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## **Impact of Returns from Cassava Production and Processing on Poverty among Women in Abia State, Nigeria**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author NSC designed the study, wrote the protocol, supervised the work, performed the statistical analysis and managed the analyses of the study. Author ACM wrote the first draft of the manuscript and carried out all field work. Authors AAJ and OKN managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aim:** To determine the impact of returns from cassava production and processing on poverty among rural women in Abia State, Nigeria.

**Study Design:** Survey.

**Place and Duration of Study:** Abia State, between July 2015 to April 2016.

**Methodology:** Random sampling technique was used to select 120 women- 60 cassava farmers and 60 cassava processors- from selected rural communities in Abia State. Descriptive statistics which included frequency distribution means and percentages, as well as inferential statistics which

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included farm budgetary tools, head count method of estimating poverty indicators, paired t-test at 5.0% alpha level and Gini coefficient model were used to analyze the data.

**Results:** The mean age of cassava farmers and the processors were 44 and 56.4 years respectively, and their mean annual income was found to be ₦234,580.67 and ₦198,280.33 respectively (1 USD = #400). Average total cost incurred per hectare of cassava production and per cassava processing household was ₦27, 812.93, and ₦33 146.16 respectively. Average revenue from cassava output and cassava processing was found to be ₦87, 836.67 and ₦79, 836.67 respectively. Cassava production enterprise had an average net income of ₦60, 023.74 per farmer per hectare, average profitability Index (PI) for all farms was 0.68, and Rate of Returns on Investment was 215.81%, Benefit-Cost Ratio was estimated to be 3.16. The processing enterprise had an average net income of ₦46, 690.51 per processing household. The average PI for all farms was 0.58, Rate of Returns on Investment was 140.9%, and the Benefit-Cost Ratio was estimated to be 2.41. The mean per capita income and mean per capita expenditure for the cassava producers and processors were ₦27, 296.00 and ₦ 16,566.00 and ₦16, 100.28 and ₦11, 684.8 respectively.

**Conclusion:** Cassava production and processing in the area were profitable and has pivoted to be a veritable occupation that can lift a lot of rural women out of the pit of poverty; the return on investment in cassava is like no other. Access to extension services and credit was shown to be a bane to rural women making the best from cassava. To this end, it is recommended that extension bodies both public and private do more to educate rural women in agriculture, especially those in cassava production and processing on effective ways to source for credit to scale up their investments in cassava.

**Keywords:** Cassava; producers; processors; poverty; profitability.

## 1. INTRODUCTION

Cassava (*Manihot esculenta*) originated from Brazil, and is one of the most important food crops in West Africa. It is ranked the most important root crop in terms of world production [1] and Nigeria is it's the highest producer [2]. The roots are processed by various methods into different products, playing major role in alleviating poverty and food crisis. Some of the value-added forms in which it is utilized are garri, fufu, tapioca, ethanol, starch, cassava flour, cassava chips, glucose syrup, lafun, livestock feed, and a cassava-based adhesives. Cassava processing could be manually done or mechanized.

As a result of growing urbanization, cassava has become an essential part of diet of more than 70 million Nigerians [3]. The estimated per capita consumption of cassava in Nigeria is 238 Kcal [4]. Furthermore, cassava generates income for its producers, processors, transporters and marketers and it serves as raw material in industries such as bakery, textile, paper, plywood and confectioneries; [5,3]. Cassava is thus an important commodity for intervention and for poverty alleviation as it provides food security.

Women play central role in cassava production, processing and marketing, contributing about 58

per cent of the total agricultural labour in the southwest, 67 per cent in the southeast and 58 per cent in the North central zones Nigeria, [6]. They are almost entirely responsible for processing cassava, this provide additional income-earning opportunity as well as enhancing its ability to contribute to household food security [7]. The Federal Government's policy of including cassava flour in bread and other confectioneries to substitute wheat flour has presented great opportunities for investors and farmers alike. The dominance of cassava-based food on the dietary table, the adaptability of the cultivars to diverse soil and climate conditions, the wide-spread cultivation coupled with the export potentials have made the crop a dependable crop for alleviating poverty sustainably.

It is generally observed that there is low level of investment in small scale cassava processing in Abia State. This is evident in the preponderance of women most of whom are resource poor in cassava processing enterprises. Inadequate empirical data on value addition to cassava and processing might be the bane of the sector to attract the necessary attention of private entrepreneurs in and big investors. This therefore portends negative consequences for the food security and employment generation situations in the State. Socio-economic characteristics and some other variables that can affect the amount

of value added to cassava products have not been considered over time.

This study determined the impact of returns from cassava production and processing on poverty among rural women in Abia State, Nigeria and is relevant in terms of the valuable information it will provide on the level of income from produced cassava tubers, processed tubers, food security, and farmers' welfare. The study shows the impact of returns of cassava production and processing by rural farm households, and established socio-economic and policy strategies required in stimulating rural enterprise.

## 2. MATERIALS AND METHODS

This study was conducted in Abia State, Nigeria which is located in the South- East Agro-ecological zone of Nigeria. It lies within longitude 7° 23'E and 8° 2'E, and latitude 4° 47'N and 6° 12'N. It has a population of 2,833,999 made up of 1,454,195 males and 1,599,806 females with population density of 578 persons per square kilometre [8]. The state has an average annual relative humidity of 75 per cent.

The population of the study comprised of cassava farmers and cassava processors from selected rural communities in Abia State. Multistage sampling was used to select 120 respondents, consisting of 60 cassava farmers and 60 cassava processors.

The first stage was the selection of the Aba, Ohafia and Umuahia agricultural zones of Abia State. At the second stage, one local government was randomly selected from each of the zones-Aba zone; Ukwa west government areas: Ohafia zone; Ohafia local government areas: Umuahia zone; Ikwuano government areas. Two communities were randomly selected from each of the three local governments in the study area. Ten cassava producers and ten cassava processor were chosen from each selected community which gave a sample size of 120 respondents. Primary data was generated from the respondents using a validated, well structured questionnaire. The questionnaire was administered by personal interview method.

### 2.1 Method of Data Analysis

Data obtained from the study were analyzed using both descriptive and inferential statistics.

Descriptive statistics such as means and percentages, farm budgetary tools, head count method of estimating poverty indicators were used. Furthermore, inferential statistics such as paired t-test at 5.0% alpha level and Gini coefficient model was also used.

### 2.2 Model Specification

The model that represents the farm budgetary tool used to measure the net farm returns from cassava production and processing is given as:

$$Ni = TR - TC \quad (1)$$

$$Ni = TR - TFC - TVC \quad (2)$$

Where

$Ni$  = Net income from cassava production or processing.

$TR$  = Total revenue from cassava production or processing.

$TFC$  = Total fixed cost for cassava production or processing.

$TVC$  = Total variable cost for cassava production or processing.

The head count method of estimating poverty indicators is given in line with [9] as:

$$P_o = \frac{Q}{n} = H \quad (3)$$

Where

$P_o$  = Incidence or prevalence of poverty.

$H$  = Head count ratio or the incidence of poverty which is measured as the percentage of respondents in poverty i.e. whose per capita expenditure is below the poverty line.

$n$  = Total number of respondents studied (population sample).

$Q$  = Number of poor people (below poverty line).

The paired sampled Z-test used to estimate the effect which returns from cassava production and processing have on poverty bench line of women in cassava enterprise in the study area is fitted as;

$$Z_{cal} = \frac{x_i - x_j}{\sqrt{\frac{s^2 x_i}{n_i} + \frac{s^2 x_j}{n_j}}} \quad (4)$$

Where

$\bar{X}_i$  = Means of returns from women cassava producers and processors above poverty line and women cassava producers and below poverty line.

$\bar{X}_j$  = Mean of returns from cassava production and processing of women in cassava enterprise.

$S^2 \bar{x}_i$  = Squared standard deviation of poverty bench line of women in cassava enterprise.

$S^2 \bar{x}_j$  = Squared standard deviation of return from cassava production and processing of women in cassava enterprise.

$n_i$  = Number of women at the poverty bench line.

$n_j$  = Number of women with return from cassava production and processing that kept them at the bench line or above it.

The Gini coefficient model that was used to estimate welfare indicator of cassava producers and cassava processors before engaging on the enterprise and after engaging on the enterprise is given as:

$$G = 1 - \sum_{i=0}^{n-1} (X_{i+1} - X_i)(Y_{i+1} - Y_i) \quad (5)$$

which reduces to:

$$G = 1 - \Sigma XY$$

Where

G = Gini coefficient

X = Percentage of women in cassava enterprise.

Y = Cumulative net returns of cassava producers and cassava processors above and below poverty line.

Note: 1 USD = #400

### 3. RESULTS AND DISCUSSION

#### 3.1 Socio-economic Characteristics of Respondents

This section described the socio-economic characteristics of the farmers based on their relevance to cassava production and processing under review. They are; age, marital status,

educational status, occupational status, household size, farm/processing size, labour source, credit accessibility, and income. Table 1 showed that majority of cassava producer and processors (41.7% and 65%) were within the age bracket of 40-49 and 50-59 years respectively. The mean ages of the farmers were 44 and 56.4 years. The implication is that majority of the respondents were young farmers and that younger women engage in cassava production than cassava processing. Majorities (65% and 71.7%) of the cassava producers and processors were married. This is an indication that married individuals dominated the farming and processing of cassava in the study area. 83.3% and 80% cassava producers and processors had one form of formal education or the other. This result is consistent with [10]. The mean household size of the cassava producers and processors was 8 persons per household. Majority (56.7% and 53.3%) of both cassava producers and processors operate small scale farming and processing business. Majority (75% and 83.3%) of cassava producers and processors had no access to credit, and (83.3% and 90%) of the respondents had no access to extension services respectively. 53.3% and 58.3% of the cassava producers and processors respectively used family labour as their major source of labour. 43.3% of cassava producers earn annual income ranging from ₦200, 001.00 to ₦250, 000.00, whereas most (51.7%) of cassava processors earn annual income of at most ₦200, 000.00. The mean annual income of the cassava producers was found to be ₦234, 580.67, whereas the mean income for processors was given as ₦198, 280.33. This implies that cassava producers in the study area earn more income than the cassava processors.

#### 3.2 Cost and Returns in Cassava Production

Table 2 showed that the variable costs items comprised of the cost of stem cuttings, labour, pesticide, fertilizer, water and organic manure, while the fixed cost components were cost based on land rent, purchase of baskets/bags and depreciated values of farm equipments. Labour, rent on land, stem cuttings and fertilizer with (36.3%), (22.8%), (10.2%) and (7.1%) respectively constituted the bulk of average total cost of cassava production. The average total variable cost constituted 66.9% while the average fixed cost constituted 33.1% of the average total cost of cassava production. The average total variable cost of cassava production

amounted to about ₦18, 618.5 while the average total fixed cost (TFC) was found to be ₦9, 194.43. The average total cost incurred per hectare of cassava production was ₦27, 812.93.

The average revenue from cassava output was found to be ₦87, 836.67. The enterprise had an average net income of ₦60, 023.74 per farmer per hectare.

**Table 1. Distribution of respondents by age**

| <b>Age</b>                             | <b>Cassava frequency</b> | <b>Producer percentage</b> | <b>Cassava frequency</b> | <b>Processor percentage</b> |
|--|--------------------------|----------------------------|--------------------------|-----------------------------|
| 20-29                                  | 8                        | 13.3                       | 4                        | 6.7                         |
| 30-39                                  | 9                        | 15.0                       | 4                        | 6.6                         |
| 40-49                                  | 25                       | 41.7                       | 12                       | 20.0                        |
| 50-59                                  | 17                       | 28.3                       | 39                       | 65.0                        |
| 60-69                                  | 1                        | 1.7                        | 1                        | 1.7                         |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100</b>                  |
| <b>Mean=</b>                           |                          | <b>44</b>                  |                          | <b>56.4</b>                 |
| <b>Marital status</b>                  |                          |                            |                          |                             |
| Single                                 | 10                       | 16.7                       | 6                        | 10.0                        |
| Married                                | 39                       | 65.0                       | 43                       | 71.6                        |
| Divorced                               | 2                        | 3.3                        | 3                        | 5.0                         |
| Separated                              | 4                        | 6.7                        | 4                        | 6.7                         |
| Widow                                  | 5                        | 8.3                        | 4                        | 6.7                         |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100.0</b>                |
| <b>Educational status</b>              |                          |                            |                          |                             |
| No education                           | 10                       | 16.7                       | 12                       | 20.0                        |
| Primary education                      | 12                       | 20.0                       | 33                       | 55.0                        |
| Secondary education                    | 38                       | 63.3                       | 15                       | 25.0                        |
| Tertiary education                     | -                        | -                          | -                        | -                           |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60.0</b>              | <b>100.0</b>                |
| <b>Household size interval</b>         |                          |                            |                          |                             |
| 1-3                                    | 4                        | 6.7                        | 3                        | 5.0                         |
| 4-6                                    | 18                       | 30.0                       | 16                       | 26.7                        |
| 7-9                                    | 18                       | 30.0                       | 20                       | 33.3                        |
| 10-12                                  | 14                       | 23.3                       | 13                       | 21.6                        |
| 13-15                                  | 4                        | 6.7                        | 5                        | 8.4                         |
| 16-18                                  | 2                        | 3.3                        | 3                        | 5.0                         |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100.0</b>                |
| <b>Mean</b>                            | <b>8</b>                 |                            | <b>8.2</b>               |                             |
| <b>Scale of production/ Processing</b> |                          |                            |                          |                             |
| Small scale                            | 34                       | 56.7                       | 32                       | 53.3                        |
| Medium scale                           | 16                       | 26.6                       | 18                       | 30.0                        |
| Large scale                            | 10                       | 16.7                       | 10                       | 16.7                        |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100.0</b>                |
| <b>Access to credit</b>                |                          |                            |                          |                             |
| No Access                              | 45                       | 75.0                       | 50                       | 83.3                        |
| Access                                 | 15                       | 25.0                       | 10                       | 16.7                        |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100.0</b>                |
| <b>Access to Extension</b>             |                          |                            |                          |                             |
| No Access                              | 50                       | 83.3                       | 54                       | 90.0                        |
| Access                                 | 10                       | 16.7                       | 6                        | 10.0                        |
| <b>Total</b>                           | <b>60</b>                | <b>100.0</b>               | <b>60</b>                | <b>100.0</b>                |
| <b>Source of Labour</b>                |                          |                            |                          |                             |
| Hired                                  | 2                        | 3.4                        | 10                       | 16.7                        |
| Communal                               | 3                        | 5.0                        | 1                        | 1.7                         |

| Age                    | Cassava frequency | Producer percentage | Cassava frequency | Processor percentage |
|------------------------|-------------------|---------------------|-------------------|----------------------|
| Family                 | 32                | 53.3                | 35                | 58.3                 |
| Family and hired       | 23                | 38.3                | 14                | 23.3                 |
| <b>Total</b>           | <b>60</b>         | <b>100.0</b>        | <b>60</b>         | <b>100.0</b>         |
| <b>Income level(₦)</b> |                   |                     |                   |                      |
| 0 - 50, 000            | -                 | -                   | 1                 | 1.7                  |
| 50, 001 - 100,000      | 2                 | 3.3                 | 6                 | 10.0                 |
| 100,001 - 150,000      | 7                 | 11.7                | 4                 | 6.7                  |
| 150,001 – 200,000      | 8                 | 13.3                | 31                | 51.7                 |
| 200,001 – 250,000      | 26                | 43.3                | 12                | 20.0                 |
| 250,001 – 300,000      | 10                | 16.8                | 5                 | 8/3                  |
| 300,001 – 350,000      | 3                 | 5.0                 | 1                 | 1.7                  |
| 350,001 - 400,000      | 2                 | 3.3                 | -                 | -                    |
| 400,001 – 500,000      | 2                 | 3.3                 | -                 | -                    |
| Total                  | 60                | 100.0               | 60.0              | 100.0                |
| <b>Mean</b>            | <b>234,580.67</b> |                     | <b>198,280.33</b> |                      |

Source: Field survey data, 2015. (1USD=#400)

**Table 2. Average cost and returns per hectare of cassava production in the study area (1USD=#400)**

| Variables   | Value (₦) | Percentage of total cost |
|---|-----------|--------------------------|
| Rent on land  | 6,348.33  | 22.8                     |
| Depreciated value of farm equipments                      | 1,805.27  | 6.5                      |
| Baskets/Bags  | 1,040.83  | 3.7                      |
| Total Fixed Cost (TFC)                                    | 9,194.43  | 33.1                     |
| Stem cuttings   | 3,015.00  | 10.2                     |
| Labour  | 10,091.67 | 36.3                     |
| Pesticide   | 1555.00   | 5.6                      |
| Fertilizer  | 1,986.67  | 7.1                      |
| Organic manure  | 1,234.17  | 4.4                      |
| Water   | 736.00    | 2.6                      |
| Total Variable Cost (TVC)                                 | 18,618.50 | 66.9                     |
| Total Cost (TC)   | 27,812.93 |                          |
| Revenue   | 87,836.67 |                          |
| Net Farm Income (Profit) = (TR-TC)                        | 60,023.74 |                          |
| BC-Ratio = (TR/TC)  | 3.16      |                          |
| Profitability Index =(NI/TR)                              | 0.683     |                          |
| Rate of Returns on Investment(%) = (NI/TC*100)            | 215.81    |                          |
| Rate Of Returns On Variable Cost (%) = (TR-TFC/TVC*100) = | 422.89    |                          |
| Operating Ratio (OR) = TVC/TR                             | 0.212     |                          |

Source: Field survey, 2015

The average profitability Index (PI), for all farms was 0.68, indicating that out of every naira earned; about 68 kobo accrue to the farmers as net income. The Rate of Returns on Investment was 215.81%, indicating that a farmer makes about ₦216 profit on every naira spent on cassava production. The Rate of Returns on Variable Cost (RRVC) was estimated to be about 422.39%, indicating that every ₦1 cost incurred on variable inputs generates about ₦422.39. This suggests that improvement in the profitability of

cassava production was made possible through increased efficiency in the use of variable inputs. Moreover, the Operating Ratio (OR) of 0.21 indicates greater total revenue over total variable cost. The Benefit-Cost Ratio (BCR) was estimated to be 3.16, indicating that cassava production in the study area was highly viable as it returns ₦32 for every ₦1.00 spent. This agrees with the findings of [11]. According to them, for every #1.00 investment on cassava production, #2.19 is realizable. The farmers return for every

one naira invested on cassava production is #2.19 as indicated by the computed benefit-cost ratio. This, therefore, affirms it a profitable venture. Also according to [12], the Benefit Cost Ratio was N2.00, indicating that for every N1.00k expended in cassava production, N1.00k was realized as a profit. This follows the findings of [13] who reported BCR of N1.9:1.0 for cassava farmers in Akwa Ibom State.

It can therefore be concluded that cassava production in the area is profitable and that farmers involved in cassava production make relatively high income from their farms.

### 3.3 Cost and Returns in Cassava Processing

Table 3 showed that the fixed cost components were cost based on land/shop rent, depreciated values of farm equipments and sieve/basket, while the variable costs items comprised of the cost of cassava root, labour and water. Cassava root, labour, rent on land/shop and depreciated value of processing equipment with (45.3%), (19.7%), (11.8%) and (11.4%) respectively constituted the bulk of average total cost of cassava processing household. The average total variable cost constituted 69.4% while the average fixed cost constituted 30.6% of the average total cost of cassava production. The average total variable cost cassava production amounted to about ₦23, 007.67 while the

average total fixed cost (TFC) was found to be ₦10 138.49. The average total cost incurred per cassava processing household in the study area was ₦33 146.16. The average revenue from cassava processing was found to be ₦79, 836.67. The enterprise had an average net income of ₦46, 690.51 per processing household.

The profitability ratios computed to establish profitability levels of the enterprise included Profitability Index (PI), Rate of Returns on Investment (RRI), Rate of Returns on Variable Cost (RRVC) and Operating Ratio (OR). The average PI for all farms was 0.58, indicating that out of every naira earned; about 58 kobo accrue to the farmers as net income. The Rate of Returns on Investment was 140.9%, indicating that a farmer makes about ₦141 profit on every naira spent on cassava processing. The Rate of Returns on Variable Cost (RRVC) was estimated to be about 302.93%, indicating that every ₦1 cost incurred on variable inputs generates about ₦302.9. This suggests that improvement in the profitability of cassava processing in the study area was made possible through increased efficiency in the use of variable inputs. Moreover, the Operating Ratio (OR) of 0.29 indicates greater total revenue over total variable cost. The Benefit-Cost Ratio (BCR) was estimated to be 2.41, indicating that cassava processing in the study area was relatively viable as it returns ₦24 for every ₦1.00 spent.

**Table 3. Average cost and returns per cassava processing household in the study area (1USD=#400)**

| Variables   | Value (₦) | Percentage of total cost |
|---|-----------|--------------------------|
| Rent on Land/shop   | 4,566.33  | 13.8                     |
| Depreciated value of processing equipments                | 3,785.16  | 11.4                     |
| Sieve and basket  | 1,787.00  | 5.4                      |
| Total Fixed Cost (TFC)                                    | 10,138.49 | 30.6                     |
| Cassava root  | 15,015.00 | 45.3                     |
| Labour  | 6,544.67  | 19.7                     |
| Water   | 1,448.00  | 4.4                      |
| Total Variable Cost (TVC)                                 | 23,007.67 | 69.4                     |
| Total Cost (TC)   | 33,146.16 |                          |
| Revenue   | 79,836.67 |                          |
| Net Farm Income (Profit) = (TR-TC)                        | 46,690.51 |                          |
| BC-Ratio = (TR/TC)  | 2.41      |                          |
| Profitability Index = (NI/TR)                             | 0.585     |                          |
| Rate of Returns on Investment(%) = (NI/TC*100)            | 140.86    |                          |
| Rate of Returns on Variable Cost (%) = (TR-TFC/TVC*100) = | 302.93    |                          |
| Operating Ratio (OR) = TVC/TR                             | 0.29      |                          |

Source: Field Survey, 2015

### 3.4 Poverty Indicators among Cassava Producers and Cassava Processors

The poverty indexes for cassava producers and cassava processors before are shown in Table 4. Which showed that the mean per capita income and mean per capita expenditure for the cassava producers and cassava processors were ₦27, 296.00 and ₦ 16,566.00 and ₦16, 100.28 and ₦11, 684.8 respectively. Again, all values for cassava producers appear to be higher than for cassava processors. The core poverty and moderate poverty lines for cassava producer and cassava processors were N5521.88 and, N11, 043.75 and N3, 894.93 and N7, 789.87, respectively. The results show that with respect to the incidence of poverty, about 20.0% and 40.0% of cassava producer and cassava processors respectively were below the poverty line. This indicates that poverty is wide spread among the cassava producers and processors especially the cassava processors. The result further showed that about 53.33% and 26.67% of the cassava producers and cassava processors respectively were non-poor among the respondents. The intensity of poverty (poverty gap index) was 13.32% and 30.28% for the cassava producers and cassava processors, respectively. These reflect the mean of the gap between the core poor standard of living and the poverty line. They show the shortfall of the core poor's expenditure from the poverty line expressed as the average of all in the population. This is a measure of the cost of eliminating poverty (relative to the poverty line), because it shows how much would have to be transferred to the poor to bring their incomes or expenditures up to the poverty line (as a proportion of the poverty line). The squared poverty gaps (poverty

severity/depth) were 1.77% and 9.17% for cassava producers and cassava processors respectively.

### 3.5 Effect of Returns from Cassava Production and Processing on Poverty Bench Line of Respondents

The result indicated household size (-0.641), household monthly income (4.022 significant at 1%), total household monthly expenditure (2.097 significant at 5%), mean per capita household expenditure (1.417), mean per capita household income (2.401 significant at 5%), intensity of poverty (-3.043 significant at 1%) and depth of poverty (-2.983 significant at 1%) appear to be significantly different between the two groups. Again cassava producers had higher values for household monthly income, total household monthly expenditure, mean per capita household expenditure and mean per capita household income, but lower values for mean household size, intensity of poverty and depth of poverty than cassava processing households respectively. These imply overall higher living standards among cassava producers than those of cassava processors.

### 3.6 Poverty Gap of Cassava Producers and Processors

The mean per capita income and mean per capita expenditure for the cassava producers and processors were ₦27, 296.00 and ₦ 16,566.00 and ₦16, 100.28 and ₦11, 684.8 respectively. Again, all values for cassava processors appear to be higher than for cassava producers. The core poverty and moderate poverty lines for cassava processors and

**Table 4. Poverty indices for cassava producers and cassava processors (1USD=#400)**

| Poverty indices                 | Cassava producers | Cassava processors |
|---------------------------------|-------------------|--------------------|
| Number of processors'           | 60                | 60                 |
| Mean household size             | 8                 | 8.2                |
| Mean per capita income (₦)      | 27, 296.00        | 16100.28           |
| Mean per capita expenditure (₦) | 16566             | 11684.8            |
| Core poverty line (₦) (%)       | 5521.88 (20.0)    | 3894.93(40.0)      |
| Moderate poverty line (₦) (%)   | 11043.75 (26.67)  | 7789.87 (33.33)    |
| Non-poor (₦) (%)                | >11043.75(53.33)  | >7789.87 (26.67)   |
| Poverty incidence (%)           | 20.0              | 40.0               |
| Intensity (Gap) of poverty (%)  | 13.32             | 30.28              |
| Depth (severity) of poverty (%) | 1.77              | 9.17               |

*Field survey data, 2015. Figures in parentheses are percentages of column number of processors*

**Table 5. Comparison of poverty indices and income level between cassava producers and processors (1USD=#400)**

| Poverty indicators                               | Mean      | SEM      | Df       | t-value      |
|--|-----------|----------|----------|--------------|
| <b>Total household annual income (₦)</b>         |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 125600.00 | 80903.35 | 14770.86 |              |
| Cassava processors <sup>b</sup>                  | 66466.67  | 34865.98 | 6365.63  |              |
| (a-b)  | 59133.33  | 80520.18 | 14700.91 | 59 4.022***  |
| <b>Total household annual expenditure (₦)</b>    |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 77976.67  | 52388.59 | 9564.81  |              |
| Cassava processors <sup>b</sup>                  | 49546.67  | 77667.51 | 14180.08 |              |
| (a-b)  | 28430.00  | 74248.38 | 13555.84 | 59 2.097**   |
| <b>Household size</b>                            |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 8         | 3.474    | 0.452    |              |
| Cassava processors <sup>b</sup>                  | 8.2       | 3.573    | 0.552    |              |
| (a-b)  | -0.2      | -4.099   | -0.572   | 59 -0.641    |
| <b>Mean per capita household income (₦)</b>      |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 27295.73  | 26273.13 | 4796.80  |              |
| Cassava processors <sup>b</sup>                  | 16100.28  | 17461.52 | 3188.02  |              |
| (a-b)  | 11195.45  | 25540.00 | 4662.94  | 59 2.401**   |
| <b>Mean per capita household expenditure (₦)</b> |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 16565.63  | 15137.06 | 2763.64  |              |
| Cassava processors <sup>b</sup>                  | 11684.80  | 18002.40 | 3286.77  |              |
| (a-b)  | 4880.83   | 18872.66 | 3445.66  | 59 1.417     |
| <b>Intensity of poverty (%)</b>                  |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 13.32     | 233.452  | 4.986    |              |
| Cassava processors <sup>b</sup>                  | 30.28     | 342.453  | 6.345    |              |
| (a-b)  | -16.96    | 167.203  | -5.573   | 59 -3.043*** |
| <b>Dept of poverty (%)</b>                       |           |          |          |              |
| Cassava producers <sup>a</sup>                   | 1.77      | 21.028   | 2.296    |              |
| Cassava processors <sup>b</sup>                  | 9.17      | 24.345   | 2.501    |              |
| (a-b)  | -7.40     | 20.176   | -2.481   | 59 -2.983*** |

\*\*\* and \*\* represents 1% and 5% level of significance. SEM = Standard error of mean

**Table 6. Poverty indices for cassava producers and processors in the study area (1USD=#400)**

| Poverty indices                 | Cassava processors | Cassava producers |
|---------------------------------|--------------------|-------------------|
| Number of processors'           | 60                 | 60                |
| Mean household size             | 5.60               | 5.67              |
| Mean per capita income (₦)      | 27, 296.00         | 16100.28          |
| Mean per capita expenditure (₦) | 16566              | 11684.8           |
| Core poverty line (₦) (%)       | 5521.88            | 3894.93           |
| Moderate poverty line (₦) (%)   | 11043.75           | 7789.87           |
| Non-poor (₦) (%)                | >11043.75          | >7789.87          |
| Poverty incidence (%)           | 20.0               | 40.0              |
| Intensity (Gap) of poverty (%)  | 13.32              | 30.28             |
| Depth (severity) of poverty (%) | 1.77               | 9.17              |

Computed by the authors from field survey data, 2015. Figures in parentheses are percentages of column number of processors

cassava producers were ₦5521.88 and, ₦ 11, 043.75 and ₦ 3, 894.93 and ₦ 7, 789.87, respectively. The results show that with respect to the incidence of poverty, about 20.0% and 40.0% of cassava processors and cassava producers respectively were below the poverty line. The intensity of poverty (poverty gap index)

was 13.32% and 30.28% for the cassava processors and cassava producers respectively. These reflect the mean of the gap between the core poor standard of living and the poverty line. The squared poverty gaps (poverty severity/depth) were 1.77% and 9.17% for cassava processors and cassava producers

respectively. This means that poverty tends to be more severe among cassava processors than the cassava producers.

#### 4. CONCLUSION

Cassava production and processing has pivoted to be a veritable occupation that can lift a lot of rural women out of the pit of poverty; the return on investment in cassava is like no other. Again, cassava has the potential of creating jobs with decent income for most rural people if they can key into either its production or processing. Furthermore, the study showed that investing in cassava business both as farmers and processors is highly profitable. Hence, it would be worthwhile for big and medium scale investors as well as individual who have the wherewithal to invest in cassava production as well as processing. Again, access to extension services and credit was shown to be a bane to rural women making the best from cassava. To this end, it is advised that extension bodies both public and private do more to educate rural women in agriculture, especially those in cassava production and processing on effective ways to source for credit to scale up their investments in cassava.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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