities.

According to Kuswanto (2019), a farmer' household spending comprises production expenditures (such as seed, fertilizers, land rent, and agrochemicals) as well as extra capital and household consumption (food, processed food, housing, clothing, health, education, recreation, sports, and others). Agricultural expenditure, non-agricultural expenditure, and home consumption expenditure are the three types of spending that farmers incur. Mathematically the expenditure is formulated as seen in equation (8).

$$E = E_{sf} + E_{of} + E_{nfa} \qquad 8$$

Where;

E = Farmers expenditure,

E_{sf} = Expenditure on Rice Farming Businesses,

E_{of} = Expenditure on other Farming Businesses, and

= Expenditure on non-Farming activities.

Quantile Regression Analysis

A multiple linear regression was used as a piece of baseline information, and quantile regression was employed to determine and analyze socio-economic factors influencing the income of rice farmers. Farmers income was used as a proxy for welfare because it has a direct correlation with welfare and also because data on it is simple and readily available. In quantile regression, conditional 50th (middle income) and 75th (high income) quantiles for income were approximated with respect to the independent variables. The basic quantile regression model is specified as a linear function of explanatory variables. The model is stated explicitly as

$$Y_I = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \eta_I \qquad 9$$

Where,

Y_I = Income of Rice Farmers (in naira),

i = Number of Independent Variables,

ß0= Constant Term,

ß1 – ß4 = Regression coefficients,

X1 = Household Size (Total Number of Persons) ,

X2 = Age of the Farmers (Years),

X3 = Level of Education (in Years),

X4 = Membership of Cooperative Society (yes = 1, no = 0)

X5 = Farming experience (years),

Ui = Error Term.

RESULTS AND DISCUSSION

Costs and Return of Rice Production among NIRSAL Beneficiaries and Non-Beneficiaries in the Study Area

The costs incurred on various resources used and the benefits received from the sales of the rice produced were estimated based on the market price at the period under consideration (2023/2024 farming season) and are presented in Table 2. The total revenue for beneficiaries, non-beneficiaries, and pooled was estimated to be ₦2,980,031.53, ₦2,035,710.21, and ₦2,507,870.87, respectively. The total variable cost for NIRSAL beneficiaries and non-beneficiaries, pooled, was estimated to be ₦385,805.12, ₦340,514.55, and ₦363,159.83, respectively. The fixed costs for beneficiaries, non-beneficiaries, and pooled costs were estimated at ₦85,850.44, ₦66,411.49, and ₦75,995.97, respectively. The gross margin for beneficiaries, non-beneficiaries, and pooled was estimated to be ₦2,594,226.41, ₦1,695,195.66, and ₦2,144,711.04, respectively. On average, beneficiaries, non-beneficiaries, and the pooled had net farm incomes of ₦2,508,645.97, ₦1,628,784.17, and ₦2,068,715.07 per hectare of rice produced in the study area, respectively.

The study also used some other financial analyses, like operating ratio (OP) and gross ratio (GR), to further reveal the profitability or otherwise of rice farmers in the study area. The gross ratio for beneficiaries, non-beneficiaries, and pooled was ₦6.3, ₦5.0, and ₦5.5, with operating ratios of 0.1 kobo, 0.2 kobo, and 0.1 kobo, respectively. The gross ratios for both farmer groups are greater than one, indicating that both farmer groups are able to cover their expenses and even make a profit. The operating ratios for both farmer groups were less than one, also implying that both farmer groups are able to keep their expenses below their revenue. A higher gross ratio indicates that the business has a higher profit margin, while a lower operation ratio also correlates with higher profitability, as the farm business generates more revenue relative to expenses. Though the ratios for both farmer groups indicate that they are both profitable, the gross ratio for NIRSAL beneficiaries is higher; in the same vein, the operating ratio for NIRSAL beneficiaries is lower, both implying higher profitability, which could be attributed to their relationship with NIRSAL. These findings are in line with Nneka et al. (2019), Offor et al. (2020), Ebrima *et al.* (2020), and Ibrahim *et al.* (2021), who posited that rice production was a profitable enterprise.

Furthermore, Table 2 revealed a net farm income difference of ₦879,861.80 between beneficiary farmers and non-beneficiary 'farmer groups. The net farm income difference represents about a 35% increase in profit. This suggests that the NIRSAL had a positive impact on the income of the beneficiaries; hence, the profit of the beneficiaries was greater than that of the non-beneficiaries. This suggests that rice production by the NIRSAL beneficiaries was more profitable than that of non-beneficiaries.

Table 2: Gross Margin Analysis of Rice Production among NIRSAL Beneficiaries in Comparison with Non-Beneficiaries in the Study Area

Cost/Returns	Unit	Beneficiaries	Non-Beneficiaries	Pooled
Revenue				
Quantity Sold	Naira	2,831,883.69	1,976,727.90	2,404,305.79
Home Consumption	Naira	148,147.84	58,982.31	103,565.08
Total Revenue (A)	Naira	2,980,031.53	2,035,710.21	2,507,870.87
Inputs				
Seed Cost	Naira	18,353.33	17,936.07	18,144.70
Fertilizer Cost	Naira	142,453.33	138,276.26	140,364.79
Agro-Chemical cost	Naira	36,384.44	33,593.61	34,989.03
Input Cost		197,191.11	189,805.94	193,498.52
Hired Labour				
Land Preparation	Mandays	15,305.56	15,062.79	15,184.17
Planting	Mandays	11,684.44	10,682.65	11,183.55
Fertilizer Application	Mandays	6,097.78	5,324.20	5,710.99
Chemical Application	Mandays	5,747.78	4,868.72	5,308.25
Weeding	Mandays	25,448.89	20,415.14	22,932.02
Harvesting	Mandays	12,406.67	9,031.20	10,718.93
Threshing	Mandays	16,697.78	10,493.15	13,595.46
Storage	Naira	5,331.11	5,035.39	5,183.25
Total Hired Labour Cost		98,720.00	80,913.24	89,816.62
Family labour				
Land Preparation	Mandays	9,740.00	10,075.34	9,907.67
Planting	Mandays	6,273.33	4,760.27	5,516.80
Fertilizer Application	Mandays	4,743.11	3,615.07	4,179.09
Chemical Application	Mandays	6,283.33	6,029.68	6,156.51
Weeding	Mandays	11,760.44	11,001.37	11,380.91
Harvesting	Mandays	8,957.78	7,203.20	8,080.49
Threshing	Mandays	9,225.56	8,198.63	8,712.09
Storage	Naira	3,926.67	3,689.50	3,808.08
Total Family labour Cost		60,910.22	54,573.06	57,741.64
Total Labour Cost		159,630.22	135,486.30	147,558.26
Transportation	Naira	19,148.00	10,816.61	14,982.31
Loading/Off	Naira	8,130.22	3,305.25	5,717.74
Total Fee and Commission	Naira	1,705.56	1,100.46	1,403.01
Total Variable Cost (B)		385,805.12	340,514.55	363,159.83
Fixed Cost				
Land Cost	Naira	27,528.89	25,216.89	26,372.89
Depreciation on Asset				0.00
Water Pump	Naira	6,285.56	6,611.87	6,448.71
Sprayers	Naira	10,640.67	7,748.40	9,194.53
Hoe	Naira	898.89	568.95	733.92
Cutlass	Naira	882.00	1,668.72	1,275.36
Power Tiler	Naira	39,344.44	24,596.65	31,970.55
Total Depreciation Cost		58,051.56	41,194.60	49,623.08
Total Fixed Cost (C)		85,580.44	66,411.49	75,995.97
Total Cost (D)		471,385.56	406,926.04	439,155.80
Gross Margin (E=A-B)	Naira	2,594,226.41	1,695,195.66	2,144,711.04
Net Farm Income (F=A-D)	Naira	2,508,645.97	1,628,784.17	2,068,715.07
Gross Ratio (A/D)		6.3	5.0	5.5
Operating ratio (B/A		0.1	0.2	0.1
% Change in NFI				35%

Source: Field Survey (2024)

Effect of NIRSAL Credit Facilities on Rice Farmers Income in the Study Area

Table 3 shows that the total income of the non-NIRSAL beneficiaries and beneficiaries was ₦3,065,159.69 and ₦4,096,032.58, respectively. The table also revealed farmers household income exchange (FHIE) of 1.09 and 1.59 for non-NIRSAL beneficiaries and beneficiaries, respectively. The FHIE for both the beneficiary and non-beneficiary farmer groups was above 1, implying that the income of both farmers was enhanced. However, that of beneficiaries (1.59) is higher than that of non-beneficiary 'farmers (1.09). This improvement in income could be attributed to their participation in NIRSAL facilities. This is in line with the findings of Balogun et al. (2021) and Akinwale (2021), who posited that programs designed to provide credit to farmers helped improve their welfare in Nigeria. The result revealed a 32% increase in the welfare of beneficiaries, which may be attributed to the impact of the NIRSAL credit, suggesting that the NIRSAL credit facilities improved the welfare of beneficiary farmers in the study area.

Table 3: Effect of NIRSAL on Rice Farmers Income

Items	Non-Beneficiaries	Beneficiaries
Income from Rice Farming Businesses	1,628,784.17	2,508,645.97
Income from Other Farming Businesses	1,304,666.67	1,433,728.07
Income from Non-Farming Businesses	131,708.86	153,658.54
Expenditure from Rice Farming Businesses	1,391,833.33	1,036,341.46
Expenditure from Other Farming Businesses	1,025,833.33	1,076,016.26
Expenditure from Non-Farming Businesses	98,926.04	101,385.56
Total Income	3,065,159.69	4,096,032.58
Total Expenditure	2,824,592.71	2,583,743.28
Farmer Household Income Exchange	1.09	1.59
% Change in income	32%	

Source; Field Survey (2024)

Socioeconomic Factors Influencing the Income of Rice Farmers

Quantile regression analysis of factors influencing the income of rice farmers for beneficiaries and non-beneficiaries of NIRSAL credit facilities in the study area is presented in Table 4. Quantile regression analysis helps to examine or analyze the relationship between variables at different points. For this study it shows the factors affecting income, which is used as a proxy for welfare at the 50% and 75% quantiles of the rice farmers in the study.

From the results of the 50% quantile, household size had a positive coefficient and was significant at a 1% probability level (P<0.01) for pooled data, non-beneficiaries, and beneficiaries. This means that adding one person to a household increases income and eventually welfare by 0.03, 0.046, and 0.032 units for pooled data, non-beneficiaries, and beneficiaries, respectively. Age had a positive coefficient and was significant (P<0.01) for pooled data and non-beneficiaries. This suggests that a unit increase in age led to about a 0.005 and 0.009 unit increase in welfare for pooled data and non-beneficiaries, respectively. This suggests that as the farmers get older, their income status and eventually welfare improve, possibly because of profit they would have made over the years. This result opposed the

finding of Jarita and Nur (2020), who found that at the 50th quantile of household size and age, microfinance women participants contribute negatively and significantly to per capita income at a 10% significance level. Farming experience had a negative coefficient of 0.004 and was significant (P<0.10) for pooled data. Apparently, the negative coefficient indicates that a younger farmer tends to perform better as opposed to an older farmer with respect to income generation. This implies that younger farmers are more productive and efficient in enhancing their profitability since they are more competitive and agile and can learn and adopt new technology faster than traditional or old farmers. Hence, rice production tends to be more successful for younger farmers due to their easy acceptance and application of new agricultural technologies and access to credit through NIRSAL. This finding is in line with that of Casinillo (2023), who found that at the 50th quantile, years of farming was negative and significantly influenced the income of rice farmers. Similarly, Mazzocchi *et al.* (2020) mentioned that young farmers are more active and are more likely to diversify agricultural techniques than traditional farmers.

The results at the 75% quantile reveal that household size had a positive coefficient and was significant at 1% and 5% probability levels for pooled data and non-beneficiaries, respectively. This means that adding one person to a household increases income (welfare) by 0.015 and 0.018 units for pooled data and non-beneficiaries, respectively. Age had a positive coefficient and was significant (P<0.01) for pooled data and non-beneficiaries. This suggests that a unit increase in age led to about a 0.005 and 0.01 unit increase in income for pooled data and non-beneficiaries, respectively. This suggests that as the farmers get older, their income status improves, apparently due to accumulated profit over the years. This result contradicts the finding of Jarita and Nur (2020), who reported that at the 75th quantile, age does not significantly affect the household income of microfinance women participants. Level of education had a positive coefficient and was significant (P<0.05) for non-beneficiaries. This suggests that a unit increase in level of education led to about a 0.034 unit increase in income of non-beneficiary rice farmers in the study area. This suggests that as the educational level of the non-beneficiary farmers increases, their income status is enhanced.

Member of Cooperative Society had a positive coefficient and was significant (P<0.05) for beneficiaries. This suggests that a unit increase in membership of the cooperative society led to about a 0.227 unit increase in income of rice farmers in the study area. This suggests that membership in the Cooperative Society helped to improve the income status of farmers. This might be because cooperative societies can access credit and support from NIRSAL and other agricultural agencies more easily.

Table 4: Factors Influencing Welfare of Rice Farmers who are NIRSAL Beneficiaries, Non-Beneficiaries, and Pooled Data

		Pooled			Non-Beneficiaries			Beneficiaries	
	Factors	Coefficient	Standard Error	t-value	Coefficient	Standard Error	t-value	Coefficient	Standard Error
50%	Household Size (Number)	0.03***	0.005	6.31	0.046***	0.007	6.77	0.032***	0.005
	Age of the Farmer (Years)	0.005***	0.002	3.00	0.009***	0.002	3.75	0.003	0.002
	Level of Educational (Years)	-0.002	0.017	-0.14	0.011	0.025	0.42	0.003	0.022
	Member of Cooperative Society (Dummy)	-0.092	0.077	-1.19	-0.147	0.126	-1.17	0.007	0.069
	Farming Experience (Years)	-0.004*	0.002	-1.72	-0.006	0.004	-1.32	0.0001	0.002
	Constant	0.911***	0.168	5.42	0.725***	0.257	2.82	0.859***	0.232
75%	Household Size (Number)	0.015***	0.006	2.75	0.018**	0.007	2.56	0.017	0.011
	Age of the Farmer (Years)	0.005***	0.002	3.37	0.01***	0.002	4.22	0.004	0.002
	Level of Educational (Years)	0.024	0.015	1.53	0.034**	0.018	1.95	0.019	0.029
	Member of Cooperative Society (Dummy)	-0.139*	0.081	-1.71	-0.129	0.078	-1.66	0.277**	0.133
	Farming Experience (Years)	0.003	0.003	1.00	0.003	0.004	0.63	0.002	0.002
	Constant	0.954***	0.173	5.50	0.682***	0.162	4.22	1.31***	0.293
0.50	Pseudo R-Squared	0.1176			0.1340			0.1446	
0.75	Pseudo R-Squared	0.1151			0.1154			0.1362	

*** 1% Significant Level (P<0.01), **5% Significant Level (P<0.05), 10% Significant Level (* P<0.10)

Source: Field Survey (2024)

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Conclusion and Recommendations

Rice production in North-Central Nigeria is a profitable venture, with beneficiaries and non-beneficiaries making a net farm income of ₦2,508,645.97 and ₦1,628,784.17, respectively, per hectare of rice production. Furthermore, there was also a 32% increase in income for beneficiaries, which may be attributed to the effect of the NIRSAL credit facilities on their performance. Therefore, it is highly recommended that NIRSAL stakeholders should continue to reach out to more smallholder farmers in the country, especially to attain sustainability and productivity in rice farming. Also, NIRSAL should intensify as well as expand their scope of influence to ensure the impact of the scheme on farmers income reflects or translates to food self-sufficiency.

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