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Processing technologies available to cassava processors and range of products derivable from cassava processing in Enugu State, Nigeria.

Mgbakor Miriam N.
Department of Agricultural Economics and Extension, Faculty of Agriculture and Natural Resources Management Enugu State University of Science and Technology (ESUT).

ABSTRACT

Cassava roots contain cyanide, which is poisonous. Different varieties of cassava contain different amounts of cyanide. Cassava must be processed into various forms in order to reduce cyanide content and improve its palatability. The results revealed that major processing technologies used by the cassava producers according to frequency of use are peeling (74.4%), pressing (68.2%), grating (58.5%) and washing (55.2%). Majority (98.2%, 73.8%, 72.9% and 71.5%) of the cassava farmers made use of cast iron-made frying pot, aluminium/plastic made/basket sieve, grating machine and hydraulic press in cassava processing. About 49% and 48% of the cassava farmers/processors owned presser and grater equipment respectively, with garri (89.1%) and Akpu/fufu (61.8%) being the two predominant products got from cassava processing. About 57% of the cassava farmers obtained cassava tubers for processing from both own farms and market. Result of data analysis also revealed that mean monthly expenditure of the cassava producers/processors was ₦ 18, 775.64, with 12.6% and 31.8% of them classified as core poor and moderately poor respectively. The poverty incidence and poverty gap among the cassavaproducers/processors were 0.4441 and 0.2949 respectively.

Keywords: Cassava, roots, cyanide, processing and processors

INTRODUCTION

Cassava is one of the most important staple food crops grown in tropical Africa [1,2,3,4,5,6]. It plays a major role in alleviating the African food crisis because of its efficient production of food energy, year-round availability, tolerance to extreme stress conditions, and suitability to present farming and food systems will make cassava products gain more popularity in Nigeria [7,8,9,10,11]. Cassava roots contain cyanide, which is poisonous. Different varieties of cassava contain different amounts of cyanide [12,13,14,15]. The roots of 'sweet' varieties contain low levels of cyanide and can be eaten raw [16,17]. While roots that contain high amounts of cyanide normally taste bitter and therefore requires processing before it could be eaten [18,19]. Casssava contains cynogenic compounds which is toxic to the body, for this reason and some more, processing of cassava, therefore, becomes imperative to detoxify cassava by eliminating the toxic compound (HCN) [20], reduce the moisture content to reduce the weight, avoid loss of huge profit due to post-harvest losses of fresh cassava roots, acquire a value addition to prolong the shelf life, increase the nutritional value of cassava, reduce transport costs, improve more demandable products as well as increase the income generation of cassava product [21]. Hence cassava must be processed into various forms in order to reduce cyanide content and improve its palatability [22]. The nutritional status of cassava can also be improved through fortification with other protein-rich crops [23]. Processing reduces food losses and stabilizes seasonal fluctuations in the supply of the crop [24]. The major processed forms of cassava roots fall into four general categories: meal, flour, chips and starch [25]. The meal include gari, Akpu/fufu, Alibo/lafun, Abacha/tapioca, Odorless Fufu, and the Flour, starch and chips fall into industrial products [25].

A flow chart for processing five of the above mentioned products is displayed in Figure 1

Cassava Processing Flow chat

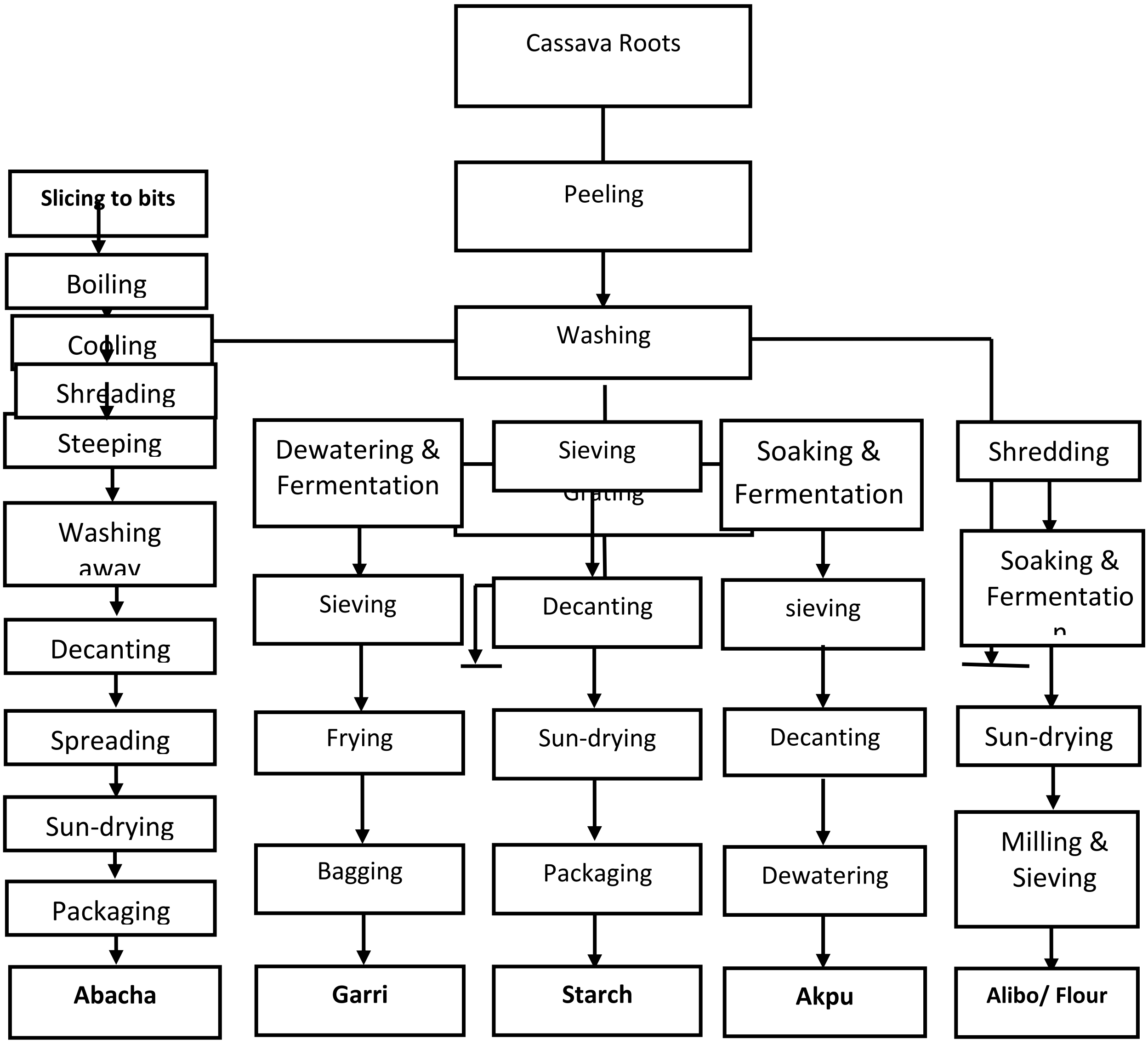

Figure 1: **Source: [7]**

The above figure 1 reveals the both unimproved and improved production methods of Abacha, Garri, Starch, Akpu and Alibo/Cassava Flour

Objectives of the Study

The broad objective of this study was to identify processing technologies available to cassava processors and range of products derivable from cassava processing in the study area.

RESEARCH METHODOLOGY

The Study Area

The study was carried out in Enugu state of Nigeria. The state is one of the five states in South Eastern Nigeria and is purposively selected for this study because of its agricultural potential, high proportion of farmers as well as concentration of agricultural institutions. The study covered major cassava producing and processing communities in Enugu state. Enugu State is bounded to the Northwest and Northeast by Kogi State and Benue State respectively, to the East by Ebonyi State, to the South by Abia State and Imo State and to the West by Anambra State. The state is located between latitudes 58° 50´ and 78° 01´ N of the Equator and longitudes 68° 50´ and 78° 55´ E of the Greenwich Meridian. The state comprises of 17 Local Government Areas (LGAs) namely; Aninri, Awgu, Enugu East, Enugu North, Enugu South, Ezeagu, Igbo Etiti, Igbo Eze North, Igbo Eze South, Isi Uzo, Nkanu East, Nkanu West, Nsukka, Oji River, Udenu, Udi and Uzo Uwani which form the three agricultural/senatorial zones (Enugu North, Enugu East and Enugu West) of the state. It comprises four hundred and seventy three (473) communities. The state is made up of two tiers of government, the state government and the local government. The State Government is responsible for economic development policy including implementation of development projects in the state while the Local Governments have jurisdiction over activities confined within their boundaries. Enugu state has an estimated population of 3.891,339 million persons comprising 1,990,773 females and 1,900,566 males, with an annual projected percentage increase of 2.6% from base year (National Population Commission, (NPC) 2006). Average population density of the State is 780 persons/km^2.Enugu state has a tropical savannah climate. Its climate is humid and this humidity is at its peak between March and November. For the whole of Enugu State, the mean daily temperature is 26.7 °C (80.1 °F) with an average annual rainfall of 2,000 mm, which arrives intermittently and becomes very heavy during the rainy season. The State is characterised by two prominent seasons, namely; rainy season which usually occur from April to October and dry season which occurs from November to March. Other weather conditions affecting the city include Harmattan, a dusty trade wind lasting a few weeks in December and January. Like the rest of Nigeria, Enugu is hot all year round. The land is 223 metres above sea level and because of its topography; the soil is naturally well drained during its rainy seasons. Erosion is one of the problems of some places due to the sloppy nature of its terrain and incidence of land slide. Economically, the state is predominantly rural and agrarian, with a substantial proportion of its working population engaged in farming, mining, transportation, although trading (18.8%) and civil services (12.9%) are also important. In the urban areas trading is the dominant occupation, followed by public and private services. A small proportion of the population is also engaged in manufacturing activities, with the most pronounced among them located in Enugu, Oji, Ohebedim and Nsukka (Nigerian National Bureau of Statistic, 2008). The Profile of Major Mineral Resources in Enugu State are; Coal, Limestone, Gypsum, Glass sand, Copper, Bauxite, Calcite, Bentonite, Dolorite, Iron-Stone, Clay, Fire-clay, Brine. There are also traces of Petroleum and Natural gas in Ugwuoba in Oji-River Local Government area and Uzo-Uwani in Enugu state.Enugu state is located in a tropical rain forest zone with a derived savannah. Enugu has rich fertile soil conditions over a wide range of agro-ecological zone which allow for a very diverse crop production such as cassava Tree crop: cashew (*Anacardium occidentale*), kola nut (*Cola nitida*), oil palm (*Elaesis guineensis*), cocoa (*Theobroma cacoa*), mango (*Mangifera indica*), breadfruit (*Treculia africana*), guava(*Psidium guajava*), pawpaw (*Carica papaya*), Plant sucker: plantain (*Musa paradisiaca),* banana (*Musa sapientum*), Fruit crop: pineapple (*Ananas comosus*), maize (*Zea mays*), Root crop: cassava (*Manihot esculenta*), yam (*Dioscorea spp*), coco-yam(*Esculenta spp*), sweet potato (*Ipomoea batatas*), Legume/vegetables: Bambara groundnut (*Voandzeia subterranea*), pigeon pea (*Cajanus cajan*), black bean (*Phaseolus vulgaris*), melon(*Cucumis melo*), groundnut (*Arachis hypogaea*), okra, (Abelmoschus esculentus), red pepper(*Capsicum annuum*), fluted pumpkin (*Telfairia occidentalis*), spinach(*Spinacia oleracea*), bitter-leaf(*Venonia amygdalina*), low-lying and seasonally flooded areas are being used for rice (*Oryza sativum*) production.

Sampling Procedure

In an empirical investigation, it is very difficult to collect information from the whole population. Therefore, researchers are often forced to make inferences based on information derived from a representative sample of the population. The size of the sample and amount of variation usually affect the quantity and quality of information obtained from the survey. Both factors can be controlled using appropriate sampling methods.

Population of the Study

Population in research could be described as a full set of numbers of objects or people. Classification of the population is the first step in the sampling procedure, namely, the sector or element under investigation, the sampling unit and the area of investigation. The population for this study are cassava farmers in Enugu State, Nigeria that are registered with Enugu State Agricultural Development Programme (ENADEP). They comprised registered cassava producers and processors from the 17 LGAs of Enugu State as presented in Table 1. It is worthy to note that in Enugu state, all cassava producers also process cassava at least for self and family consumption as against buying processed cassava products from the market. In this scenario and in the concept of study, qualifies the farmers as producers/ processors. This also ensures that there is no duplication in the sampling.

Table 1: Population and Sample Size of ADP Registered Cassava Producers and Processors in Enugu State, Nigeria

Agro-Ecological Zone	Local Government Areas	Registered cassava producers and processors	Sample size
Enugu East	Enugu East	67	
	Enugu North	46	
	Enugu South	39	
	Isi Uzo	121	
	Nkanu East	146	
	Nkanu West	84	
Sub Total		503	75
Enugu West	Aninri	134	
	Awgu	219	
	Ezeagu	172	
	Oji-river	121	
	Udi	146	
Sub Total		792	118
Enugu North	Igbo Eze North	112	
	Igbo Eze South	74	
	Igbo Etiti	163	
	Nsukka	226	
	Udenu	165	
	Uzouwani	246	
Sub Total		986	147
Grand Total		2281	340

Source: Cassava Desk ENADP, 2013

The sampling frame used for the study is a list of 2281 registered cassava producers and processors in Enugu State which was obtained from the Enugu State Agricultural Development Programme (ENADEP) at the time of study. During the period of sampling, Enugu state is demographically divided into 3 agricultural zones as follows Enugu East, Enugu West and Enugu North each with 6, 5 and 6 Local Government Areas (LGAs) respectively.The formula used in selecting sample size proportionate to the population of registered cassava producers and processors in Enugu State is as given by Yamane (1967) as follows:

$$n = \frac{N}{1+N(e)^2}$$

n = sample size,
N= Population size,
e = limit of tolerable error or level of precision,
1= unity

The population of registered cassava producers and processors is 2281 and the limit of tolerable error was chosen at 0.05 probability level, to provide for an adequate confidence level. Therefore:

N = 2281 registered cassava producers and processors
e = 0.05 probability level
1= unity
Applying the above formula:

$$n = \frac{2281}{1+2281\,(0.05)^2} = \frac{2281}{1+2281\,(0.0025)} = \frac{2281}{1+5.7025} = \frac{2281}{6.7025} = 340.32$$

Therefore a sample size of 340 cassava producers and processors is statistically adequate for the study. Multi-stage random sampling technique was used to select sampling location and respondents for the study. In the first stage, 4 LGAs were selected randomly from each of the 3 agro-ecological zones in the study area, giving a total of 12 LGAs out of the 17 LGAs in the study area. The selected LGAs are Enugu East, Nkanu East, Nkanu West, Isi Uzo, Aninri, Awgu, Ezeagu, Oji-river, Igbo Etiti, Nsukka, Udenu and Uzouwani. In the second stage, proportionate random sampling technique was applied to determine 75, 147 and 118 registered cassava producers and processors that were selected from Enugu East (Enugu East, Nkanu West, Isi Uzo and Nkanu East LGAs), Enugu North (Igbo Etiti, Nsukka, Udenu and Uzouwani LGAs) and Enugu West (Aninri, Awgu, Ezeagu and Oji-river LGAs) agro-ecological zones respectively to give a sample size of 340 cassava producers and processors for the study as follows:

$$\text{Enugu East} = \frac{503}{2281}\,x\,\frac{340}{1} = 75$$

$$\text{Enugu North} = \frac{986}{2281}\,x\,\frac{340}{1} = 147$$

$$\text{Enugu West} = \frac{792}{2281}\,x\,\frac{340}{1} = 118$$

In the third stage, simple random sampling technique was applied in each stratum to select the already determined sample size. As a result of inadequate information pertaining to accurate population of all the cassava producers and processors in the state, the law of large samples or numbers was applied in choosing the size of sample. According to [16,19] the law states that the sample mean converges to the distribution mean as the sample size increases. It also stated in the mathematical premise that the greater the number of exposures: (1) the more accurate the prediction, (2) the less the deviation of actual losses from the expected losses (X-x approaches zero) and (3) the greater the credibility of the prediction. [8,9] further asserted that for any given study area without accurate population size, the chosen size of sample should be greater than 300, thus the sample size of this study is adequate since more than 300 respondents were selected.

Data Collection

Data for this study was gathered from primary source. Primary data were collected from the selected sample following a field survey conducted with a pre-tested semi-structured questionnaire in Enugu East local government area. The researcher employed services of twelve trained enumerators (one for each local government area) who are indigenes and familiar with the areas to assist in data collection. One set of questionnaire was administered to the selected cassava producers and processors. The questionnaires were carefully structured to elicit responses on socio-economic characteristics such as age, sex, level of education, marital status, household size, farm size, farming experience, non-farm occupation, annual income, sources of finance, access to extension and membership of farmers organization and other relevant variables such as costs and returns from cassava production and processing, technologies available for cassava production and processing, production systems of cassava, products of cassava processed in the area, perceived effect of cassava production and processing by the respondents. In addition data on their farm income and household consumption expenditure details were collected.The secondary sources of information were journals, magazine, textbooks, publications and annual reports form World Bank, Food and Agricultural Organization (FAO), USAID, International Institute for Tropical Agriculture (IITA), National Root Crops Research Institute (NRCRI), and National Special Programme for Food Security (NSPFS), Agricultural Development Programme (ADP), FADAMA, CMP and other relevant reports.

Model Specification

The models were specified for this study as follows:

Poverty Indicators

The measurement of household welfare or standard of living is a question which has not been resolved completely. There are many ways one could go about addressing this issue depending on the context, need and availability of information. Since quality of life has to take into consideration all direct and indirect consumption, both tangible and intangible items, measuring welfare has become a daunting task. Poverty can be measured mostly on two scales- the relative scale measurement of poverty and the absolute scale measurement of poverty. However, the most common single indicator of welfare in the literature is to generate value of consumption basket both market purchases and consumption of own production, using appropriate price measures. In the present case, since expenditure is expressed only in terms of value, there is no need to construct a vector of prices which then can be used to convert the quantity information into a value. To determine the poverty status of households in the study area, a poverty line was constructed, using two-thirds of the mean per adult equivalent expenditure, below which a household was classified as being poor and above which a household was classified as being non-poor. The use of consumption to identify and measure poverty has a long tradition, right from the study of Rowntree. The World Bank has also been assessing global poverty by using expenditure data collected through household surveys. This is because consumption level, which is reflected in consumption expenditure, has been conventionally viewed as a preferred welfare indicator. Also, for practical reasons of reliability, consumption expenditure levels are thought to better capture long-run welfare levels than current income levels.

$H = q/n$ ... eq. 1

Where:

H = head count ratio;

q = number of cassava producers and processors that are poor;

n = total number of cassava producers and processors;

The poverty gap was calculated as:

$I = \{\Sigma (Z-Y)/Z\}$ ... eq. 2

I = poverty gap

Z = poverty line - estimated using the mean household expenditure (relative scale)

Y = average per capita household expenditure of poor cassava producers and processors.

The poverty severity was calculated as:

$I = \{\Sigma(Z-Y)^2/Z\}$ ...eq.3

I = poverty gap
Z = poverty line - estimated using the mean household expenditure (relative scale)
Y = average per capita household expenditure of poor cassava producers and processors.
The poverty line used in determining poverty among the cassava producers and processors is expressed following Osondu *et al.,* (2015a):
Z = 2/3 (Y)
Where,
Z = poverty line measured in Naira (₦)
Y = mean per capita household expenditure measured in Naira (₦)
Given;

$$\text{Per capita expenditure/income} = \frac{\text{Total Monthly household expenditure}}{\text{Household size}}$$

$$\text{Mean capita household expenditure} = \frac{\text{Total per capita household expenditure}}{\text{Total number of households}}$$

Enterprise Budget Model

Profit of an enterprise according to [6] can be calculated from the gross margin as follows:
GM = TR – TVC ... eq. 4
ꞃ = Gross margin – total fixed cost
Where:
GM = Gross margin
TR = Total revenue
GI = Gross income
TVC = Total variable cost
ꞃ = profit or net income
Cost function estimation model for cassava production and processing
TC = TFC + TVC ... eq. 5
Where
TC = Total cost in Naira
TFC = Total amount of depreciation on fixed assets and rent in Naira
TVC = Total variable cost in Naira
Revenue estimation model for cassava production and processing
$TR = TP_x P$ ... eq. 6
Where
TR = Total Revenue in Naira
TP = Total output in Naira
P = Price per kg in Naira.
Specification for other parameters of estimation for cassava production and processing
Profitability index = NI/TR
Rate of returns on investment (%) = NI/TC x 100/1
Rate of return on variable cost (%) = TR-TFC/TVC x 100/1
Operating ratio (OR) = TVC/TR

OLS Regression Model

The ordinary least square multiple regression model was used to estimate the determinants of gross margin of cassava production and processing. This was similar to the procedure adopted by [5,9]. The implicit form of the model is as:

$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, e)$ ... eq. 7
Where:
For cassava production
Y = Gross margin of cassava production (Naira)
X_1 = Age of farmers (years)
X_2 = Education level (number of years spent in school)
X_3 = Marital status (1= married, 0 = otherwise)
X_4 = Household size of farmer (number)
X_5 = Farm size (hectares)
X_6 = Farming experience (years)

X_7 = Quantity of fertilizer used (kg)
X_8 = Membership of farmers association (yes = 1; no = 0)
X_9 = Transport cost (Naira)
X_{10} = Price of product (Naira)
X_{11} = Labour cost (Naira).
X_{12} = Credit access (Amount of Naira accessed)
X_{13} = type of technology used (improved =1; otherwise = 0)
X_{14} = Use of improved variety (improved =1; otherwise = 0)
e = Error term assumed to fulfil all assumptions of the classical linear regression model.
E.i~ N (0, δ^2).

For cassava processing
Y = Gross margin of cassava processing (Naira)
X_1 = Age of processors (years)
X_2 = Education level (years)
X_3 = Marital Status (Married =1; otherwise = 0)
X_4 = Household size of processor (number)
X_5 =Labour cost (₦)
X_6 = Processing experience (years)
X_7 = Quantity of cassava tuber processed (Naira)
X_8 = Membership to association (Yes =1; otherwise = 0)
X_9 = Type of Processing technology used (improved =1; otherwise = 0)
X_{10} = Transport cost (Naira)
X_{11} = Price of product (Naira).
X_{12} = Credit access (Naira)
X_{13} = Processing Cost (Naira)
e = Error term assumed to fulfil all assumptions of the classical linear regression model.
E.i~ N (0, δ^2).

Four functional forms of the model (Linear, exponential, double logarithmic and semi- logarithmic) were fitted to the data. The lead equation was selected based on statistical and econometric criteria including number of significant variables, magnitude of the F- ratio, R^2 and the conformity of the variables to *a priori* expectation. The four functional forms are as stated thus:

Linear function:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_5x_5 + b_6x_6 + b_7x_7 \ldots + b_{14}x_{14} + ei$$

Semi – log function

$$Y = b_o + b_1\log x_1 + b_2\log x_2 + b_3\log x_3 + b_4\log x_4 + b_5\log x_5 + b_5\log x_5 + b_6\log x_6 + b_7\log x_7 \ldots + b_{14}\log x_{14} + ei$$

Double log function

$$\text{Log } Y = b_o + b_1\log x_1 + b_2\log x_2 + b_3\log x_3 + b_4\log x_4 + b_5\log x_5 + b_6\log x_6 + b_7\log x_7 \ldots + b_{14}\log x_{14} + ei$$

Exponential Function

$$\text{Log } Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 \ldots + b_{14}x_{14} + ei$$

Paired-t-test Analysis

The paired treatment test was used to determine effect of use of improved cassava production/processing technologies on poverty of cassava producers and processors in Enugu State.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{--- eq. 8}$$

n_1+n_2 – 2 degrees of freedom

Where:

t = Student "t" statistic
$\bar{X}_1$ = Sample mean of poverty indicators of cassava producers and processors after using improved technologies;
$\bar{X}_2$ = Sample mean of poverty indicators of cassava producers and processors before using improved technologies;

S_1^2 = Sample variance of poverty indicators of cassava producers and processors after using improved technologies;

S_2^2 = Sample variance of poverty indicators of cassava producers and processors before using improved technologies;

n_1 and n_2 = Sample size of cassava producers and processors using improved technologies;

Mean Score Analysis

Mean score was used to realize part of objective ii and to analyse objective x and xi. Mean score was used to realize part of objective ii (use of improved production technologies) using a 3-point likert scale graded thus: very often=3, often=2, never= 1. The values of the responses were added and further divided by 3 to obtain a mean score of 2.0, which was regarded as mean level of use of improved cassava production and processing technologies. Technologies with mean score of 2.0 and above were regarded as being used by the respondents. While technologies with mean score of below 2.0 were regarded as not used by the respondents. Mean score was also used to analyse objective x following use of a three point Likert scale to determine effect of cassava production and processing on poverty of cassava farmers and processors in Enugu State (where perception on effect of poverty was captured with a 3-point likert scale graded thus: high effect = 3; low effect = 2 and no effect = 1).

The Likert scaling is a method of ascribing quantitative values to qualitative perception to make it amenable to statistical analysis. The values of the responses were added and further divided by 3 to obtain a mean score of 2.0, which was regarded as mean level for effect of cassava production and processing on poverty. Responses with mean score of 2.0 and above were regarded as being influenced by cassava production and processing while responses with mean score of less than 2.0 were regarded as not being influenced by cassava production and processing.

Thus, mean effect of cassava production and processing = X

$X = \Sigma fx/N$, (the mean score).

Mean ($\overline{X}$) of each item was computed by multiplying the frequency of positive response to each question with its appropriate likert nominal value and the sum was divided by the sum of the number of the respondent to the items. This is summarized with the equation below:

$\overline{X} = \Sigma fn/N$.

Where

$\overline{X}$ = mean score;

Σ = summation sign;

F = frequency or number of respondents who responded positively;

n = Likert nominal value;

N = Number of respondents.

To determine the problems constraining cassava production and processing, a three point likert type scale with three response options (very serious = 3; serious = 2; and not serious =1) were used. The values on the likert type scale were summated to 6 and were divided by 3 to give 2.0. The respondents mean score were obtained for each response item such that any one higher or equal to 2.0 was regarded as a major problem and any one less than 2.0 was regarded as a minor problem.

Tests for Validity and Reliability of Research Instrument

This is an essential part of the research procedure. These tests were used to determine the adequacy and accuracy of the content of the measuring instrument.

Validity of Research Instrument

Validity is the extent a measuring instrument measures what is expected to measure. Validity is the most important attribute of the research procedure. It is always specific to the particular situation and purpose. An instrument that is valid in one situation may not be in different situation because of the differences in objectives or environment. For the purpose of this study, content and face validity were used to determine the adequacy of the content of the measuring instrument. The instrument was developed on the basis of the study objective, scrutinized and was validated via peer review mechanism. The questionnaire was given to my supervisor, professors in the department and experts in the field of Agricultural Economics for their constructive criticism and necessary input to improve its' content and face validity. Thereafter the necessary modifications were made; ambiguous items were amended while those considered irrelevant were removed.

Reliability of Research Instrument

Reliability of research instrument refers to the degree of consistency and precision (accuracy) with which an instrument measures what it is supposed to measure. That is, the degree to which the instrument measures the same thing time after time. It is the ability of an instrument to consistently produce the same result provided no real change has occurred in the respondent's characteristics. The three methods used to determine reliability include test – retest method, multiple form method and split-half method. The reliability test for the instrument used in this study was conducted using test-retest method involving a sample of 20 respondents randomly from the sample frame. After a period of 12 weeks, the exercise was repeated on the same set of the respondents. Scores were assigned to the items relating to socio economic characteristics, poverty and gross margin. The total scores for each exercise was computed and later subjected to Pearson Product Moment Correlation (PPMCC) analysis was used to test the reliability of the instrument. A reliability coefficient of 0.824 obtained. This was considered high enough to accept the instrument as reliable as the reliability coefficient exceeded the minimum threshold of 0.7.

RESULTS AND DISCUSSION

Sex Distribution of Respondents

The respondents, both male and female in cassava production and processing in the survey area were asked to indicate where they belong. Details are as shown on Table 1 below.

Table 1: Distribution of the cassava producers and processors according to sex

Sex	Frequency	Percentage
Male	197	57.9
Female	143	42.1
Total	340	100.0

Source: Field survey, 2015

Table 1 shows that 57.9% of the cassava producers and processors were males, while 42.1% of them were females. It shows that cassava production and processing in the study area was dominated by males. This could be as a result of the stress attached to production and processing of cassava which the female folk sometimes cannot bear. This is in agreement with [12,14] assertion that male population dominated cassava production and processing in Nigeria. Another reason may be that cassava production and processing are capital intensive and males have better access than females to production resources especially credit [20].

Age Distribution of the Respondents

The ages of the respondents of both male and female producers and processors who participated in this survey were determined by categorizing them into five groups according to their age brackets. The age distribution of respondents is shown on Table 2 below.

Table 2: Distribution of the cassava producers and processors according to age

Age	Frequency	Percent	Mean
≤ 19	2	0.6	
20 - 39	61	17.9	
40 - 59	190	55.9	50.34 years
60 - 79	86	25.3	
≥ 80	1	0.3	
Total	340	100.0	

Source: Field survey, 2015

SD = 11.53yrs.

Table 2, shows that 55.9% and 25.3% of the cassava producers and processors are within the age brackets of 40-59 years and 60-79 years respectively. This indicates low involvement of youths in cassava production and processing enterprises. This finding agrees with [4,6] assertion that most youths in Nigeria have left agriculture in favour of employment in non-agricultural sector. The lowest percentages [(0.6%) and (0.3%)] of the respondents were between the age range of 0-19 years and 80-99 years respectively. This indicates that the very young and feeble do not participate prominently in cassava production and processing. According to [17], most of the very young are involved in academics and are not engaged prominently in agricultural production, while the very aged ones lack the strength to cope with the drudgery involved in cassava production and processing. The mean age of the respondents was 50 years and this indicates that majority of the cassava producers and processors in Enugu state fall within the productive ages. Farmers in their productive ages have the tendency to be very active in the enterprise's operation and more geared towards imbibing new innovation which in turn facilitates their adoption of new technology being a positive factor in agricultural production [19]. They can therefore put more effort into the value chain of cassava with particular emphasis in production and processing in order to increase their output.

Education Level of the Respondents

Formal or non-formal system of education designed to educate youths and adults in various subjects of learning were investigated in this study. It is generally believed that educational attainment of farmers is an essential factor that enhances their adoption of new practices and technology. In other words, farmers who have had formal education are more receptive to new ideas than those who are illiterate [9]. In this study the level of education was measured by asking the respondents to indicate the levels they attained and the result of the survey is presented in Table 3 below.

Table 3: Distribution of the cassava producers and processors according to level of educational qualification

Level of Education Attained	Frequency	Percentage (%)
No formal Education	56	16.5
First School Leaving Certificate	85	25.0
Junior Secondary School Certificate	28	8.2
WASC/GCE/SSCE/NECO/NABTAB	109	32.0
OND/NCE	38	11.2
HND/BSc/BA/Bed	21	6.2
Post graduate	3	0.9
Total	340	100.0

Source: Field survey, 2015

Table 3 reveals that 16.5% of the cassava producers and processors had no formal education and 25.0% of them had primary school education. Cumulatively, 40.2% and 18.3% of the cassava producers and processors had attended secondary and tertiary institutions respectively. In summary, 83.5% of the respondents had formal education. This means that majority of cassava producers and processors in Enugu State are literate. The ability to read and write would enable the farmers to better utilize effectively and efficiently whatever resources exist in the area. The level of education attained by a farmer not only increases his/her farm productivity but also enhances ability to understand and evaluate new production technologies [11,19]. According to [16] education raises human capital and significantly increases a farmer's ability to make correct and meaningful choices for farm operations.

Marital Status of the Respondents

Marital status is the fact of being married or unmarried such as a single, bachelor /spinster, formerly married that is husband or wife is late, married but separated or divorced. Marriage with family propels one to higher level of responsibility to cater for dependants and this is expected to facilitate sharp perception of new technology to increase productivity. Marital status in the study was determined by asking the respondents to indicate which of the categories they belong and the frequency distribution is as shown in Table 4.

Table 4: Distribution of the cassava producers and processors according to marital status

Marital status	Frequency	Percentage (%)
Single	39	11.5
Married	267	78.5
Widowed	30	8.8
Divorced	4	1.2
Total	340	100.0

Source: Field survey 2015

Table 4 shows that majority (78.5%) of the cassava producers and processors were married, with 11.5%, 8.8% and 1.2% of them being single, widowed and divorced respectively. The added responsibility of marriage could be the reason to venture into cassava production and processing for household survival. According to [20], married farmers are more involved in cassava production and processing in order to ensure household food security.

Household Size of the Respondents

A household is defined in English dictionary as people who live together in a single home. A household unit according to [21], is defined in dejure terms, which relies on the concept of normal residence whether or not an individual member of the household was present at time of interview. There are other criteria that are vital in classifying the household members. According to [21]; and Federal Office of Statistics (FOS) [22] a household refers to a group of related or unrelated people, living in a dwelling unit or its equivalent, eating from the same pot and sharing a common housekeeping arrangement who take or are subject to others taking financial decisions. According to the concept of this survey, a household is recognized as people who live and eat together in a dwelling in the study area. This section describes the distribution of respondents according to household size as shown in Table 5.

Table 5: Distribution of the cassava producers and processors according to Household size

Size of Household	Frequency	Percent	Mean	SD
≤ 4	63	18.5		
5-9	170	50.0	7.88	3.57
10-14	92	27.1		
15-19	15	4.4		
Total	340	100.0		

Source: Field survey 2015

SD =Standard Deviation

Table 5 shows that a good proportion (50.0%) of the household unit of the cassava producers and processors had household size of between 5-9 persons. This is followed by 27.1% with 10-14 household members and the least (4.4%) with household members of between 15-19 persons. The mean household size of the respondents is 8 persons. This implies that family labour would be readily available when needed in cassava production and processing in the study area. The result lends credence to [16,18] assertions that farmers had reasonable farm hands from within the household that could help in cassava production. However, [19] reported that large household size could lead to economic inefficiency where small farm sizes are available for cultivation.

Farm Size of the Respondents

Land has always remained at any given time in the study area, an alarmingly appreciable resource, no matter how small it is. The land available to a household for cultivation depends on the size of land disposed to them. Hence, many farm households negotiate for more land to augment the one that is already in their possession, especially when the size of the lands to be used is small. Therefore in other to determine their farm size, the respondents in the survey were asked to indicate which of the eight categories they belong. The various household farm sizes of the cassava producers and processors are shown in Table 6.

Table 6: Frequency distribution of respondents according to their Farm size

Farm Size (hectares)	Frequency	Percentage	Mean	SD
≤1	178	52.4		
1.1 – 2.0	98	28.8	1.6	1.2
2.1 – 3.0	22	6.5		
3.1 – 4.0	13	3.8		
4.1 - 5.0	9	2.6		
5.1 - 6.0	6	1.8		
6.0 -7.0	9	2.6		
≥ 7.1	5	1.5		
Total	340	100.0		

Source: Field survey, 2015

Table 6 shows that more than half (52.4%) of the respondents had farm sizes that were less than one hectare. This confirms [8] finding that majority of farmers operate on fragmented farm holdings and apparently depend on manual labour. Also, 28.8% of the respondents have farm holdings that were within the brackets of 1.1–2 hectares. Cumulatively, 87.7% of the respondents cultivated on less than 3.1 hectares of land with a mean farm size of 1.6. This reflects the limited access of farmers to land which was a result of high rent paid on hired land, problems of land tenure system (land fragmentation) that are prevalent in the study area. This is in accordance to [9,13,17] assertion that in Nigeria, cassava is generally cultivated by small holder farmers with low resources. Although Smallholder farmers control a vast proportion of the productive agricultural resources in Nigeria, they are characterized by low level of resource utilization, low levels of productivity, low returns to labour and low level of capital investment which limits their production potentials [20].

Farming/Processing Experience of the Respondents

Experience is an increased knowledge or skill gained through being actively involved in an enterprise over a period of time. The cassava producers and processors need to have skills and practical competence, to strengthen their ability in allocating scarce resources as well as making sound production decisions to increase productivity. It is this wealth of knowledge and skills acquired by the cassava producing and processing household in repeated performance over a number of years in an enterprise that is called farm enterprise experience. The production and processing experience of the cassava producers and processors are shown in Table 7.

Table 7: Distribution of respondents according to cassava farm enterprise experience

Farm enterprise experience (years)	Frequency	Percentage	Mean	SD
1-10	103	30.3		
11-20	78	22.9		
21-30	67	19.7	22 years	13.2
31-40	75	22.1		
41-50	13	3.8		
51-60	4	1.2		
Total	340	100.0		

Source: Field survey 2015

Table 7 Shows that 30.3% of the respondents have been in cassava production and processing enterprises for between 1- 10 years, followed by 22.9 % of the respondents who have between 11-20 years of experience in cassava production and processing enterprise respectively. Table 4.7 further shows that the mean years of experience in cassava production/processing is 22 years. This indicates that the respondents were well versed in the enterprise and are likely to adopt new technology if opportunity comes. High experience in both cassava production and processing enterprises would enhance the respondents' ability for efficient management practices that will ensure increased productivity, all things being equal. According to [14] farmers' years of experience impacted positively on their productivity and efficiency due to prudent allocation of resources overtime arising from acquired practical knowledge through trial and error over time. However, experience can sometimes become a limiting factor to production and processing improvement as farmers become set in their ways and refuse to change and take advantage of new ideas on production [17].

Primary Occupation of the Respondents

Occupation refers to job or profession which people engage in [15] to obtain their livelihood. Primary occupation refers to a person's major source of income. In rural Nigeria, especially in Enugu state, farming is the primary occupation of the rural dwellers and production and processing is mostly at subsistence level. Apart from farming, there are jobs in which the respondents engage in, as a means of earning a living or an added income. Some of these as indicated by the respondents are: civil service, food processing, trading, craftwork, transporter, food vendor, artisan, pensioner and clergy. The major source of income to the cassava producers and processors are as shown in Table 8.

Table 8: Distribution of the cassava producers and processors according to primary occupation

Primary occupation	Frequency	Percentage
Farming	152	44.7
Civil service	19	5.6
Food processing	81	23.8
Trading	29	8.5
Craft work	6	1.8
Transporter	5	1.5
Food vendor	11	3.2
Artisan	20	5.9
Retired/Pensioner	12	3.5
Clergy	5	1.5
Total	340	100.0

Source: Field survey 2015

The information gathered from Table 8 indicates that 44.7% of the respondents engaged primarily in farming. While the major source of income to 23.8% of them was food processing. Other activities engaged in by the respondents include, civil service (5.6%), trade (8.5%), craftwork (1.8%), transport (1.5%), food vendor (3.2%), artisan (5.9%), pensioner (3.5%) and clergy (1.5%). Cumulatively, majority (68.5%) of the respondent's main means of livelihood was farming and food processing. This highlights the important role which cassava production and processing play in the life of the respondents. This is in consonant with [9] which affirms that farming is the predominant occupation in rural parts of Nigeria and play the most important function in the livelihood of the people.

Types of Cassava Processing Technologies Accessible to Rural Farmers and Range of Products Derivable from Cassava Processing

Processing is important for the utilization and marketing of cassava. It reduces the bulk and extends its shelf life thereby reducing transportation cost. Fresh cassava roots have low value per unit weight; whereas processing adds value to it and therefore increases the market value. In addition, fresh roots of some cassava cultivars contain cyanogens which are reduced or eliminated through processing [6]. In the light of these attributes processing, therefore, becomes imperative to detoxify cassava by eliminating the toxic compound [9], reduce the moisture content, reduce the weight, avoid loss of huge profit due to post-harvest losses of fresh cassava roots, acquire a value addition to prolong the shelf life, increase the nutritional value, reduce transport costs, give more demandable products and increase the income generation from cassava product. Cassava roots can be processed into several different products. The major processed forms of cassava roots fall into four general categories: meal, flour, chips and starch. The meals include gari, fufu, lafun, tapioca [9] and abacha. The major food items produced by farmers in the study area are: gari, akpu, abacha, alibo, odourless fufu, high quality cassava flour, and starch. Processing provides smallholder cassava producers with additional economic opportunities, beyond simply selling the fresh roots. Processing enables smallholders to increase their incomes, since they can demand a higher price for the value-added processed products.

Types of Cassava Processing Technologies Available to Respondents

Results of analysis on distribution of cassava producers and processors according to types of available cassava processing technologies used in the study area are presented in Table 9.

Table 9: Distribution of the respondents according to use of processing technologies (n=340)

Processing Technologies	*Frequency	Percentage
Peeling	253	74.4
Washing	188	55.2
Grating	199	58.5
Chipping	64	18.8
Dewatering	66	19.4
Extraction	16	4.7
Pressing	232	68.2
Sifting	108	31.8
Drying	125	36.8
Boiling	66	19.4
Distilling	17	5.0
Fermenting	115	33.8
Frying	28	8.2
Pelletizing	9	2.6
Grinding	112	32.9
Milling	118	34.7

Source: Field survey, 2015

*Multiple responses recorded

Table 9 shows that the major processing technologies used by the cassava producers and processors according to frequency of use are peeling (74.4%), pressing (68.2%), grating (58.5%) and washing (55.2%). Other important processing technologies used by the cassava producers in the study area are: drying (36.8%), fermenting (33.8%), grinding (32.9%) and sifting (31.8). These technologies according to [3,6] are widely used in Nigeria to detoxify cassava, reduce the moisture content, avoid loss of huge profit due to post-harvest losses of fresh cassava roots, acquire a value addition to prolong the shelf life, increase the nutritional value, reduce transport costs, give more demandable products and increase the income generated from cassava product. Few of the cassava processors processed cassava by dewatering (19.4%), boiling (19.4%) and chipping (18.8%). Other cassava processing technologies such as extraction (4.7%), pelletizing (2.6%) and distilling (5.0%) were used to process cassava into forms for industrial uses. The available processing methods reflect the diverse forms of utility added to cassava. These leave the farmers with opportunities of choice in their menu, and increase in their income. The avalanche of the processing forms available could be attributed to the increased campaign on cassava production and processing by the government initiative and transformation agenda on cassava. The people themselves were convinced on the enormous potentials following the processing of cassava into different forms which made for variety, increased income, increase in employment and wellbeing of farmers.

Cassava Processing Equipment used by the Respondents

In response to growing labour shortages in Nigeria and upward surge of youths towards urban centres, creating a vacuum in the rural area and labour sector, researchers have developed a wide array of simple mechanical processing technologies to reduce drudgery in processing of cassava. Research Institutes such as Product Development Agency (PRODA), Federal Institute of Industrial Research Oshodi (FIIRO), and International Institute of Tropical Agriculture (IITA), as well as the Agricultural Engineering Departments in UNN and other several Universities and Polytechnics in the country, have developed many mechanized units designed to remove the constraints that cassava processors face. Thus, several models and variations of modern cassava processing equipment are available in Nigeria [17]. These include among others: Washing Machine, Cassava Chipping Machine, Grating Machine, Hammer Mill, Hydraulic Press, Dryers and Pelletizer. The respondents in the survey were asked to indicate the types of processing machines that are used for processing in the study area. The result of their response is presented in Table 10.

Table 10: Distribution of the respondents by the frequency of using Modern processing equipment (n=340)

Processing Technologies	Use often	Occasionally use	Never use	Total
Use of Mechanical Peeler	6 (1.8%)	20 (5.9)	314 (92.3%)	340
Use of Washing Machine	6 (1.8%)	0	334 (98.2%)	340
Use of Grating Machine	248 (72.9%)	7 (2.1%)	85 (25.0%)	340
Use of Hydraulic Press	243 (71.5%)	16 (4.7%)	81 (23.8%)	340
Use of Steeping tank for soaking	1 (0.3%)	2 (0.6%)	337 (99.1%)	340
Use of Aluminium/plastic made/basket sieve	251 (73.8%)	17 (5.0%)	72 (21.2%)	340
Use of sieving machine	2 (0.6%)	0	338 (99.4%	340
Use of motorized fryer	0	0	340 (100.0%)	340
Rotary Dryer	6 (1.8%)	0	334 (98.2%)	340
Hammer mill	1 (0.3%)	0	339 (99.7%)	340
Pulverizing machine	7 (2.1%)	3 (0.9%)	330 (97.1%)	340
Cast iron-made/earthen ware frying pot	334 (98.2%)	6 (1.8%)	0	340
Drying on platform/mat	265(77.9%)	45(13.2%)	30 (8.8%)	340
Use of milling machine	116 (34.1%)	24 (7.1%)	200 (58.8%)	340
Hot/electric sealer	0	0	340 (100.0%)	340

Source: Field survey, 2015

Table 10 shows that the respondents use some modern cassava processing equipment in their enterprises. Majority (98.2%), of the respondents in the survey indicated that cast iron-made frying pot. Other processing equipment that were often used by (77.9%) of the respondents are drying on platform/tarpaulin/mat, (73.8%,), aluminium/plastic made basket sieve, (72.9%) and (71.5%) of them often used grating machine and hydraulic press respectively. while, milling machine was used often by 34.1% of the processors. However, majority (92.3%), of the cassava producers/processors indicated having never used mechanical peeler washing machine (98.2%), steeping tank (99.1%), sieving machine (99.4%), motorized fryer (100.0%), electric sealer (100.0%), hammer mill (99.7%) and pulverizing machine (97.1%). The high costs of these cassava processing machines which are beyond the reach of local processors could be responsible for the high frequency of never being used in the study area. A cursory look at Table 10 reveals that most cassava processors in Enugu state still operate on a small scale level and are therefore unable to afford use of impressive processing equipment. Cassava processing in the study area still continues to present daunting challenges because of low productivity and is characterized by low level of technology use.

Mode of processing technology of the processors

There are two identified modes of processing technologies (unimproved and improved) that are available to the farmers in this survey. The distribution of the cassava processors according to mode of processing technologies used is presented in Table 11.

Table 11:Distribution of respondents according to mode of processing technology used

Mode of technology	Frequency	Percentage
Improved	263	77.4
Unimproved	77	22.6
Total	**340**	**100.0**

Source: Field survey, 2015

The result in Table 11 shows that the majority (77.4%) of the processors use improved technology while 22.6% of the processors make use of unimproved technology. The implication here is that majority of the farmers in this survey make use of improved technologies though not in all the operations. In the study area there is a blend of improved and unimproved usage of technique which in actual fact could be termed "mixed technology". However, it is a step forward and a shift from the old methods of processing cassava.

Ownership of cassava processing equipment

It is obvious that employment of equipment in cassava processing saves time, increases volume of operation and reduces the drudgery associated with cassava processing. The cost of procuring such equipment is however, very high and most times cannot be afforded by cassava processors. The result of the distribution of the cassava processors according to the ownership of equipment is presented in the Table 12.

Table 12: Distribution of the respondents by Ownership of Cassava Processing Equipment (n=340)

	Cassava Processing Equipment		
Ownership	Grater	Presser	Miller
Community	9 (2.6)	10 (2.9)	11 (3.2)
Cooperative Group	31 (9.1)	21 (6.2)	15 (4.4)
Individual	168 (49.4)	166 (48.8)	95 (27.9)
Local Government	0	1 (0.3)	0
State Government	0	0	1 (0.3)
Federal Government	0	1 (0.3)	1 (0.3)
Non-government organizations (NGOs)	6 (1.8)	5 (1.5)	5 (1.5)

Source: Field survey, 2015

Figures in parentheses are percentages

Table 12 indicates that 49.4%, 48.8% and 27.9% of the cassava processors owned presser, grater and miller equipment respectively. Also, 9.1%, 6.2% and 4.4% of the processors had cooperative ownership of grater, miller and presser machines respectively. However, Table 12 reveals that most of the cassava processors did not own much processing equipment and this could limit their production scale. Few equipment used by the cassava processors are owned by communities and NGOs. Local, State, and Federal Governments do not own significant amount of cassava processing equipment in the study area.

Products Derived from Cassava Processing

Cassava may not be available for consumption if it has not undergone some transformation from its raw natural state to a usable state. Table 13 presents the various products derived in the study area from cassava processing.

Table 13: Distribution of respondents according to products from cassava processing (n= 340)

Processed forms	Frequency	Percentage
Garri	303	89.1
Fufu/Akpu	210	61.8
Abacha/Tapioca	198	58.2
Fermented Flour (Alibo)	172	50.6
Chips	108	31.8
Starch	20	5.9
Odourless Fufu	2	0.6
High Quality Cassava Flour (HQCF)	1	0.3
Livestock feed	1	0.3

Source: Field survey, 2015

*Multiple responses recorded

Table 13 shows that majority (89.1%) of the cassava processors processed cassava into garri. Also, 61.8% and 58.2% of the cassava processors are involved in processing cassava into fufu/akpu and abacha/tapioca. Other common products of processed cassava produced by 50.6% and 31.8% of the cassava processors are fermented flour and cassava chips. According to [13] the predominant products of processed cassava in south-eastern Nigeria including Enugu State are: garri, fufu/ akpu and abacha.Only 5.9%, 0.6%, 0.3% and 0.3% of the cassava processors were involved in processing cassava into starch, odourless fufu, HQCF and livestock feed. This shows that in the study area the bulk of produced cassava tubers were processed into human meals. This result lends credence to [15] assertion that Nigeria is yet to tap the full potential embedded in cassava processing and still imports some cassava products like starch, ethanol and adhesives due to underutilization of productiontechnologies.

Sources of Cassava Tubers

Cassava processors have various sources of obtaining their root tubers for processing namely; from farmer's own farm, procurement from the market etc. The respondents were asked to indicate where they procured the cassava root tuber. The distribution of the cassava processors according to sources of cassava tubers are presented in Table 14

Table 14: Distribution of Respondents According to Source of Cassava Tuber

Sources of Cassava Tubers	Frequency	Percentages
Own farm only	146	42.9
Procurement only	0	0
Both procurement and own farm	194	57.1
Total	340	100.0

Source: Field survey, 2015

Table 14 shows that 57.1% of the cassava processors obtained cassava tubers from their own farms and also procured cassava tubers from the open market in other to augment the quantity sourced from own farms. While 42.9% of the cassava processors used cassava tubers from their own farms only. The finding lends credence to results obtained by [16] in Abia State, Nigeria.

CONCLUSION

In conclusion, the study also revealed that major processing technologies used by the cassava producers according to frequency of use are peeling (74.4%), pressing (68.2%), grating (58.5%) and washing (55.2%). Majority (98.2%, 73.8%, 72.9% and 71.5%) of the cassava farmers made use of cast iron-made frying pot, aluminium/plastic mad**e**/basket sieve, grating machine and hydraulic press in cassava processing. About 49% and 48% of the cassava farmers/processors owned presser and grater equipment respectively, with garri (89.1%) and Akpu/fufu (61.8%) being the two predominant products got from cassava processing. About 57% of the cassava farmers obtained cassava tubers for processing from both own farms and market. Result of data analysis also revealed that mean monthly expenditure of the cassava producers/processors was ₦ 18, 775.64, with 12.6% and 31.8% of them classified as core poor and moderately poor respectively. The poverty incidence and poverty gap among the cassavaproducers/processors were 0.4441 and 0.2949 respectively.

REFERENCES

1. Abalu, G. I. (2008). Agricultural self-sufficiency by Year 2020: From the Frying Pan into the Fire. Nigerian Association of Agricultural Economists. NAAEEconomic and Policy Series, Vol. 1. No. 1, October.
2. Abang, S.O. and Agom, D.I. (2004). Resource use efficiency of small-holder cassava farmers: The case of cassava producers in cross River State, Nigeria. *Journal of Food, Agriculture and Environment,* 2 (3): 87-90.
3. Abdullahi, A. (2003). Employment creation and opportunities in the agro- allied sub-sector: the case of cassava production. Central Bank of Nigeria Bullion, 27(4): 1-9.
4. Abdullahi, S. A. (2009). Entrepreneurship Skills Development as an EconomicEmpowerment and Poverty education Strategy in Nigeria.*Nigerian Academy of Management Journal,*3 (1): 42 - 47.
5. Abolaji, D., Willie, D., Siyabola, O., Oladele, O.F. and Isiaka, A. (2007).Capacity Innovations in Cassava Production, Harvesting and Processing in Nigeria.
6. Achem, B. A. (2011). Assessment of Constraints to Cassava Value-Added Enterprises in Kwara State, Nigeria. *Journal of Agricultural Extension,* 15, (1):124-34.
7. Achem, B.A. et al., (2013): A Comparative Assessment of the Profitability of Cassava Processing Enterprises in Kwara State, Nigeria. *Global Journal of Current Research* Vol. 1 No. 2. 2013. Pp. 57-61.
8. Addy, P. S., Kashaija, I.N., Moyo, M.T., Quynh, N.K., Singh, S. and Awalekhwa, P.N. (2004). Constraints and Opportunities for Small and Medium Scale Processing of Cassava in the Ashati and Brong Ahafoa Regions of Ghana: International Centre for Development oriented Research in Agriculture (ICRA).
9. Adebayo, A. (2009). Theoretical Perspectives on Poverty Reduction: Challenges forPolicy in Nigeria. *International Journal of Economic and Development Issues,* 8 (1): 34- 41.
10. Adebayo, E. (2005). Modelling the uptake of Agricultural knowledge and information among small scale farmers in Ogun State.*Nigeria Journal of Agricultural Extension*, 9: 116 125.
11. Adegbite, D. A., Oluruntoba, O.A., Adubi, K.O. and Shobanke S. B. (2008). Impact of National Fadama Development Project II on Small Scale Farmers' Income in Ogun State. Implications for Agricultural Financing in Nigeria. *Journal of Sustainable Development in Africa,* Vol 10, No. 3, 2008
12. Adeola R.G, Ayoade A.R (2009): Effect of gender discrimination in access to technologies among farmers in Ibadan/Ibarapa Agricultural zone of Oyo state Nigeria. *Ozean Journal of social sciences, Vol. 2, No. 2*, page 66
13. Adeolu, B.A. and Taiwo, A. (2004).The Impact of National Fadama Facility in Alleviating Rural Poverty and Enhancing Agricultural Development in South Minister of Agriculture Federal Republic of Nigeria at the International Institute of Tropical Agriculture (IITA), Ibadan – Nigeria.
14. Adetunji, M.O., Oladejo, J.A., Oladiran, J.O. and Ojedokun, I.K. (2015). Factors associated with Poverty Status among Women Cassava Processors in Ogbomoso Agricultural Zone of Oyo State, Nigeria. *International Journalof conomics and BusinessManagement,* 1 (5): 1-12.
15. Afolabi J.A. (2009): An Assessment of Garri Marketing in South –West Nigeria, Journal of Social Sciences 21(10):33 –38
16. Ahmadu J. And Egbodion (2013) Effect of Oil Spillage on Cassava Production in Niger Delta Region of Nigeria: *American Journal of Experimental Agriculture 3(4):*

914-926, 2013 Science domain *international* *www.sciencedomain.org*

17. Aigbokhan, B. E. (2000). Poverty, Growth and Inequality in Nigeria: A Case Study.Nairobi: African Research Consortium.
18. Ajani, E.N. and Onwubuya, E.A. (2013).Analysis of use of improved cassava production technologies among farmers in Anambra state, Nigeria.*Journal of Agricultural Research,* 2(12): 335 – 341.
19. Ajani E.N, Mgbenka R. N., Onah O. (2015) "Empowerment of Youths in Rural Areas through Agricultural Development Programmes: Implications for Poverty Reduction in Nigeria" *Journal of Research in Agriculture and Forestry*, 212) February 2015 36
20. Ajayi, M.T., Banmeke T.O.A., Omoregbee, F. E. and Edeoghon C.O.(2007) Extension guide for growing cassava and rapid production of quality cassava planting material.
21. Akeredolu – Ale, E.O. (1975) "Poverty as a Social Issue: A Theoretical Note" In:Poverty inNigeria, Nigeria Economic Society (NES) Annual Conference,Ibadan UniversityPress, Ibadan, PP: 43-61.
22. Akorede, M. A. (2004). Cassava industrial revolution in Nigeria: the potential for a newindustrial agriculture, Ibadan 40-43.
23. Akinnagbe, O.M. (2010). Constraints and strategies towards improving cassavaproduction and processing in Enugu North Agricultural Zone of Enugu State,Nigeria.*Bangladesh Journal of Agricultural Research,* 35(3): 387-394.
24. Akinpelu, A.O. * L. E.F. Amamgbo*, A.O. Olojede,* A.S. Oyekale (2011). "Health implications of cassava production and consumption", *Journal of Agriculture and Social Research (JASR)* Vol. 11, No. 1, 2011
25. Akintunde O, Amaefula E (2005). "68m Nigerians Are Poor", The Punch Newspaper, Lagos: May.