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# Determinants of Poverty Status of Cassava-based Farmers in Imo State, Nigeria

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### Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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## ABSTRACT

The study assessed the determinants of Poverty Status of Cassava based farmers in Imo State, specifically; it examined the socio-economic characteristics of cassava farmers and assessed determinants of poverty status among cassava-based farmers in Imo state. Multistage and purposive sampling techniques were used in selecting sixty (60) cassava-based farmers in the three agricultural zones in the area. Data used for the study were obtained using structured questionnaire. The data obtained were analyzed using descriptive statistics, Foster Greer Thorbecke (FGT) and ordered probit model. The result showed that the mean age was 50 years, 67% of the respondents were women, 47% of the respondents attended secondary education, they have 25 years mean farming experience, the mean household size was 6 persons, 88% of the farmers are married, and they have mean farm size of 1.03 hectare. The result of Foster Greer Thorbecke (FGT) analysis showed that the estimate of the poverty profile of cassava-based farmers in the study area was N62, 476.67k, the poverty incidence was 0.25, and the poverty depth and severity were 0.0659 and 0.0362 respectively. This implied that 6.59% of the total expenditure is required to close the poverty gap while in extreme cases additional 3.62% was required to cross the poverty line. The ordered probit analysis showed that education, household size, farm income and extension contact were statistically significant at 1% and 5% probability levels, respectively. Findings revealed that education, household size, farm income and extension contact were the significant determinants of farmers poverty status.

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## **1. INTRODUCTION**

Poverty is an unacceptable deprivation in human well-being comprising both physiological and social deprivation World Bank, 2000; Etim et al. [1]. According to Food and Agriculture Organization [2], poverty is a situation in which an individual lacks control over economic resources, is unable to take part in the society and fails to meet up to a standard of living generally accepted by a given society at a given period. Based on proper scrutiny and understanding of various definitions and concepts of poverty, suffice it to say that, poverty can be seen as the sum-total of all the factors, both social, psychological, physical, economic and otherwise which affects and predisposes a particular set of people in the society and makes them vulnerable to adverse conditions thereby making them live below the generally accepted standard of living. Nigeria has been reported to have assumed the position of poverty capital of the world. There is an estimate of 86.9million Nigerians living in extreme poverty. The international poverty line is \$1.90 i.e. ₦684, however a recent assessment on poverty level in Nigeria shows that over 70% of the population are living on less than \$1 per day where over 50% are living below the national poverty line [3].

Poverty could be absolute or relative. Absolute poverty is a situation whereby a person cannot afford to meet basic needs, similarly, relative poverty is when a person cannot afford to meet up with his desires and wants, in other words, his resources (material, cultural and social) are inadequate and exclude him from the minimum acceptable living standard of the society in which he lives [1,4]. The Food and Agriculture Organization, FAO [5] reported that close to 870 million in the world were suffering from chronic undernourishment between the years 2010 and 2012 with the majority of them found in developing countries of which Nigeria is inclusive. According to Oladeebo et al. [6], Many programs and projects that were based on resource allocation such as Millennium Development Goals (MDGs), farm input subsidies (E-wallet project) and N-power programmes have been developed by government and civil society in Nigeria with the help of non-governmental agencies. The aim was to eradicate poverty in the society. However the global statistics of hunger and

undernourishment are still shocking; Thus, the need to eradicate hunger remains the major global challenge confronting both developed and developing countries [7].

In Nigeria, the agricultural sector is characterized by intense poverty which is at an increasing rate even though many policies have been formulated for its alleviation [8], Apata et al. [9] and Etim et al. [1]. According to Etim et al. [1], the reasons behind the pervasiveness of poverty in the Nigerian agricultural sector cannot be far-fetched due to the fact that most of the people living in Nigeria are poor. This has been due to the fact that about 63% of rural dwellers mainly the poor engage in subsistence farming on relatively small fragmented lands, have low access to infrastructures and social amenities, inadequate access to modern technology, increasing population growth, poor market and road network, high rate of illiteracy, poor storage facilities, etc. These challenges militating crop production is undoubtedly the reason behind the insufficiency in food production and supply in the country resulting to abject hunger and poverty. This in line with the findings of Ibekwe et al. [10] that the gap between food production rate and food demand is continuously widening despite the fact that various programs have being introduced by the government in order to increase food production, eradicate hunger and poverty and also increase the standard of living of the populace.

Cassava (*Manihot esculenta*) as defined by the International Institute of Tropical Agriculture [11] is a herbaceous perennial woody shrub with an edible root, which grows in tropical and subtropical areas of the world. It is a nutty-flavored starch-tuber that belongs to the spurge family Euphorbiaceae. It is rich in carbohydrates, calcium, vitamins B and C, and essential minerals. However, its nutrient composition differs according to variety, soil conditions, climate, and other environmental factors during cultivation [11]. Akpan et al. [12] also reported that cassava is one of the popular and widely cultivated food crops in the southern part of Nigeria. This could be as a result of its wide range of use and ability to be processed into different products such as garri, fufu, dry cassava chips, cassava flour, cassava starch, etc. its importance in the livelihood of rural poor and the developing country like Nigeria cannot

be overstated. Aside from satisfying the dietary needs of the greater part of Nigeria population especially the rural poor, there is a record of increasing demand for cassava as a raw material for manufacturing livestock feed, biofuel, pharmaceutical and textile industries (Akpan et al. 2015). As result cassava has been considered as one of the preemptive famine reserve crops in areas where rainfall is unpredictable, this gives it an advantage over yam and other root and tuber crops in Africa most especially in Nigeria (Hendershot, 2004) as reported by [7], as a result cassava production in Nigeria is on the increase with an average yield of 10.6-tonnes per hectare Ebong et al. [13] and Onubuogu et al. [14]. Despite all the aforementioned efforts of the government and non-governmental agencies alongside with the role of cassava poverty eradication, there is still a record of over two-third of Nigerian populace ascribed as being poor. The principal roles of cassava in food economy and its ability to survive drought and do well on poor soils have made it an important food and cash crop which has the capability of reducing poverty [15], yet, the rural people that are the main producers of cassava are poverty stricken. This in line with [3] agrees that 65% of the poor people live in rural areas where their major occupation is farming. The question now is what determines poverty level of rural farmers who engage in cassava production in the study area and this is the research gap this study sought to close. The relationship between poverty and agriculture is essential because of the key role played by agriculture in raising economic growth, improving productivity and income. Hence there is a need for sustainability of cassava production as food security and poverty reduction tool in Nigeria. Therefore, this study seeks to assess the determinants of Poverty Status of Cassava based farmers in Imo State, specifically; it examines the socio-economic characteristics of cassava farmers and examines the determinants of poverty status among cassava-based farmers in Imo state.

## 2. MATERIALS AND METHODS

The study was conducted in the three agricultural zones in Imo state which are Okigwe, Orlu and Owerri. Imo state is situated in the South Eastern part of Nigeria. It consists of twenty seven (27) local government areas [6]. Imo State lies within the latitude 4°45-N and 7°15-N and longitude 6°50-E and 7°25-E with land area of about 5,100 km<sup>2</sup> [17]. It is bordered by Abia state on

the East, River Niger and Delta state on the West, by Anambra State to the North and Rivers State to the South. It has an annual rainfall varying from 1,500 mm to 2,200 mm, an average annual temperature above 20°C and an annual relative humidity of 75% with humidity reaching 90% in rainy season [17]. The estimated population is 4.8 million and the population density varies from 230-1,400 people per square kilometer [14]. The main occupation in Imo state is trading and agriculture [16]. Most households cultivate food crops such as cassava, cocoyam, yam, maize, melon, okra and vegetables (green, fluted pumpkin, water-leaf and bitter leaf), etc. and rear livestock especially birds and goats [16]. The household are also involved in the processing of some of these crops example; maize to corn meal, cassava to garri, fufu and flour. The choice of using Imo State as a study area is because cassava is the predominant crop in the area and is usually planted as a mixed or mono cropping.

Multistage and purposive sampling techniques were used to select households from which socio-economic characteristics and the determinants of poverty status among cassava-based farmers were carried out in the study area. In the first stage one local government area was randomly selected from each of the three agricultural zones in the State. This was because farming was their major occupation in the study area. In the second stage, two communities were randomly selected from each of the three local government areas. In the third stage, one rural village was randomly selected from each of the six communities making a total of six villages for the study. Finally, a total of ten farmers were randomly selected from each of the villages giving a sample size of sixty (60) respondents. The study utilized primary data which was collected by using structured questionnaire/focus-group discussion method, while the secondary information were gotten from relevant literatures, academic journals and online publications on cassava-based farmers in the area. Objectives were analyzed using simple descriptive statistical techniques such as mean, Frequency distribution, tables and percentages, Foster Greer Thorbecke (FGT) indices and ordered probit model. The FGT Poverty indices are stated by (Edoumiokumo et al. 2014):

$$Pa = \frac{1}{N} \sum_{i=1}^n \left[ \frac{Z-Y_i}{Z} \right] \alpha$$

Where,

- N = Total population (number)
- n = Number of farmers below the poverty line (number)
- Y<sub>i</sub> = Per capita expenditure of those classified poor (naira)
- α = Poverty aversion parameter that takes the value 0, 1, 2 (number)
- z = Poverty line: two-third of the total expenditure (naira) and

$$z = \frac{2}{3} \left[ \frac{\text{Total Expenditure}}{N} \right]$$

When α = 0, the poverty incidence was calculated as follows:

$$P_0 = \frac{n}{N}$$

Poverty incidence also known as poverty head-count refers to the proportion of the total population of a given group that is poor, based on a given poverty line.

When α = 1, the poverty depth is stated as:

$$P_1 = \frac{1}{N} \sum_{i=1}^n \left( \frac{z-y_i}{z} \right)^1$$

The poverty depth also known as poverty gap refers to the difference between a given poverty line and the mean expenditure of the poor, expressed as a ratio of the poverty line.

When α = 2, the poverty severity is stated as:

$$P_2 = \frac{1}{N} \sum_{i=1}^n \left( \frac{z-y_i}{z} \right)^2$$

This is often described as a measure of the severity of poverty. While the poverty gap takes into account the distance separating the poor from the poverty line, the square gap takes the square of that distance into account. However, given the expenditures and poverty line generated, the cassava-based farmers were further categorized into the following poverty state.

- 0 = extremely poor
- 1 = moderately poor
- 2 = slightly non poor
- 3 = Non poor

The ordered probit model was then used to assess the determinants of poverty status among cassava-based. Whenever poverty categories have a natural order, the ordered probit is the appropriate model to be employed in the estimation of relevant probabilities (Greene, 2002).

Ordered probit measures the probability that the dependent variable falls in one of the discrete categories conditioned on levels of the independent variable. This is stated as:

$$y^* = \beta_0 + \sum_{j=1}^k \beta_j X_{ji} + \mu_i$$

Where,

- y\* = Unobserved variable (latent variable)
- μ<sub>i</sub> = error term
- β<sub>0</sub>, ..., β<sub>j</sub> = Parameters

X<sub>ji</sub> = Independent variables of the i<sup>th</sup> farmer (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub>, X<sub>6</sub>, X<sub>7</sub>, X<sub>8</sub>)

X<sub>1</sub> = Age (years)

X<sub>2</sub> = Education (Years)

X<sub>3</sub> = Farming experience (years)

X<sub>4</sub> = Household size (number of persons)

X<sub>5</sub> = Annual farm income (N)

X<sub>6</sub> = Farm size (hectares)

X<sub>7</sub> = Extension contact (number of visits per month)

X<sub>8</sub> = Membership of Cooperative (Member=1, Non-member= 0)

Given the various categories, the study derived the probabilities of being poor as:

$$Pr(y_i = 0) = Pr(y_i^* < \mu_1)$$

$$Pr(y_i = 1) = Pr(\mu_1 \leq y_i^* < \mu_2)$$

$$Pr(y_i = 2) = Pr(\mu_2 \leq y_i^* < \mu_3)$$

$$Pr(y_i = 3) = Pr(\mu_3 \leq y_i^*)$$

Therefore, what was observed (y<sub>i</sub>) is the following actual placement in the discrete category:

0 = extremely poor if Y<sub>i</sub> = 0 if Y<sub>i</sub>\* < Z<sub>1</sub> (extremely poor)

1 = moderately poor if Y<sub>i</sub> = 1 if Z<sub>1</sub> ≤ Y<sub>i</sub>\* < Z<sub>2</sub> (moderately poor)

2 = slightly non poor if  $Y_i = 2$  if  $Z_2 \leq Y_i^* < Z_3$  (slightly non poor)

3 = Non poor if  $Y_i = 3$  if  $Z_3 \leq Y_i^*$  (non-poor)

Where;

$Y_i$  = Observed variable (Dependent variable)  
 $Z_i$  = Threshold parameter for the placement of  $y_i^*$  in the discrete poverty categories (constructed from the poverty line).

### 3. RESULTS AND DISCUSSION

From Table 1.1 the mean age was 50 years meaning that cassava production was relatively dominated by aged farmers. This could be associated with increased rural-urban migration and also youth engagement in non-agricultural activities hence leaving cassava production in the hands of old farmers, this could create hindrance to efficient production as Anyanwu et al. (2012) recognized that young people are more likely to be energetic and have the capacity to use innovation than aged people. The mean farm size of 1.03 ha, showed that cassava farming in the study area was dominated by small farm scale farmers and this is in agreement with the findings of Offor and Onyewuchi, [18] and Anyiro et al. [19] who stated that most farmers have farmland of less than or equal to 1 ha. The implication of having less than or 1 ha of land invariably means that the farmers cannot commercialize cassava farming to be more profitable. The household size of 6 persons confirms an average household among cassava farmers in the area which implies that they can be supportive and can serve as a cheap source of labour for farming activities thereby reducing the cost of production. But there are two sides of the coin which is if the average age of the farmers household is too young or too old, therefore it may become a burden which implies that the too young and too old may not be supportive in his cassava venture but rather are dependent and are expensive to carter for.

This is consistent with the findings of Eze and Nwibo [20] in Delta State and Akpan et al. (2017) in Akwa Ibom State. The mean value of 25 years in cassava production showed that majority of the respondents in the area has adequate experience in cassava production, but adequate experience must translate into more profit in cassava farmers' ventures. This is because more years of experience increase technical know-how. Also more women are involved in cassava production than men because farming is perceived as female occupation (Amusa et al. 2011), the perception of cassava being categorized as a female crop should be scrutinize as males should be encouraged to go into it for commercial purposes than the gender dichotomy which is perceived to occupy presently in order to close the poverty gap. The farmers had basic education and are literate enough about the practice and can impact knowledge to others. This is in agreement with Anyanwu et al. (2012), who showed that increase in the educational level of smallholder cassava farmers will result in increase in their orientation towards cassava production for the market or commercialization index.

**Estimation of poverty status of cassava-based farmers and determinants:** Table 2 showed the estimate of the poverty profile of cassava-based farmers in the study area. It showed that the poverty line was ₦62476.67k. This is an indication that the expenditure of a cassava-based farmer below this value was poor. The poverty incidence was 0.25, implying that about 25% of cassava-based farmers are classified poor in the area. It also showed that the poverty depth and severity were 0.0659 and 0.0362 respectively. This an indication that additional 6.59% of the total expenditure required to close the poverty gap, while at extreme cases additional 3.62% is required to cross the poverty line.

Using the poverty line, the farmers were further placed into four poverty categories, namely, extremely poor (0), moderately poor (1), slightly

**Table 1. Socioeconomic characteristics of cocoyam farmers in the study area**

Socio-economic variables	Mean distribution
Age	50 years
Household size	6 persons
Education	9.23 years
Years of experience	25 years
Farm size	1.03 ha

**Table 1.1. Distribution of respondents based on their socio-economic characteristics**

Gender	Frequency	% distribution
Male	20	33
Female	40	67
<b>Marital status</b>		
Single	7	12
Married	53	88
<b>Level of education</b>		
No formal education	0	0
Primary	24	40
Secondary	28	47
Tertiary	8	13
<b>Membership of cooperative</b>		
Members	25	42
Non-members	35	58
<b>No. of extension visit/month</b>		
0	26	43
1	0	0
2	34	57
<b>Total</b>	<b>60</b>	<b>100</b>

Source: Field Survey Data (2019)

**Table 2. Estimated poverty profile of cassava-based farmers**

Items	Values
Poverty line (Z)	62476.67
Number below Z	15
Poverty incidence (Head count)	0.25
Poverty depth	0.0659
Poverty severity	0.0362

Source: Field Survey Data, 2019

**Table 3. Estimate of ordered probit**

	Coefficient	Std. error	Z	p-value
Age	0.00083926	0.000836086	-1.0038	0.31548
Education	0.110422	0.0497391	2.2200	0.02642**
Farm experience	-0.0212265	0.0179367	-1.1834	0.23665
Household size	-0.402818	0.102332	-3.9364	0.00008***
Farm Income	3.38124e-05	1.43448e-05	2.3571	0.01842**
Farm Size	0.15379	0.171299	0.8978	0.36930
Extension contact	-0.791578	0.323866	-2.4442	0.01452**
Membership Coop	0.102088	0.342199	0.2983	0.76545
Cut1	0.214418	0.912876	0.2349	0.81430
Cut2	1.22951	0.916981	1.3408	0.17998
Cut3	2.09201	0.938329	2.2295	0.02578**

Mean dependent var 1.440678 S.D. dependent var. 1.118361; Log-likelihood -66.55774 Akaike criterion 155.1155; Schwarz criterion 177.9684

Hannan-Quinn 164.0363

Likelihood ratio test: Chi-square [0.0002] 29.8809

Source: Field survey (2019)

non poor (2) and non-poor (3). The ordered probit was then used to measure the probability that the poverty state of each farmer falls in one of the category.

The ordered probit analysis showed that education, household size, farm income and extension contact were statistically significant at 1% and 5% probability levels, respectively.

**Table 4. Marginal effects of poverty determinants**

<b>Variables</b>	<b>Extremely poor (0)</b>	<b>Moderately poor(1)</b>	<b>Slightly non poor (2)</b>	<b>Non poor (3)</b>
Age	-0.0274	-0.0272	0.0235	0.0311
Education	-0.0519	-0.0309	0.0312	0.0516
Farm Experience	-0.0166	-0.0109	0.0101	0.0174
Household size	0.0788	0.1303	-0.0125	-0.1966
Farm Income	-0.0205	-0.0182	0.0133	0.0254
Farm size	0.0107	0.0022	-0.0101	-0.0028
Extension contact	-0.0107	-0.0284	0.021	0.0181
Membership Coop	0.0059	0.0074	-0.0026	-0.0107

Source: Field survey (2019)

However, the likelihood chi square (29.8809) was found significant at 1% probability, and as a result, the null hypothesis was rejected. Therefore the study accepted the alternative and concluded that the socioeconomic characteristics of cassava-based farmers influence the poverty level in the area. Given that the dependent variable of the regression, is an ordered variable, the marginal effects of the explanatory variables were computed for the four categories of poverty which, to some extent, would reflect the effect of a unit change in any explanatory variable on the probability of being extremely poor (0), moderately poor (1), slightly non poor (2), and non-poor (3).

Table 4 showing the marginal effects of poverty Determinants. Education was found positive and statistically significant at 5% probability level. This implies that a unit change in education level will influence the level of poverty in the area which invariably means that 95% times that education reduces the level of poverty in the area increases. Household size was found negative and statistically significant at 1% probability level. Household size which is negative means that more of the cassava base farmers household were not supportive but rather dependent and it further drives down the fact that more mouths to feed or aged family to take care of increases the cassava based farmers level of poverty. Farm income was found positive and statistically significant at 5% probability level. Extension contact was found positive and statistically significant at 5% probability level.

#### 4. CONCLUSION

From the findings, it could be concluded that cassava farmers were mostly female and falls below poverty level. This implies that cassava based farmers in the study are were poor. Socio-economic characteristics of the cassava-

based farmers were found to influence their poverty status. The main determinants of poverty level in the study area were level of education, household size, farm income and extension contact. More males and especially youths should be encouraged to join cassava venture to be able to help aged ones, learn from their experiences and bring innovation to cassava production. Farm size of cassava based farmers should be increased through giving them loans to acquire lands for cassava commercialization so as to increase their profit.

#### COMPETING INTERESTS

Author has declared that no competing interests exist.

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