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Poverty status and income inequality among farming households in Dutse Local Government Area of Jigawa State, Nigeria

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ABSTRACT

The study examined the poverty status, its determinants and income inequality of farming households using cross sectional data in Dutse Local Government Area of Jigawa state, Nigeria. Focusing on the 2022 farming season, data were collected from 122 farming households who were selected through a multi-stage sampling technique. To achieve the objectives of this study, the Foster-Greer-Thorbecke (FGT) index, Gini coefficient and a logistic regression model were employed. The result revealed that 83% of the households were poor, poverty incidence was 98.4% and Gini coefficient was 0.6. Factors identified to influence the poverty status were credit access, farming experience, farm income and off farm income. Specifically, the odds ratio of the variable representing access to credit showed that having access to credit increases their odds of becoming poor by 864.23 times. However, this does not diminish the importance of credit supply to smallholder farmers. Rather, it calls for a proper monitoring to ensure appropriate use of the credit funds. In addition, farm income and non-farm income had no association with the poverty status of the households as indicated by their odds ratios of 1.000, respectively. Furthermore, the study found that having longer years of farming experience was not positively related with a lower likelihood of them being poor. These findings call for a recommendation on increased information about proper farming practices. Policies favourable to increasing agricultural productivity and income as well as encouraging diversification of income generating activities both within and outside crop production could reduce the poverty incidence in the study area.

Keywords: Farmers; households; poverty; inequality; Nigeria; odds ratio

INTRODUCTION

Poverty is an issue that governments and populations face globally (Yunus, 2011). Its multifaceted nature makes it problematic for all areas of human life, and its impacts can have catastrophic effects on both man and his environment (Pogge & Rippin, 2013). By definition, poverty exists when one or more people fall short of the standard of economic welfare regarded to be a fair minimum, either in an absolute sense or by the standards of a particular

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society (Jude *et al*., 2020). Nigeria has a large share of people living in poverty. Approximately 40.1% of its population were classified as poor, living below the national poverty line of ₦137,430 (US$381.75) per year in 2018/19 (NBS, 2020). This high incidence of poverty is more pronounced in the agriculture sector which ironically employs around 75% of the country's labour force in the country and provides a means of livelihood for 90% of the rural population (IFAD, 2001). Despite being the primary occupation for rural households, majority of their population live in poverty (Adepoju & Obayelu, 2013). An explanation for this is that agricultural farm income is extremely variable, and household welfare and agricultural production can be affected by farm income (Key *et al*., 2017). Such variabilities in farm incomes can be caused by factors including type of enterprise, management skills and attitudes of farmers, weather conditions, and soil fertility conditions. In response, various state governments across the country have been making efforts in the form of projects/programmes towards empowering farmers in their states by cushioning the impacts of these challenges.

In Jigawa state, where 87% of its population are poor (NBS, 2020), the government so far has initiated a number of programmes/projects that sought to revitalise its agriculture sector by empowering farmers. An example of such initiatives in the state is the 'cluster farming initiative programme' introduced in 2016 with the aim of refocusing the subsistence mindset of smallholder farmers to the commercial potential of their farming activities. Thus, alleviating poverty among agricultural households in the state. This reflects the commitment of the state government in upgrading its small-scale agriculture by focusing on quality, input provision to local farmers and provision of extension services to attain huge improvements in yields and incomes. However, a situation of weak response, although unexpected could serve as a signal to re-evaluate the processes and models of such programmes so as to strengthen them in order to achieve their ultimate goals. Typically, governmental interventions in agriculture aim for a wide range of economic, social and environmental objectives. So, it is not unusual that many organisations have typically framed income objectives of agricultural policies in terms of distribution or equity (OECD, 1998; Moreddu, 2011). A particular goal of such interventions in agriculture is the support of smallholder farmers of low income by alleviating poverty while reducing inequality, thus ensure sufficient incomes uniformly (Finger & El Benni, 2011). This is important as situations of unreasonable and insufficient remunerations for smallholder farmers of low incomes directly causes supply shortages and indirectly causes demand shortages, culminating in a broader under performance of the state and federal governments in the agriculture sector. By concentrating on reducing poverty, policymakers may ensure that the most vulnerable and underprivileged populations' (in this case, farmers) fundamental needs are not overlooked. To this end, this study aimed to assess the poverty status of the farming households in Dutse, Jigawa state which can serve as a baseline against which the performance of future agriculture-based poverty alleviating projects/programmes can be empirically evaluated. Complimenting the general aim, the specific objectives were to analyse the income inequality among the farmers, and to identify socio-demographic factors that influenced their poverty among the farming households.

METHODOLOGY

The Study Area

The study was conducted in Jigawa State's Dutse L.G.A which is the state's capital, located between latitude 11° 51' 37'' N and longitude 9° 23' 23' E. Dutse has a land area of

22,410 km^2, an average annual rainfall of 958.5 mm and an average temperature of 31°C. According to NPC's 2018 estimates, there were 251,135 residents in Dutse and was projected to reach 460,587 in 2023 (NPC, 2022). Farming is the main economic activity and common crops include rice, wheat, millet, and sesame. Based on a Nigerian Living Standards Survey (NLSS) conducted between 2018 and 2019, reported by the National Bureau of Statistics (NBS) (2020), the poverty headcount rate for Jigawa state was 87.02% which was above the national average of 40.1%. To put this into perspective, approximately 9 out of 10 individuals were living in households (in the state) where their real per capita consumption expenditures fell below the national average of ₦137430 per year. Other poverty indices reported for the state were a poverty severity of 20.53 and a gini coefficient of 28.

Sampling Technique and Sample size

A multistage sampling technique was used for this study. The first stage involved a purposive selection of four villages among the 11 wards of Dutse L.G.A based on the intensity of cereal farming activities provided by the Jigawa Agricultural and Rural Development Authority (JARDA). The chosen wards were Kudai, Sakwaya, Kachi and Madobi. In the second stage, a snowball and convenience selection of 25 farming households from a population of 20,000 farmers was employed to select 122 respondents. The sample size was determined using the Cochran's formula given as:

$$n_0 = \frac{z^2 pq}{e^2} \text{----------(1)}$$

Where, n = Sample size, e = Desired level of precision (i.e the margin error), p = Estimated proportion of the population which has the attribute in question, q = 1-p, z = z-score corresponding to the desired confidence level. Applying the Cochran's formula for a 20% population proportion of 95% confidence level and 7% margin of error yielded 125 respondents.

Method of Data Collection

Cross sectional data were sourced from farmers using interview schedules. However, after examining the completed copies of the interview schedules, a total of 122 copies were certified for analysis.

Methods of Data Analyses

The analytical techniques used for this study included descriptive statistics, Foster-Greer- Thorbecke model, Gini coefficient and logistic regression model.

Models Specifications

Foster-Greer-Thorbecke (FGT) Poverty Indices

To examine the poverty status of the households, the FGT poverty index was adopted, using an income approach which considers per capita household incomes. The index is generally written as:

$$P = \frac{1}{n}\sum_{i=1}^{q} \frac{(z-yi)^{\alpha}}{z} \text{----------(2)}$$

Where P = Foster, Greer and Thorbecke index ($0 \leq P \leq 1$), n = The total sample in the population, Z= Poverty line which is the minimum income below which a household is considered poor, q = Number of households below poverty line, y_i = Income of the household, α = levels for the severity of poverty which takes the values of 0, 1, and 2 for poverty incidence, poverty depth, and poverty severity, respectively. Thus, if $\alpha = 0$, the index becomes:

$$P^0 = \frac{1}{n}\sum_{i=1}^{q} \frac{(z-yi)^0}{z} \text{----------(3)}$$

which gives the incidence of poverty measured as the percentage of respondents whose per capita incomes were below the poverty line. An increase in the degree of aversion to poverty represented by an $\alpha = 1$ expressed as:

$$P^1 = \frac{1}{n}\sum_{i=1}^{q} \frac{(z-yi)^1}{z} \text{----------(4)}$$

reflects the depth of poverty or the proportion of the poverty line that the average poor will require to attain the poverty line. If $\alpha = 2$ as specified by:

$$P^2 = \frac{1}{n}\sum_{i=1}^{q} \frac{(z-yi)^2}{z} \text{----------(5)}$$

measures the severity of poverty which is the mean of square proportion of the poverty gap. When converted to percentage, it gives the magnitude by which a poor household's per capita income should increase to escape poverty.

Poverty Line

The common approach to analysing poverty status in agricultural economics is based on a headcount of poor individuals who fall below a specified threshold. This threshold is called the 'Poverty line', defined as the minimum or the cut-off standard of expenditure on food or per capita income below which an individual or household is described as poor (Anyanwu, 1997). This study adopted an income approach to measure poverty based on its advantage of allowing for distinction between sources of income (Ouellette *et al*., 2004). Hence, the poverty line was established as two-thirds (2/3) of the mean per capita income in the study area. Thus, households whose mean incomes fell below the poverty line were considered as poor while those whose incomes were above the benchmark were considered as non-poor. Thus:

$$\text{HPCY} = \frac{\text{THY}}{\text{HHS}} \text{----------(6)}$$

$$\text{MPCHY} = \frac{THY}{n} \text{----------(7)}$$

$$\text{PL} = 2/3(\text{MPCHY}) \text{----------(8)}$$

Where: HPCY = Household Per Capita Income, THY = Total Household Income, HHS = Household Size, MPCHY = Mean Per Capita Households Income, n = Total number of respondents, THHY = Total Households Income, PL = Poverty Line

Logistic Regression Model

A logistic regression model was used to determine the probable factors that influenced poverty status among the farming household in the study area. It was considered appropriate

for this analysis due to its unique ability to consider both categorical and dichotomous dependent variables. The logistic probability function is given as:

$$P_i = 1/1 + e^{-z_i} = f(Z_i) \text{----------(9)}$$

Where P_i is the probability that a household i (i = 1, 2 … n) will be poor, Z_i = a random variable which predicts the probability of a household being poor or non-poor. The probability P_i in equation 9 is further transformed into:

$$P_i = e^{z_i}/1 + e^{z_i} \text{----------(10)}$$

Therefore, for the i^{th} observation, a household will be:

$$Z_i = lnP_i/1 - P_i = \beta_0 + \sum\beta_0 X \text{----------(11)}$$

Therefore, ln(P/1-P) = 1, if the household is poor and ln(P/1-P) = 0, if otherwise. The Implicit form of the model is defined as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + U \text{--------(12)}$$

Where:

Y = Poverty status of household (Poor = 1, 0 = otherwise), X_1 = Marital status (1= married, 0 = otherwise), X_2 = Household size (Headcount), X_3 = Access to credit (1=Yes, 0 = No), X_4 = Farming experience (Years), X_5 = Farm Income (Naira), X_6 = Off farm Income (Naira), X_7 = Membership of co-operatives (1= yes, 0 = No), U = Error term.

Gini coefficient

Developed by Corrado Gini in 1912, the gini coefficient is a commonly used statistical measure of income inequality in a society. The ratio ranges between 0 and 1, with 0 indicating a perfect equality meaning everyone has equal income and a value of 1 corresponds to perfect unequal income among the farmers where one person has all the income. The Gini ratio was estimated by the equation:

$$\mathbf{G} = \frac{\sum_{n=1}^{n}(2i - n - 1)_{x_i}}{n^2\mu} \text{----------(13)}$$

Where G = Gini coefficient, i = 1,……,n farmers (in ascending order), xi = income of individual farming household (xi ≤ x2 ≤ …..≤ xn), n = total number of households and μ = mean income.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Farming Households in Dutse L.GA, Jigawa State

Socio-economic characteristics of the respondents presented in Table 1 shows that the farmers were majority male, married, 41 years old, mostly had some level of formal education, with large household size and cultivated one hectare on average. These results highlight a typical smallholder production system. These individual characteristics were found in similar studies by Busari *et al*. (2018), Smith & Johnson (2018) and Ukwuaba *et al*. (2020).

Table 1: Distribution of the respondents based on socio-economic characteristics (n = 122)

Variable	Frequency	Percent
Gender		
Male	110	90.2
Female	12	9.8
Marital status		
Single	31	25.4
Married	87	71.3
Divorced	2	1.6
Widowed	2	1.6
Educational status		
Primary education	14	11.5
Secondary education	43	35.2
Tertiary education	15	12.3
Qur'anic education	50	41.0
Source of land acquisition		
Inherited	60	49.2
Gift	26	21.4
Purchase	27	22.1
Hired	9	7.3
Extension contact		
Have contact	44	36.1
No contact	78	63.9
Gender of household head		
Male	116	95.1
Female	6	4.1
Credit access		
Access	37	30.3
No access	85	69.7
Membership of cooperative		
Yes	16	13.1
No	106	86.9
Credit sources		
Friends, relative/family	30	24.6
Private trader sector	7	5.7
No source	85	69.7

Poverty Profile of Farmers in Dutse L.G.A of Jigawa State

The poverty profile of the farmers was analysed and the results are in Table 2. Applying a poverty line of ₦30732.33, which was 2/3rd of the mean per capita income, the analysis showed that 83.6% of the respondents were poor, 98.4% of the total of respondents were living below the poverty line as reflected by the poverty incidence value which indicated that poverty was pervasive in the study area. The poverty depth was 34.7%, meaning that the income of the poor households must raise by 34.7% in order to reach the poverty line. For clarity, it means that about 35% of the per capita income which is ₦10756.32 is needed to raise the poor farmers from below the poverty line to the poverty line. Similar result (0.30)

was reported by Ike and Uzokwe (2015). The poverty severity index revealed that 96.1% of the respondents were extremely poor. The implication is that the farming households were facing significant economic hardship and had a low-income level. This finding was in line with Jatto *et al*. (2021) in their study of poverty status of farm households in Oyo state, Nigeria.

The poverty incidence (P_0) was 98.4% which implied that 98.4% of the total respondents were living below the poverty line revealing that poverty was pervasive in the study area. Furthermore, a severity of 96.1% reveals that a high proportion of the respondents were extremely poor. The implication is that the farming households will be faced with significant economic hardship and be constrained with the ability to diversify both in terms of the types of enterprises and in taking advantage of any local labour market options. This finding was in line with Jatto *et al*. (2021) in their study of poverty status of farm households in Oyo state, Nigeria. Although, agriculture is the leading income source in northern Nigeria, there is a huge variation in incomes depending on factors including type of enterprise being pursued, farm management skills and attitudes of farmers and fertility of the soil in the area. These determine the yields and incomes of farming households.

Table 2: Poverty profile and income inequality of the respondents

S/No	Indicators	Value
1	Poverty line (₦)	30732.33
2	Poor (%)	83.60
4	Poverty incidence	0.98
5	Poverty depth	0.35
6	Gini coefficient	0.61

Gini Coefficient of the Respondents

A 0.61 gini coefficient as presented in Table 2 indicates a severe inequality of income within the farming households in the study area. According to Luebter (2010), Gini coefficient above 0.35 indicates higher inequality. The implication of this finding is that poverty and income inequality are closely related (McKnight, 2018), and it has been argued that rising income inequality is a manifestation as well as a driver of poverty (UNU/WIDER, 2000). This is because income inequality translates into inequalities in access to basic services and lower opportunities to get out of the poverty trap (African Development Bank (ADB), 2012). Furthermore, it has been found that income inequality adversely impacts poverty in Sub-Saharan Africa (Amponsah, Agbola & Mahmood, 2023). Thus, as income inequality increases, the incidence of poverty also increases. In comparison with other studies, Akpan *et al*. (2020) reported a lower Gini coefficient of 0.58 among oil palm farmers in Akwa Ibom state of Nigeria. This is unsurprising because oil palm is considered a cash crop in Nigeria compared to the farmers in the study area who were cereals farmers.

Factors Influencing Poverty Status of the Respondents

A binary logistic regression analysis was conducted to determine the factors influencing the poverty status of farmers in the study area and the results are presented in Table 3. Important diagnostics tests on the model showed the model was statistically significant, indicating that the explanatory variables estimated reliably distinguished between

the poor and non-poor (Chi^2) = 82.09, p = 0.000). The pseudo-R^2 value of 0.78 translated to 78% of the variance observed in the model was attributed to variability among the independent variables. The fitness of the model was further confirmed by the 1% significant level of the chi-square (X^2) value. The dependent variable (poverty status) was captured as poor = 0 and Not poor = 1 based on the poverty line of ₦30732.33 ($1.90 per day per adult equivalent as at November, 2023).

According to the result, household size variable was significant at 10% with a negative coefficient (β = -0.16). The result revealed that an increase in household size decreases the farmers' chances of being poor. Possible explanation for this is that depending on working age of household members, they may be able to find additional sources of income for the household, resulting in poverty reduction. This finding supports Mattayaphutron and Mahamat (2021). The odds ratio indicated that ceteris paribus, a one person increase in household size was associated with 0.85 times decreases the households' odds of becoming poor. Having access to credit was found to be statistically significant (at 1%) and it suggested that farmers who had access to credit were likely to be poor. The odds ratio of 864.23 means that, ceteris paribus, having access to credit increases their odds of becoming poor by 864.23 times. The finding was quite interesting because advocates for credit facilities argue in favour of the positive effects. For example, Igbalajobi *et al*. (2013) reported that credit access enables farmers to purchase sufficient and timely inputs for their production activities, which ultimately results in increased yields, output, income, and savings, and eventually a reduction in household poverty. However, it is important to note that credit can be positive only if it is used exclusively for what they are meant for. This study did not confirm if the 13% (Table 1) of the respondents who had access to credit defaulted in their usage. Comparing this finding with other studies revealed a contrasting outcome. While Jatto *et al*. (2021) reported similar findings for farmers in Oyo state, Nigeria, Machio (2015) found no effect of credit on poverty status of cash crop farmers in Kenya.

Table 3: Factors influencing poverty status among the respondents

Independent variable	Exp (B)	Standard Error	Sig	Odds ratio
Marital Status	-0.4155	1.3239	0.754	0.6600
Household size	-0.1614	0.0880	0.067*	0.8510
Credit access	6.7618	2.2533	0.003***	864.2324
Farming experience	0.2020	0.9179	0.028**	1.2238
Farm income	8.79e-06	2.88e-06	0.002***	1.0000
Off farm income	0.0000144	6.71e-06	0.032**	1.0000
Membership of cooperative	-0.0632	1.4591	0.965	0.9387
Constant	-10.6512	4.6581	0.022**	0.0000
Diagnostic Tests				
LR chi^2	82.094			
DF	7			
Pseudo R^2 (Cox & Snell)	0.7778			
Log likelihoods	-11.7230			

Note: *** signifies statistically significant at 1%, ** signifies statistically significant at 5%, * signifies statistically significant at 10%.

Furthermore, the odds of being poor was predicted to grow by about 1.224 times for every additional year in households' farming experience. This relationship was statistically significant at 5% with a positive coefficient ($\beta = 0.2020$). Oftentimes, rural farmers are found to be conservatives or may be too confident in their production/management practices where they may not be open to new technologies. This could result in non-optimal use of their resources, leading to low yields and low incomes, hence, poverty. As confirmed by Kibet *et al*. (2019), risk averse farmers are likely to be poor. Additionally, the results showed that the variables representing amounts of incomes received from farming and nonfarm sources were statistically significant at 1% and 5%, respectively. Specifically, their positive coefficients translated to increases by one naira in both variables reduced their chances of being poor by negligible amounts. According to their odds ratios presented in Table 3, the odds of the respondents being poor were unaffected by them having farm incomes or having non-farm incomes. Jatto *et al*. (2021) reported similar results for per capita income of farm households in Oyo state, Nigeria.

CONCLUSION

Jigawa state has a large and growing share of people living in poverty and this may be more pronounced among the farmers. Hence, empirical evidence on the poverty status, its determinants, and income inequality of farming households in Dutse L.G.A is crucial due to the dominance of agriculture-based employment activities in the state. Based on the results, it was established that smallholder males, who were married, and had large household sizes dominated the farming households in the study area. The households cultivated one hectare on average and do suffer the consequences of poverty. Of particular importance was the revelation of a high incidence of poverty (98.4%) and an unequal distribution of income (0.6), which could threaten the livelihoods of the farming households and the sustenance of farming activities in the area. An investigation of socio-economic determinants of their poverty status showed that the coefficients of farm income and off farm income were positive and had significant influences on the poverty status of the respondents. The odds ratios revealed that there was no association between farm income and poverty status of the respondents. However, this does not diminish the importance of agriculture for poverty reduction in the state, being the dominant activity for many of its households. Without a doubt, agriculture is an important activity in Jigawa state, and the performance of the agricultural sector has implications for poverty. The agriculture system in the state is characterized as smallholder, employing very basic technology in their production activities. The study found that longer years of farming experience was linked to poverty, and this could indicate them being risk-averse and unwilling to adopt new technology that could improve their yields and incomes. Additionally, it could imply their improper use of inputs. Therefore, a recommendation was made for increased information about proper farming practices. Policies favourable to increasing crop yields and outputs as well as encouraging diversification of income generating activities both within and outside agriculture could reduce the poverty incidence in the study area. Additionally, credit supply-based interventions need to monitor closely if and how farmers use their funds so as to prevent misuse.

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