

## RESEARCH ARTICLE

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## Effects of Livelihood Diversification on the Poverty Status of Cassava Farmers in Edo South, Edo State, Nigeria

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### Abstract

Cassava farmers are faced with several constraints that have often times led to reduced income and consequently, poverty. Hence, they tend to find alternative means to generate income. This study therefore focused on the effect of livelihood diversification on the poverty status of cassava farmers in Edo South, Edo State, Nigeria. A three-stage sampling procedure was used to select 104 cassava farmers in the study area. The data were analysed using descriptive statistics, budgetary technique, Foster- Greer- Thorbecke (FGT) poverty measure and logit regression model. Results showed that many of the cassava farmers were growing plantain (67.6%), maize (64.7%) and yam (56.9%), while the off farm activity mainly engaged in was trading (16.7%). The result also showed that the gross margin and net profit per hectare of cassava farm per production cycle were ₦133,527.59 and ₦124,279.2 respectively. The result showed that the average income of farmers that engaged in other on-farm activities was ₦100,898.04, while, the average income of the farmers that engaged in off farm activities was ₦134,352.94. The relative poverty lines of the farmers with and without diversification were ₦323.11 and ₦253.04 respectively. The absolute poverty line was ₦456.56. Result on the poverty status showed that about 49% and 45% of farmers with and without diversification respectively were poor. The significant determinants of poverty were household size and farm size at 1% level of significance. It was concluded that livelihood diversification reduced the poverty of the cassava farmers in the study area.

**Keywords:** Diversification; Poverty; Foster-Greer-Thorbecke (FGT) model; Cassava; Edo State.

### 1. Introduction

A precise definition of poverty has become a controversial issue both in theory and policy [4]. [13] describes poverty “as hunger, lack of shelter, being sick and unable to seek health care, not having access to school, not having a job, fear of the future, powerlessness and lack of representation and freedom”. In Nigeria, in spite of the country’s vast natural and human resources the issue of poverty has been described as pervasive and palpable on the people especially the rural dwellers [1] who depend mainly on agriculture for their means of survival. It is however important to know how poor the rural dwellers would be when engaged in a mixed enterprise of agricultural and non agricultural activities. They engage in several agricultural activities, and, in recent times cassava is an important crop grown by many of the farmers due to its high

demand both locally and internationally for several domestic and industrial uses [4].

Cassava (*Manihot esculenta*) an important staple food crop in Nigeria is the third source of food carbohydrate after rice and maize. It plays a number of different but equally important roles in Africa development such as famine reserve, rural food staple, cash crop, urban food staple, industrial raw material and livestock feed amongst others [8]. Despite these unique roles, the cassava subsector is still constrained by a number of factors such as pests and diseases, poor/traditional processing facilities, risks and uncertainty and declining farm sizes due to high population growth rate [12]. These constraints which may result in low income have caused many of the cassava farmers to diversify into other livelihood activities as a thought way out of their poor income.

Livelihood diversification as defined by [3] is the process by which rural households construct a diverse portfolio of activities and assets in order to survive and

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improve their standard of living. Livelihood diversification reduces household vulnerability or weakness to shocks brought about by climate change, pests and diseases outbreak and other forms of disasters. This study therefore identified other forms of livelihood activities engaged in by the cassava farmers; determined the profitability of cassava production; determined the contribution of the other livelihood activities of the cassava farmers; determined the poverty status of the farmers with and without diversification; and identified the determinants of poverty among cassava farmers.

## 2. Materials and Methods

### 2.1. Area and scope of study

Edo State is an inland State in Southern Nigeria. Its capital is Benin City. It was formed on the 27<sup>th</sup> of August, 1991. Edo State is located on longitude 06°04' East and 06°43' East and latitude 05°44' North and 07°35' North of the Greenwich meridian. It occupies a land area of 19,794 square kilometres. Edo State shares boundaries with Delta State in the South, Ondo State in the West, Kogi State in the North and Kogi and Anambra States in the East. The State has 18 local government areas. It has a tropical climate characterized by two distinct conditions of wet season (April-October) and dry season (November-March). The State has an estimated population of 3,479,502 according to the 2006 population census figure. Agriculture is the predominant occupation of the people in the State. The major cash crops produced are rubber, cocoa and oil palm. In addition, the State produces food crops such as cassava, yam, rice, plantain, guinea corn and fruits and vegetables.

The study was carried out in Edo South Agricultural Zone of Edo State. Edo South has seven local government areas which include: Egor, Ikpoba–Okha, Oredo, Orhionmwon, Ovia North East, Ovia South West, and Uhumwonde. It is made up of the bini speaking people. The scope of the study covered cassava farmers that engaged in other livelihood activities (agricultural and non agricultural activities) in Edo South.

### 2.2. Sampling procedure and sample size

A three-stage sampling procedure was used. The first stage involved the use of simple random sampling technique in selecting two Local Government Areas (Ikpoba Okha and Ovia North East Local Government

Areas) out of the seven Local Government Areas in Edo South. In the second stage simple random sampling technique was used in selecting two communities each from the two Local Government Areas. Idogbo and Ulegun communities from Ikpoba Okha LGA; and Osasinmwino and Ekosodin communities from Ovia North East LGA. The third stage employed both snowballing and simple random sampling technique in selecting 26 cassava farmers from each community making a total of 104 cassava farmers. However, only 102 copies of questionnaire were useful for this study.

### 2.3. Data analysis

Data collected were analysed using descriptive and inferential statistics. Descriptive statistics used are frequency, percentages, mean and standard deviation. The inferential statistics used are budgeting technique, Foster-Greer-Thorbecke (FGT) model, and logit regression model.

### 2.4. Budgeting technique

Gross margin and the net profit analyses are the budgeting techniques employed. These were used to determine the profitability of cassava production. According to [10], the gross margin model is given as:  $GM = TR - TVC$

Where GM = Gross margin of cassava production (₦)

TR = Total revenue from cassava production (₦)

TVC = Total variable cost of cassava production (₦)

$NFI = TR - TC$

Where NFI = profit =  $\pi$

TC = Total cost of cassava production (₦)

$ROI = \frac{\pi}{TC}$

ROI = Return on Investment

Income from other sources of income was in naira. This was gotten by asking the farmers their profit/income from their other sources of income.

### 2.5. Poverty status

The poverty status of farmers with and without diversification was determined using the poverty line analysis. This was done to categorize the farmers into poor and non-poor groups using two-third of the mean per capita income as the bench mark (poverty line) as used by [7] Households with mean per capita income below the poverty line were regarded as poor, while those with mean per capita income above the poverty line were non-poor. The poverty line is given as:

Per-Capita Income (PCI) = total income/ household size = Income per head per day

Total per-Capita Income (TPCI) = summation of PCI

Mean TPCI (MTPCI) = TPCI / Total Number of Households

Poverty line = 2/3 MTPCI

### 2.6. Absolute Poverty Line Determination

The world standard of 1.25 dollars per day was employed. The 2017 exchange rate was used and the equivalent monetary value in naira was ₦365.25 per dollar and ₦456.56 per 1.25 dollars per day as at 9<sup>th</sup> of August, 2017.

Poor: Households with mean per-capita income below the poverty line (<₦456.56).

Non-poor: Households with mean per-capita income equal and greater than the poverty line (≥₦456.56).

### 2.7. Poverty Indices Analysis

[5] poverty measure was used to determine the poverty incidence, depth and severity of the farming households.

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left( \frac{z - y_i}{z} \right)^{\alpha}$$

where n = total number of households

q = the number of poor households

z = the poverty line for the households

y<sub>i</sub> = household income of the i<sup>th</sup> farmer

Z - y<sub>i</sub> = poverty gap for each household

α = the poverty aversion parameter and takes on the value 0, 1 and 2 for poverty incidence, depth and severity respectively.

### 2.8. Determinants of poverty

Logit regression model was used in analyzing the determinants of poverty among the farmers.

Poverty status = f (age, household size, farming experience, farm size, total income, sex and marital status)

The logit model as given by [6] is:

$$\text{Logit } P(y) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7)}} = \frac{\exp(\beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7)}{1 + \exp(\beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7)}$$

$$\text{Logit } 1-p(y) = \frac{1}{1 + \exp(\beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7)}$$

P(y) = the probability that y = 1

1-p(y) = the probability that y = 0

e = base of natural logarithm

$$\log \left( \frac{Y}{1-Y} \right) = \beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7$$

log = Logarithm

$\frac{Y}{1-Y}$  = odds ratio in favour of being poor

β's = coefficients of the parameters estimated

Poverty status = dummy variable (1 = household classified as poor, 0 = non poor)

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

X<sub>2</sub> = Household size (number of persons in a household)

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

X<sub>4</sub> = Farm size (hectares)

X<sub>5</sub> = Total income (naira)

X<sub>6</sub> = Sex (male = 1, female = 0)

X<sub>7</sub> = Marital status (Married = 1, unmarried = 0)

## 3. Results and Discussion

### 3.1. Livelihood activities of cassava farmers

The result in Table 1 shows that the most common other livelihood activities engaged in by the cassava farmers were cultivating plantain (67.60%), maize (64.70%), yam (56.90%), vegetable (34.30%), melon (19.6%), cocoyam (16.7%) and trading (16.7%). The result indicates that cassava farmers engaged more in on-farm livelihood activities as compared to off-farm activities. This therefore demonstrates that agriculture still continue to play a very key role in the livelihoods of the farmers.

**Table 1.** Livelihood activities of cassava farmers

<b>On farm activities</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yam	58	56.9
Maize	66	64.7
Fruit	2	2.0
Vegetable	35	34.3
Plantain	69	67.6
Cocoyam	17	16.7
Cocoa	1	1.0
Oil palm	1	1.0
Melon	20	19.6
Poultry	1	1.0
Fishery	1	1.0
Ruminants	2	2.0
<b>Off farm activities</b>		
Teaching	3	2.9
Trading	17	16.7
Civil service	2	2.0
Tailoring	1	1.0
Mechanic	1	1.0
Hair dressing	2	2.0
Barbing	1	1.0
Health care services	1	1.0
Painting	2	2.0
Electrical works	2	2.0
Plumbing	1	1.0
Driving	1	1.0
Total	307***	301.4***

Source: Computed from field survey data, 2017.

### 3.2 Profitability analysis of cassava Production

The result in Table 2 shows the average costs, returns and profitability of cassava production in study area. The total variable cost and total depreciated fixed cost per hectare per production cycle accounted for 96.53% and 3.47% of the total cost of cassava production respectively. This implies that the total variable cost accounted for a larger proportion of the total cost than the fixed cost. Considering the variable cost of production, labour cost accounted for the highest percentage (60.23%) of the total variable cost of production. This suggests that the supply of labour in the study area was below demand which could have resulted in the high cost of labour. Also, the use of crude implements and human labour as against the use of machineries could also have contributed to the high labour cost. The least cost of the variable cost of production was the purchase of bags. The various components of the total labour cost show that cost of planting accounted for the highest percentage (35.99%) and weed control accounted for the least (17.39%).

This could mean that planting in the study area was considered a more tedious work than clearing, however, it was not as expected.

The result also shows that the gross margin and net profit per hectare per production cycle was ₦133,527.59 and ₦124,279.2 respectively. This indicates that cassava production in the study area was profitable. The return on investment was 0.47 naira. This indicates that for every 1 naira spent the business yielded a return of 47 kobo. Thus, the business was profitable. This is in line with the findings of [9] who concluded in a study carried out on productivity and profitability of cassava production in Ika South and Ika North East Local Government Areas of Delta State that cassava production was profitable.

### 3.3. Contribution of the other livelihood activities of the cassava farmers

The result in Table 3 shows that the average income of farmers that engaged in other on-farm activities was ₦100,898.04, while, the average income of the farmers

that engaged in off farm activities was ₦134,352.94. This indicates that the income of the farmers that were involved in on-farm activities as their other source of livelihood was lower (42.9%) in

comparison to the income (57.1%) of the farmers that were involved in off-farm activities as their other

source of livelihood. This implies that off-farm activities contributed more than on-farm activities. This may be attributed to the constraints peculiar to agricultural produce, most especially constraints beyond the control of the farmers such as weather factors, pests and diseases, and the perishable nature of agricultural produce amongst others.

**Table 2.** Average costs, returns and profitability of cassava production per hectare per production cycle

Variable	Value	Percentage (%)
<b>Output (kg)</b>	<b>7393.45</b>	
Price per kg	52.84	
<b>Total revenue</b>	<b>390,669.90</b>	
<b>Costs</b>		
<b>Variable costs</b>		
Land preparation	39,436.27	<b>14.8</b>
Planting	55,745.10	<b>20.93</b>
Weeding	26,926.47	<b>10.11</b>
Harvesting	32,774.51	<b>12.30</b>
<b>Total costs of labour</b>	<b>154,882.35</b>	<b>58.14</b>
Rent	19,416.22	<b>7.29</b>
Herbicide	14,856.98	<b>5.58</b>
Bags	2980.07	<b>1.12</b>
Bundle	65,006.69	<b>24.40</b>
<b>Total variable cost</b>	<b>257,142.31</b>	<b>96.53</b>
<b>Depreciated fixed costs</b>		
Cutlass	3485.29	<b>1.31</b>
Hoe	509.80	<b>0.19</b>
Wheel barrow	1543.73	<b>0.58</b>
Files	1950.98	<b>0.73</b>
Motor bike	1758.59	<b>0.66</b>
<b>Total fixed costs</b>	<b>9248.39</b>	
<b>Total costs</b>	<b>266,390.70</b>	
<b>Gross Margin</b>	<b>133,527.59</b>	
<b>Net farm income</b>	<b>124,279.20</b>	
<b>Return on investment</b>	<b>0.47</b>	

Source: Computed from field survey data, 2017.

**Table 3.** Contribution of other livelihood activities to the income of cassava farmers

Contributions	Mean income (₦)	Percentage
On farm activities	100,898.04	42.9
Off farm activities	134,352.94	57.1
Total	235,250.98	100.0

Source: Computed from field survey data, 2017.

### 3.4. Poverty status and Poverty indices of cassava farmers

The result in Table 4 shows that the poverty lines for cassava farmers with and without diversification were ₦323.11 and ₦253.04 respectively. Without

diversification about 49.0% of the farmers were poor, but with diversification the percentage of the poor dropped to about 45.0%. This implies that the farmers were better off with diversified livelihood activities. This agrees with the findings of [2] who opined that people diversify their livelihood options for better

financial returns. When compared with the international standard of 1.25 dollars (₦456.56) per day, with diversification, about 67.0% of the farmers were poor, while, only about 33.0% were non poor. This indicates that majority of the farmers were poor.

### 3.5. Poverty indices of cassava farmers

Result presented in Table 5 further shows the estimates obtained for poverty depth and poverty severity. The poverty depth of the farmers with and without diversification was 0.181 and 0.266. This implies that the poor farmers who did not diversify required a

higher percentage (27%) of the poverty line to get out of poverty than farmers who diversified (18%). The poverty severity estimate for the farmers with and without diversification was 0.097 and 0.172 respectively. This implies that 9.7% and 17.2% of the farmers with and without diversification respectively were worse off compared to an average poor cassava farmer and could be regarded as core poor. This suggests that they will need 9.7% and 17.2% more than is required for average poor cassava farmer to move out of poverty.

**Table 4.** Poverty status of cassava farmers with and without diversification

Poverty Status	Frequency	Percentage
<b>Relative Poverty</b>		
<b>With diversification</b>		
Poverty Line (₦323.11)		
Poor	46	45.1
Non poor	56	54.9
<b>Without diversification</b>		
Poverty line (₦253.04)		
Poor	50	49
Non Poor	52	51
<b>Absolute poverty</b>		
Poverty line (₦456.56)		
poor	68	66.7
Non poor	34	33.3

Source: Computed from field survey data, 2017.

**Table 5.** Poverty indices of cassava farmers with and without diversification

FGT Poverty Indices	Estimates
<b>Relative Poverty</b>	
<b>With diversification</b>	
Poverty depth	0.181
Poverty severity	0.097
<b>Without diversification</b>	
Poverty depth	0.266
Poverty severity	0.172
<b>Absolute poverty</b>	
Poverty depth	0.299
Poverty severity	0.173

Source: Computed from field survey data, 2017.

These results indicate that the farmers were better off with diversification as compared to without diversification as they had lower poverty depth and severity. The poverty depth and severity of the cassava

farmers using international standard were higher than that of the relative poverty measure. The poverty depth and severity of the absolute poverty measure were 0.299 and 0.173 respectively. This implies that the

respondents required about 30% of the poverty line to get out of poverty. The poverty severity of 0.173 suggests that they will need 17.3% more than is required for average poor cassava farmer to move out of poverty. [11] also reported poverty depth and severity in their study.

3.5. *Determinants of poverty status among cassava farmers*

The result for the logit regression as presented in Table 6 shows that the significant determinants of poverty in the study area were household size and farm size at 1% level of significance. The result of the odds ratio indicates that a unit increase in household size reduces **Table 6.** Determinants of poverty status among cassava farmers.

the odds of being poor by 0.549. This was as expected as the higher the household size the more persons available for family labour that could increase production. Also, a unit increase in farm size increases the odds of being poor by 1.801. This was not as expected as a higher farm size should mean greater output. However, this could mean that the farmers were already operating in stage 11 of the production cycle, so a further increase would move them to stage 11 where output declines. This could invariably increase their poverty.

Variable	Coefficient	Standard error	Odds ratio
Age	0.011 (0.797)	0.041	1.011
Sex	-0.606 (0.364)	0.667	0.545
Marital status	0.314 (0.794)	1.205	1.369
Household size	-0.600*** (0.001)	0.175	0.549
Farming experience	0.017 (0.608)	0.033	1.017
Farm size	0.588*** (0.000)	0.153	1.801
Constant	-2.344 (0.488)	3.378	0.096

Source: Computed from field survey data, 2017. . \*\*\* Significant at 1%.

4. **Conclusions and Recommendations**

The study concluded that cassava production was profitable in the study area, on farm and off farm activities contributed to the income of the farmers with off farm activities contributing more to their income. The study further showed that the determinants of poverty in the study area were household size and farm size of the farmers. Also, livelihood diversification reduced the incidence, depth and severity of poverty among the farmers, hence cassava farmers are encouraged to diversify into other livelihood activities.

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