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POVERTY STATUS AND PRODUCTIVITY AMONG SMALLHOLDER RICE FARMERS IN IKOT EKPENE AGRICULTURAL ZONE, AKWA IBOM STATE, NIGERIA

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Abstract
This study analyzed the Poverty status and productivity of smallholder rice farmers in Akwa Ibom State*. The data were collected from 80 smallholder rice farmers in Ikot Ekpene Agricultural Zone of Akwa Ibom State. Data were analyzed using descriptive statistics, FGT poverty index, TFP index, and the ordinary least squares model. The findings indicated a high poverty incidence of 61.4% in the study area. The study further revealed that the total factor productivity estimates of the smallholder rice farmers peaked among the non-poor category with average TFP index of 3.3, but lesser in the poor category with an average TFP index of 2.3. Education (0.159), experience (0.023), farm size (2.779), quantity of seeds (0.263) and pests and diseases (0.818) significantly affected TFP of smallholder rice farmers in both categories. it is recommended that, financial and other credit facilities should be made accessible and affordable to the rice farmers in the study area to reduce poverty and increase productivity. Again, the productivity index was higher among the non-poor category than the poor and pooled category. As such various productivity parameters such as improved varieties, incentives and subsidies should be made available to the poor smallholder rice farmers so as to push them above the poverty line.*
Keywords: Labour, Poverty depth, mean income, sustainability

Introduction

The prospect of agriculture as a whole is strongly reliant on an increase in the productivity level of the rural small-scale farmers. It is therefore very important that strategies to increase agricultural development should be directed towards increasing productivity and alleviation of poverty among farming households. In the light of this, it is imperative to look into the productivity of smallholder rice farmers which may have a direct relationship with their poverty status, if the goal of rice self-sufficiency is to be attained in Nigeria (Aboaba, 2020).

Rice (*Oryza sativa*) is a semi- aquatic plant which thrives well in wet parts of the landscape where other cereal crops may not survive, but is less tolerant to low soil moisture than other crops. This means that, it can only be produced where there is enough water within the crop growth cycle (Amaechina & Eboh, 2017). The crop is valued as one of the most vital staple foods for over half of the world population because of its nutritive and industrial value and palatability (Aboaba, 2020). It is consumed by more than 60% of the world's growing population, and offers about 19% and 13% of universal per capita requirements for energy and protein respectively which makes it critical to global food security (Ayedum & Adeniyi, 2019).

Much effort has been placed by both the individual farmers and the government to boost rice production to match the demand of the commodity in the nation. Focus on this have been on the improvement of resource use by the farmers, effective production strategies that will lead to better productivity of the enterprise as well as poverty eradication strategies by the farmers mostly among the smallholder categories (Adams & Ali, 2021). This effort seems to be futile because there exists a serious snag that hampers the smallholder rice farmers' productivity known as poverty (Usman, 2018). Although poverty is a worldwide phenomenon, it has been observed that Nigeria is one of the countries that are worst hit by the plague of poverty (Amaechina & Eboh, 2017). According to United States Department of Agriculture (2019), an individual farmer is classified as poor if he or she spends less than a dollar in a day on basic needs. The scourge of poverty is a threat to

the Nigerian population as its incidence is on the increase with biting effects more on the rural dwellers where the bulk of the population lives and the crux of agricultural activities centre in this area. This scenario of rural poverty is on the conditions that rural people are not only isolated from economic opportunities, but they also tend to have less access to social services such as health (poor health condition directly affect rice production), sanitation (filthy environments tend to harbor pests which affect crops leading to poor yield), education and economic services like electricity and good water supplies (Oyinbo & Olaleye, 2016). Efforts of the individual farmers and the government to eradicate poverty have a significant role to play in increasing the productivity level of smallholder rice farmers (Ashley-Dejo Adelaja, Idi-Ogede, Omoniyi, & Olaoye, 2020). According to Oyinbo & Olaleye (2016), the non-poor rice farmers have the potential of utilizing their resources effectively which in turn increases their productivity as they are opened to good health, good sanitation, good education and good economic services, as compared to the poor farmers who merely subsist. The debate on smallholder farms has so lengthened and gone beyond plain concentration on small versus large farms to reflect the idea that optimal rural employment of resources is necessarily a dynamic and not a stable concept applicable to a developing nation like Nigeria. The term small refers to the scale of farm operation and may mean the number of workers; capital invested, or amount of land cultivated. The milieu of this debate is the dominance of smallholder farming especially in the developing economies (Nwaru, 2018). Globally, newly half a billion farms are less than 2.0 hectares, and these farms are getting lesser in many countries day by day and are estimated to produce about 80% of the developing world's food (Fan *et al.*, 2013). The employment generation and foreign exchange earning capacities of the smallholder farming systems as well as their forward and backward linkages with other sectors of the economy forms the pivot of the rural economy (Nwaru, 2018).

This paper is supported by the individual deficiency growth theory, whose proponents were Gwartney & McCaleb in 1985. This theory attributes poverty to individual household's deficiencies. The theory states that the poor are responsible for creating their problems through lack of hard work and bad choices (Vermeulen & Cotula, 2010). Neo- classical economists reinforce individualistic sources of poverty with the assumption that individuals such as smallholder farmers are responsible for their choices in maximizing their wellbeing through wise investment and right use of resources including farm resources.

Azeeza *et al*. (2015) conducted a study to provide empirical evidence of the effect of farming on the poverty status of rural farm families in Uyo, Akwa Ibom State, Nigeria. Data were collected from 80 randomly selected farm families in the study area. Both descriptive and econometric tools were employed to analyze the data. The results showed that the study area consisted of a mixture of extremely poor, moderately poor and non-poor households. While family sizes and farming activity type, enhanced poverty while age, educational status and off farm income by family heads reduced the incidence of poverty. Idiong & Michael (2019) analyzed the profit efficiency and poverty status of rice farmers in selected rice growing communities in Cross River State, Nigeria. The multistage random sampling was used to select rice farming households in the study area. Primary data were collected by means of questionnaire. The mean per capita household expenditure (MPCHHE) and the P-alpha measures of poverty were used for the measurement of poverty while the Stochastic Profit Frontier (SPF) was used to obtain the efficiency estimates and determinants among the rice farming households. The logit regression model was also used to show the effect of some factors on poverty status of the rice farmers. The results showed that, out of the 64.32% of the farmers who were generally poor, 40.85% and 23.47% of them were assessed to extremely and moderately poor respectively. The incidence, depth and severity of poverty were 65.32%, 27.84% and 16.38% respectively. The study further showed that profit efficiency ranged between 0.34 and 1.0 with mean efficiency of 0.73, suggesting that there are opportunities for rice farmers in the State to increase their farm income with a view of reducing their poverty levels. The result indicates that educational level, farm size and efficiency negatively influenced

poverty while sex, age, educational level, farm size, household size and farming experience were the main determinants of profit efficiency. Inadequate credit access, capital and supply of farm inputs; high cost of labour, poor marketing outlets, and near absence of modern processing facilities were the rice production constraints.

Hence, the need for this research which tends to analyze Poverty status and productivity of smallholder rice farmers in Ikot Ekpene Agicultural Zone of Akwa Ibom State under the following specific objectives; to derive poverty line and classify the respondents according to their poverty status, estimate the total factor productivity of smallholder rice farmers based on their poverty status and estimate the determinants of TFP of rice farmers based on their poverty status.

Methodology

This research was carried out in Akwa Ibom State, located in the coastal Southern part of Nigeria. It lies between Latitudes $4^0 32'$ and $5^0 33'$ N; and Longitudes $7^0 25'$ and $8^0 25'$ E. The State is bordered on the East by Cross River State, on the West by Rivers State and Abia State, and on the South by the Atlantic Ocean. The State has a total land mass of 7,081km^2 and about 1343.9ha of arable land. It has a population of about 6.2 million people with a density of about 371 inhabitants per square kilometers (Niger Delta Development Commission (NDDC), 2020). The State has six agricultural zones (Oron, Abak, Ikot Ekpene, Eket, Etinan and Uyo) which are mainly for agricultural administration and extension services and not for any agro-ecological differences. The State has thirty one (31) Local Government Areas which are individually blessed with favourable weather for agricultural purposes. The major occupation of the people of Akwa Ibom State is farming and they are widely known to produce more arable crops such as rice, yam, maize, cassava, cocoyam etc. The State is also blessed with traders, civil servants and artisans (Akwa Ibom State Agricultural Development Programme (AKADEP), 2015).

This work adopted a purposive and random sampling technique to draw its respondents. The first stage involved the purposive selection of Ikot Ekpene Agricultural zone. This selection was due to the prevalence of smallholder rice farmers in the zone. In the second stage, two Local Government Areas were selected purposively from the zone. That is, Ini and Ikono L.G.As. This selection was due to the preponderance of smallholder rice farmers in the areas. In the third stage, two communities were selected purposively from each of the Local Government Areas making it a total of four communities used for the study. Furthermore, five villages were selected purposively from each of the communities making it a total of twenty villages for the study. In all, four smallholder rice farmers were randomly selected from each of the villages giving a total of 80 smallholder rice farmers used for the study and these 80 respondents formed the sample size while smallholder rice farmers formed the population for the study.

Model specifications

$$MPCI = \frac{TPCI}{N} \qquad 3.1$$

Where;

MPCI = mean per-capita income of smallholder rice farmers measured in naira value.

TPCI = total per-capita income of smallholder rice farmers measured in naira value

N = total number of sampled smallholder rice farmers.

This model was used to set a yardstick for the classification of the respondents into poor and non-poor smallholder rice farmers. The degree of poverty of the respondents was further judged by the use of the poverty line equation.

Poverty line

$$PL = \frac{2MPCI}{3} \qquad 3.2$$

Where;

PL = poverty line of the smallholder rice farmers. Farmers whose per capita income is less than poverty line measured as two-third proportion of mean per capita income of the rice farmers will be classified as poor, but those farmers whose income fall on the line or above will be classified as non poor.

$$TFP = \frac{\sum P_{yi} Y_i}{\sum P_i X_i + K} \qquad 3.3$$

Where;

TFP = total factor productivity indices of smallholder rice farmers.

P_{yi}= price of rice output (₦).
Y_i = rice output (kg).
X_i = individual farm resource (land, fertilizer, labour, seed).
P_i = price of input X_i (₦).
K = fixed inputs (₦).

OLS estimates

$$\mathbf{Y} = b_0+b_1X_1+b_2X_2+b_3X_3+ b_4X_4+b_5X_5+b_6X_6+b_7X_7 + b_8X_8+b_9X_9+b_{10}X_{10} + e \quad - \quad 3.5$$

Where;
Y = TFP index (see equation 3.4)
$\mathbf{X_1}$ = Age (Years).
$\mathbf{X_2}$ = Educational Level (Number of years spent in formal education).
$\mathbf{X_3}$= Household Size (Number of persons in the household).
$\mathbf{X_4}$ = Farming Experience (Number of years spent of rice farming).
$\mathbf{X_5}$= Access to Credit (Amount of credit in naira received within five years).
$\mathbf{X_6}$= Farm Size (hectares of land allocated to rice farming).
$\mathbf{X_7}$ = Quantity of Fertilizer (kg).
$\mathbf{X_8}$ = Quantity of seed (Kg).
$\mathbf{X_9}$ = Capital (Depreciation charges, interest on loan, land rent) (₦).
$\mathbf{X_{10}}$= Pests and Diseases (farmers who indicated incidence of pests and/or diseases in their farms is 1 while 0 is otherwise).
$\mathbf{b_0}$ = regression intercept or the constant term
$\mathbf{b_1}$-$\mathbf{b_{10}}$ = coefficients of the respective determinants of rice productivity.
e = Error Term

This model was adopted to estimate the determinants of total factor productivity of the respondents in their various categories.

RESULTS AND DISCUSSION

Estimation of poverty line and classification of respondents according to their poverty status in the study area

Table 1 showed the poverty level among smallholder rice farmers in Ikot Ekpene Agricultural zone, Akwa Ibom State. The farmers' poverty status was analyzed using the three indicators of poverty, i.e. poverty prevalence (Po), poverty depth (P_1) and poverty severity (P_2). Poverty prevalence indicates the percentage of the smallholder rice farmers falling below the poverty line; poverty depth shows the amount by which the poor smallholder rice farmers' fall short of the poverty line and severity of poverty represents the sum of the square of poverty depth divided by the number of poor smallholder rice farmers in the sample

Table 1: Poverty levels among smallholder rice farmers

Poverty Indices	
P_0	0.614
P_1	0.484
P_2	0.304
MPCI	₦171,604.9
Poverty Line	₦114,403.3

Source: Field Survey Data, 2024.

As shown in Table 1, the prevalence of poverty among the smallholder rice farmers in Akwa Ibom State was 0.614. This showed that 61.4% of the smallholder rice farmers were below the poverty line. The poverty depth was 0.484, implying that, the poor smallholder rice farmers' income would need to be increased by 48.4% to bring them out of poverty to become non-poor. The severity of poverty index was 0.304 which represented the poorest among the poor smallholder rice farmers who required the attention of policy makers in the distribution of the standard of living indicators such as health care services, clean water, good education, equality in income distribution and income generating activities. This finding was in line with the findings of Onyishi & Ezeibe, (2014) who reported high poverty prevalence in the Niger Delta Region of Nigeria; Edeke (2015) who found out that the severity of poverty in the least developed countries ranged between 0.1-0.5 and Obike, (2019), who found out that greater percentage (78.2%) of farming households in

Abia State experienced poverty in one way or the other.

Estimation of the total factor productivity of smallholder rice farmers based on their poverty status

Table 2: Productivity indices for smallholder rice farmers

POOR			NON-POOR			POOLED		
TFP indices	**Frequency**	**Percentages (%)**	**TFP indices**	**Frequency**	**Percentages (%)**	**TFP indices**	**Frequency**	**Percentages (%)**
1.0-1.5	6	12.2	1.0-2.9	24	77.4	1.0-2.9	63	78.8
1.6-2.0	8	16.3	3.0-4.9	0	0.0	3.0-4.9	10	12.5
2.1-2.5	20	40.8	5.0-6.9	2	6.4	5.0-6.9	2	2.5
2.6-3.0	9	18.4	7.0-8.9	3	9.8	7.0-8.9	3	3.8
3.1-3.5	6	12.3	9.0-10.9	1	3.2	9.0-10.9	1	1.3
			11.0-12.9	1	3.2	11.0-12.9	1	1.3
Mean	**2.3**		**Mean**	**3.3**		**Mean**	**2.7**	
Minimum	**1.1**		**Minimum**	**1.5**		**Minimum**	**1.1**	
Maximum	**3.3**		**Maximum**	**12.9**		**Maximum**	**12.9**	
Sum	**112.9**		**Sum**	**103.8**		**Sum**	**591.9**	
Standard Deviation	**0.64**		**Standard Deviation**	**2.93**		**Standard Deviation**	**1.94**	

Source: Field Survey Data, 2024.

On the average, the total factor productivity estimates of the smallholder rice farmers peaked among the non poor category with average TFP index of 3.3, but were lesser among the poor category and the pooled data with an average TFP index of 2.3 and 2.7 respectively. This result was in line with the results of Ukeje, (2014) that total factor productivity index in the agricultural sector in Nigeria ranged between 2.0 to 5.0; and Bello, *et al.*, (2016) who reported a 2.35 TFP among arable crop farmers in Ogun State Nigeria.

Based on the magnitude of the coefficient of determination (R^2), the signs, magnitude and number of statistically significant variables and a *prior* expectation, the exponential functional form was chosen as the lead equation for the poor smallholder rice farmers, as it conformed to the earlier stated parameters over the rest of the functional forms. From Table 3, it could be seen in a glance that the coefficient of determination R^2 was 0.990. This gave a better goodness of fit to the regression model and implied that 99.0% of the total variations experienced by the rice productivity of the poor farmers in the study area were as a result of the combined effects of the independent variables. It also meant that the variation in total factor productivity of poor smallholder rice farmers in the study area can be explained up to 99.0% by the identified variables of age, educational level, household size, farming experience, amount of credit, farm size, quantity of fertilizer, quantity of seeds, capital and pest and diseases. The remaining 1.0% variation can be attributed to other factors not captured in the model. The F-ratio for the rice production among the poor smallholder farmers was significant at 1% which implied that the data attested to the overall significant of the regression equation. This result was similar to the results of Haruna (2011) whose result showed a 98.1% R^2 value which indicated a better goodness of fit to the regression model for the determinants of rice productivity in Kano State of Nigeria; Usman (2015) who also presented the exponential functional form to be the lead equation with an R squared value of 95.6%; and Buhari & Ismail, (2021) who reported a high value of goodness of fit (97.2%) of the regression model to ascertain the determinants of rice productivity among arable crop farmers in Benin Kudu LGA of Jigawa State in Nigeria.

Result from Table 3 showed that educational level had positive relationship with total factor productivity and was significant at 1% level. It implied that a unit increase in the acquisition of formal education by the farmers would increase

productivity by 0.159 units. It also meant that farmers with higher level of education had greater chances of increasing their productivity than those with lower educational background. Agom, *et al.,* (2022) observed that higher level of education could reduce household poverty. Then, more educational platforms ought to be opened for the farmers in order to get them enlightened on how to increase their productivity. This should be done because, educated farmers are intelligent and calculative in utilization of available resources and are able to adjust to any changes that will result in better resource utilization. This result contradicts the result of Bello *et al.* (2016) who reported a negative relationship between years spent in school and productivity of rice farmers in Ogun State. The result of the finding also supports the findings of Igboji *et al.* (2015) who reported a direct relationship between small scale rice farmers level of education in Ebonyi State and their productivity.

Table 3: Determinants of TFP for smallholder rice farmers

Variables	Poor (Exponential form)	Non Poor (Linear form)	Pooled (Exponential form)
Constant	4.268	5.351	2.215
	(21.340)***	(16.313)***	(3.463)***
Age	-0.002	-0.003	0.007
	(-0.735)	(-0.571)	(1.049)
Educational Level	0.159	0.191	0.109
	(27.133)***	(20.429)***	(6.239)***
Household Size	0.043	0.007	0.135
	(4.396)***	(0.458)	(4.864)***
Farming Experience	0.023	0.029	0.016
	(12.936)***	(11.000)***	(1.526)
Amount of credit	7.193	-0.615	4.915e-06
	(24.154)***	(-1.034)	(4.036)***
Farm Size	2.779	2.965	0.690
	(12.941)***	(8.424)***	(2.099)**
Quantity of fertilizer	-0.143	0.157	−0.109
	(-143.000)***	(4.196)***	(−2.023)**
Quantity of seeds	0.263	0.378	0.070
	(9.154)***	(7.986)***	(0.4635)
Capital	0.316	0.523	6.723e-05
	(17.893)***	(0.850)	(3.253)***
Pests and diseases	0.818	-0.921	−0.486
	(19.499)***	(-13.408)***	(−2.314)**
Standard Error	**0.0354**	**1.593**	**0.281**
R^2	**0.990**	**0.855**	**0.930**
F-value	**402.323*** **	**36.723*** **	**801.7849**

Source: Field Survey Data, 2024.
*Significant at 10%; **Significant at 5%, ***Significant at 1%
Values in parenthesis are the t-values.

Household size showed positive relationship with productivity and was statistically significant at 1% level as well. This implied that a unit increase in the number of persons per farmers' household in the study area increased their productivity by 0.043 units. This is true because a higher household size results in a higher household labour. As such, in order to increase productivity in the area, household labour should be increased accordingly. This finding supports the findings of Ben-Chendo *et al.*. (2017) who reported that paddy rice farmers in Kaduna State had a positive relationship between farmers' household size and their farm productivity. Again, bigger household size could mean readily available household labour, when a greater percentage of the

household members are adults (Okon, *et al.,* 2018). Farming experience was statistically significant at 1% and positively signed, indicating that experience was a major indicator of productivity among the poor smallholder rice farmers in the study area. The positive variable implied that the more experienced the farmers are in their rice farming business, the more productive their farm will be as they will get acquainted to the norms associated with rice production and get more knowledge in resource combination in the area. Farmers in the area should be encouraged to get themselves exposed to other farms in order to gain more experience to manage their own farm and increase productivity through proper resource utilization that can invariably result in poverty eradication. The finding is in line with the study of of Igboji *et al.* (2015) who reported a direct relationship between small scale rice farmers years of experience in Ebonyi State and their farm productivity. The work also contradicts the work of Egbodion & Ahmadu (2015) who reported a negative relationship between farming experience and the productivity level of smallholder rice farmers in Anambra State of Nigeria.

Amount of credit received by the farmers was positively signed and also significant at 1% level. This implied that the higher the amount of credit received by the poor smallholder rice farmers, the higher their productivity in the rice enterprise. Policy implication here is that every enterprise is expanded through available financial capital and every farmer that has more chances of obtaining and utilizing any financial credit is liable to have increase in productivity than those that are unable to secure financial credit facilities. As such smallholder rice farmers in the area should be encouraged to access financial credit facilities to boost their productivity. This finding supports the finding of Adedeji *et al.* (2016) who reported a direct relationship between amount of credit received by farmers in Benue State of Nigeria and their total factor productivity. Farm size was statistically significant at 1% and positively related to total factor productivity of the poor smallholder rice farmers in the study area. This implied that a unit increase in the farm size occupied by the farmers in the area will increase the productivity of the farmers in this category by 2.779 units. Implication here is that farmers with more farmlands are liable to manage their resources effectively than those that have small farm sizes. As such farmers should acquire more farmlands for the production expansion and increased productivity. This finding is in line with the study of David and Terwase (2011) who reported that there is a direct relationship between farm size and the productivity index of rice farmers in the in Kwande Local Government Area of Benue State, Nigeria.

Quantity of fertilizer used on the farmland by the farmers was relating negatively to productivity and statistically significant at 1% level of significance. This implied that more fertilizers used by the farmers resulted in lower productivity in the study area. This may have been attributed to the chemical toxicity associated with the commercial fertilizers. It also implied that unit increase in amount of fertilizers used by the farm resulted in 0.143 units decrease in the total factor productivity of the poor smallholder rice farmers. Policy makers need to advise the farmers to reduce the use of synthetic fertilizers as this is affecting productivity negatively. Rather, they should see how to embark on the use of organic manure in their farmlands. This result agrees with the result of the findings of Oluwatayo and Adedeji (2019) who reported a negative influence of organic fertilizers on the productivity of smallscale rice farmers in Bayelsa State of Nigeria.

Quantity of seeds was found to be positively related to rice farmers' total factor productivity for the poor smallholder farmers. The implication was that a slight increase in the number of seeds sown by the farmers resulted in a 0.263 increase in the farmers' productivity level. This may have been attributed to the fact that each seed planted has the potential of increasing yield to some extent. It also means that farmers that had more seeds to cultivate on their farmlands had more productivity than those that had less seeds to cultivate. To this end, if policy makers can provide more seeds to the farmers in the area, their productivity can increased thereby tending to pull the farmers out of poverty. This finding agreed with the result of the work of Mgbenka and Mbah (2016) who reported in their review of

Smallholder Farming in Nigeria that smallholder farmers with more seeds are able to increase their productivity through their effective use of the available resources.

For the non-poor category, the linear functional form was chosen as the lead equation as it conformed to the earlier stated parameters over the rest of the functional forms. From Table 4.4, it can be seen in a glance that the coefficient of determination R^2 was 0.855. This gave a better goodness of fit to the regression model and implied that 88.5% of the total variations experienced by rice farmers' total factor productivity for the non-poor farmers in the study area were as a result of the combined effects of the independent variables. It also means that the variation in total factor productivity of non-poor smallholder rice farmers in the study area can be explained up to 85.5% by the identified variables of age, educational level, household size, farming experience, amount of credit, farm size, quantity of fertilizer, quantity of seeds, capital and pest/diseases. While the remaining 14.5% variation can be attributed to other factors not captured in the model. The F-ratio for the rice production among the non-poor smallholder farmers was significant at 1% which implied that the data attested to the overall significance of the regression equation. This result was similar to the results of Chukwuji (2016) whose result showed an 86.3% R^2 value which indicated a better goodness of fit to the regression model for the determinants of rice productivity in Anambra State of Nigeria; Ogah *et al.,* (2019) who also presented the linear functional form to be the lead equation with an R squared value of 84.7%%; and Hamzat *et al.,* (2020) who reported a high value of goodness of fit (97.2%) of the regression model to ascertain the determinants of rice productivity among rice farmers in Patigi and Edu LGAs of Kwara State in Nigeria.

Result from the table showed that educational level had positive relationship with total factor productivity and was significant at 1% level. It implied that a unit increase in the acquisition of formal education by the farmers would increase productivity by 0.191 units. It also means that farmers with higher level of education have greater chances of increasing their productivity than those with lower educational background. Then, more educational platforms should be opened for the farmers in order to get them enlightened on how to increase their productivity. This should be done because, educated farmers are intelligent and calculative in utilization of available resources and are able to adjust to any changes that will result in better resource utilization. This result contradicts the result of Bello *et al*. (2016) who reported a negative relationship between years spent in school and productivity of rice farmers in Ogun State. The result of the finding also supports the findings of Igboji *et al*. (2015) who reported a direct relationship between small scale rice farmers level of education in Ebonyi State and their productivity.

Farming experience was statistically significant at 5% and positively signed, indicating that experience was a major indicator of productivity among the non-poor smallholder rice farmers in the study area. The positive variable implied that the more experienced the farmers are in their rice farming business, the more productive their farm will be as they will get acquainted to the norms associated with rice production and get more knowledge in resource combination in the area. Farmers in the area should be encouraged to get themselves exposed to other farms in order to gain more experience to manage their own farm and increase productivity through proper resource utilization that can invariably result in poverty eradication. The finding is in line with the study of Igboji *et al.* (2015) who reported a direct relationship between small scale rice farmers years of experience in Ebonyi State and their farm productivity. The work also contradicts the work of Egbodion & Ahmadu (2015) who reported a negative relationship between farming experience and the productivity level of smallholder rice farmers in Anambra State of Nigeria.

Amount of credit received by the farmers was negatively signed and also significant at 1% level. This implied that the higher the amount of credit received by the non-poor smallholder rice farmers, the lower their productivity in the rice enterprise. This may have been attributed to high interest rate that made the farmers to default in

their loan repayment. It may also be attributed to appropriation of the funds received thereby making the farmers to incur more debt than necessary. The policy implication here is that, policy makers should make available low interest rate loans and also advise the farmers to obtain loans that they can pay back in order to reduce their financial burden. This will increase productivity and reduce poverty through effective resource utilization. This finding countered the finding of Adedeji *et al.*, (2016) who reported a direct relationship between amount of credit received by farmers in Benue State of Nigeria and their total factor productivity. Farm size was statistically significant at 1% and positively related to total factor productivity of the non-poor smallholder rice farmers in the study area. This implied that a unit increase in the farm size occupied by the farmers in the area will increase the productivity of the farmers in this category by 2.965 units. Farmers with more farmlands are liable to manage their resources effectively than those that have small farm sizes. Implication here is that farmers with more farmlands are liable to manage their resources effectively than those that have small farm sizes. As such farmers should acquire more farmlands for the production expansion and increased productivity. This finding is in line with the study of David and Terwase (2011) who reported that there was a direct relationship between farm size and productivity of rice farmers in Kwande Local Government Area of Benue State, Nigeria. Quantity of fertilizer used on the farmland by the farmers was relating positively to productivity and statistically significant at 1%. This implied that more fertilizers used by the farmers resulted in higher productivity in the study area. It also implied that unit increase in number of fertilizers used by the farm resulted in 0.153 units increase in the total factor productivity of the non-poor smallholder rice farmers. Policy makers need to advise the farmers to increase the use of both synthetic fertilizers and organic manures as this was affecting productivity positively. This result disagreed with the result of the findings of Oluwatayo & Adedeji (2019) who reported a negative influence of organic fertilizers on the productivity of smallscale rice farmers in Bayelsa State of Nigeria.

Quantity of seeds was found to be positively related to rice farmers' total factor productivity index for the non-poor smallholder rice farmers. The implication was that a slight increase in the number of seeds sown by the farmers resulted in 0.378 units increase in the farmers' productivity level. This may have been attributed to the fact that each seed planted has the potential of increasing yield to some extent. It also means that farmers that had more seeds to cultivate on their farmlands had more productivity than those that had less seeds to cultivate. To this end, if policy makers can provide more seeds to the farmers in the area, their productivity can increase thereby tending to pull the farmers out of poverty. This finding agrees with the result of the work of Mgbenka and Mbah (2016) who reported in their review of Smallholder Farming in Nigeria that smallholder farmers with more seeds are able to increase their productivity through their effective use of the available resources.

Table 3 also revealed an R-squared value of 0.930 for the pooled data set, meaning that 93.0% variation in TFP for all the smallholder rice farmers were defined by the joint effects of age, educational level, household size, farming experience, amount of credit, farm size, quantity of fertilizer, quantity of seeds, capital and pest and diseases. The outstanding or significant variables that affected TFP in the pooled data set were; educational level, household size, amount of credit, farm size, quantity of fertilizer, capital and pest and diseases.

Conclusion and Recommendations

There was a high incidence of poverty among smallholder rice farmers in Akwa Ibom State. Total factor productivity (3.3) was higher for the non-poor than the poor farmers as well as the pooled data set. Many factors contributed to the productivity of the smallholder rice farmers in the study area. It is based on this finding that the following recommendations are made; since there was high incidence of poverty, farmers in the area should be encouraged to minimize cost and maximize profit in order to increase their profitability. Farm inputs such as farm size, fertilizer, herbicides/pesticides, seeds, farm labour and capital should be provided to improve productivity level of smallholder rice farmers to

boost the economic status of rice farmers in the area.

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