Socio-economics characteristics, income inequality, and poverty status of female headed cassava (*Manihot esculenta Crantz*) farming households in federal capital territory, Nigeria

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Abstract

The study evaluated the socio-economic characteristics, income inequality and poverty status of female headed cassava farming households in Federal Capital Territory, Nigeria. Primary data were used for the study. A multi-stage sampling technique was used to select a total sample size of three hundred and three (303) households from the two area councils. The data were analyze using descriptive statistics, Foster-Greer-Thorbecke (FGT) poverty index, Gini coefficients, Probit model analysis, and principal components analysis (Factor Analysis). From the results about 59.73% of the female headed cassava farming households were less than 50 years old. 31.35% of the female headed cassava farming household were married. The mean household size was about12.00 persons. The mean annual income was 374, 868 Naira. About 56.77% of the female headed cassava farming household were poor given a poverty line ₦9, 009.37. In addition, 76% of female headed cassava farming households fell into annual income of below ₦500, 000 and they control 40% of the market share. The Gini coefficient was calculated to be 0.62. Maximum Likelihood Estimates (MLE) of the Probit Model shows that the coefficients of marital status (P<0.01), educational level (P<0.05), household size (P<0.01), income (P<0.1), and sources of livelihood (P<0.1) were the statistically and significant factors influencing poverty status among the female headed farming households in the study area. The results of the multinomial Logit model analysis show that the factors that statistically and significantly influencing the income inequality of female headed farming households in the study area, were coefficient of marital status (P<0.05), educational level (P<0.10), access to credit(P<0.05), and sources of livelihood (P<0.05) for low income earners. Educational level (P<0.01), access to credit (P<0.10) and farm size (P<0.01), were statistically and significant factors influencing income inequality or income distribution among high income earners among female headed farming households. Trading enterprise, cassava flour/garri processing, and palm/ groundnut oil pressing were major coping strategies employed by the female headed households to against poverty and income inequality. Based on the findings it was concluded that there was high income gap or income inequality among female headed farming households and they were poor. It was recommended that policies that will help create more credit access/programs in terms of loan at low interest rates for women should be implemented at all tiers of government to help mitigate and reduce the poverty among female headed household.

Keywords: Poverty, Income, inequality, Cassava, female farming households, Nigeria

INTRODUCTION

Cassava (*Manihot esculenta Crantz*) is mostly considered and regarded as a 21st century staple crop for majority of the smallholder farmers across the globe especially for farmers in Africa. The cassava crop is also recognized as the root crop that is most widely cultivated and equally treated as food security crop that is consumed in tropical region (Otekunrin, *et al.*, 2022). Cassava root in Nigeria is considered as one of the top most important crop by production and regarded as second most important crop consumed as asserted by (Otekunrin & Sawicka, 2019; Sahel, 2016). The importance of cassava is on the increase on daily basis among the crops grown in Nigeria. It is not only connected to its increasing demand as food but also as food security and industrial purposes (FAO, 2018). An enhanced and improved cassava value chain expansion could lead to increase in the income of the female headed cassava farming household while reducing their poverty index and also generate a total export value of about 2.98 billion dollars to the Nigerian economy as a foreign exchange. This can be achieved by adding value to the commodity in order to produce derivatives and by-products such as sweeteners, ethanol, cassava starch etc., through local manufacturing and processing to meet local industries need and direct consumption is strategically important to the growth of the agriculture sector and the overall economy (PWC, 2020).

Poverty and inequality has remained for a long time a subject of major concern of many governmental and non-governmental organizations in both the developed and developing nations. For example, eradication of extreme poverty and hunger is the first goal of the United Nations Eight Millennium Development Goals (UN, 2000). According to World Bank (2011), "poverty is the economic condition in which people lack sufficient income to obtain certain minimal levels of health services, food, housing, clothing and education which are necessities for standard of living". Poverty is a situation when the resources of individuals or families are inadequate to provide a socially acceptable standard of living (Agwu & Kadiri, 2014). It is seeing as a state of involuntary deprivation, lack of capabilities to carry out certain activities and lack of adequate basic necessities of life (Odusola & Ogwumike, 2001). However, a person's perception of poverty is a function of his present experience, condition of his environment, the aim of such definition, his vocation and his definition of the good life (Fasoranti, 2010). Poverty is defined as a 'pronounced deprivation in well-being'. It can be defined narrowly or more broadly, depending on how well-being is understood (Haughton & Khandker, 2009). Poverty is a scourge that continues to have adverse effects and severe hardship on millions of people all over the world. More than three billion people equivalent to almost half of the world's population live on less than $2.50 a day and over 80 percent of the world's population live in countries where income gaps are increasing with the poorest 40% of the world's population accounting for 5% of global income, while the richest 20% accounts for three quarters of world income (Human Development Report, HDR 2007).The World-Bank report (2012) reveals that an estimated 1.29 billion people in 2008 lived below $1.25 a day in developing countries. Majority of those who live in extreme poverty reside in developing worlds of Africa, Asia, and Latin-America (Gbosi and Omoke, 2004). Nigeria is a country with the largest population on the African continent, of this magnitude, 49% are female, while outstanding 51% are male. It is among the thirty most unequal countries in the world with respect to income distribution, while the poorest half of the population holds only 10% of national income (British Council, 2012; Idowu *et al.*, 2011). More disturbing is the fact that 54% of Nigerians still live in poverty and the proportion has doubled since 1980 (when about 28% were classified as poor). Human development indicators are also worse than those of comparable lower middle-income countries; 42% of Nigerian children are malnourished. The averages hide a context that is worse for women and girls. Nearly six million young women and men enter the labour market each year but only 10% are able to secure a job in the formal sector, and just one third of these are women (British Council, 2012). The average poverty incidence in Nigeria increased from 0.28 to 0.42 between 1980 and 1992 respectively and by 1996, the situation worsened to an average of 0.66. By implication, out of every 100 Nigerians, 66 were dwelling below the poverty line with great difficulties (NAPEP, 2006, Nwachukwu and Ezeh, 2007). Several socio-economic problems such hunger, infant immortality, sicknesses and disease outbreak continue to plague many in developing nations due to extreme level of poverty, sadly this deplorable situation is preventable if properly managed. Sub-Saharan Africa as a continent has a tragic record of highest incidence of poverty with about 47 percent of its population reported being poor (World Bank 2012).Many have attributed different reasons for the slow improvement in poverty alleviation in Africa, factors such as labour market shortages, macro-economic shocks and failures, poor governance, corruption, low economic growth, huge debt burden , environmental degradation, migration, unemployment and underdevelopment , crime and violence (Ajakaiye and Adeyeye, 2002) .

Inequality is a challenge to the eradication of extreme poverty and tends to reduce the pace and durability of growth (UNICEF et al., 2014; Ostry et al., 2014). Inequalities have also been found to hinder social cohesion and increase the risk of violent conflict (UNDP, 2013; Stewart, 2010). Inequality undermines social justice and human rights. Inequalities have resulted in the poorest people–including many women, young and older people, persons with disabilities, indigenous peoples, and rural populations–making less progress

towards development goals (Kabeer, 2010; World Bank, 2013). Economic, political, and social inequalities tend to reproduce themselves over time and across generations (World Bank, 2006). There is some overlap between those affected by poverty and those negatively affected by inequality, although it is important to note that certain groups and individuals are disproportionally affected. Deprivation or inequality in one dimension can influence other dimensions: for example, social inequality can lead to economic inequality (Sumner, 2013; Kabeer, 2010). Households refer to group of people who live together under a roof and accept the headship of a particular person. Due to modern living conditions whereby two or more families who are unrelated by blood or family ties reside under a roof (house). Beaman and Dillon (2009) defined households as groups of people living under the same dwelling place who eats meals together and acknowledge the authority of a man or woman who is the head of household. Household headship is usually attributed to an adult male (especially in rural settings) in the household who is most often than not, the husband (father). However, headship can be transferred due to death of previous household head, divorce, migration as well as serious illnesses. In any of these situations, headship is usually transferred to the oldest person who can either be a male or female. In cases of deaths of husbands whereby the children are still minors, headship is handed over to the wife (especially in a monogamous family). Irrespective of who takes up the headship of households, the situation of the households in all ramifications is most likely going to experience some changes. Although most poor women can also be found in households headed by a man, the poorest women are in female-headed households (UNFPA, 2002). For instance, it is of common knowledge that majority of women in the world especially in developing countries live in poverty. As reported by Quisumbing *et al.* (2001), 70% of the world's poverty stricken populations were women. The incidence of female headship of households is becoming increasingly popular in both developing and developed countries (Chant, 2007). Due to gender inequality in terms of access to productive resources, female-headed farming households have been found to be more vulnerable to poverty and its negative consequences such as food insecurity, malnutrition among children, drop-out of children from school, etc. than male-headed households. The issue of whether or not a female headed farming household is poor is widely recognized as an important, indicator of a female headed farming household's wellbeing. This is reflected in the central role the concept of poverty plays in analysis of social protection policy. In recent years, however, the term vulnerability has come to be widely used alongside poverty in discussions of poverty alleviation and social protection strategies (Oni and Yusuf, 2006). In Nigeria, the problem of poverty has, for a fairly long time, been a cause of concern to the government (Nwaobi, 2003). As a

result, the government's efforts at combating the menace actually started immediately after the attainment of independence in 1960 (Ovwasa, 2000; Omotola, 2008). Nwaobi (2003) observed that the initial attention was focused on rural development and country planning as a practical means of dealing with the problem. He further noted that the failure to adequately implement these programs can be seen as the precursor to most of the present causes of poverty in Nigeria. However not every developing nations has witnessed steady reduction in poverty. Since 1980 the poverty incidence in Nigeria has been escalating (UNDP, 2005). Recent statistics from Nigeria are shocking and distressing. The National Bureau of Statistics (NBS) 2011 of the nation reported that in spite of the rapid economic growth of the Nigerian economy, 60.9% of Nigerians in 2010 were living in absolute poverty, as compared to 54.7% in 2004. This 60.9% absolute poverty shows that more than 100 million people out of the 204,381,889 million Nigerians (population estimate Feb, 2020, United Nations) were extremely poor. Previous study done by Federal Office of Statistics (FOS) (2000) indicated that poverty incidence increased from 26.1 to 46.3% between 1980 and 1985 and 42.7 to 65.6% between 1992 and 1996, respectively. The report also revealed that poverty incidence is highest in the rural communities and women are the most affected. This is not surprising as many rural people lack capabilities in terms of employment opportunities as they mostly rely on subsistence agriculture as primary means of livelihood and also lack access to infrastructural development that can improve their wellbeing. Moreover, the Human Development Index (HDI) report (2011) of the United Nations Development Programme UNDP ranked Nigeria 156 out of 186 countries with the HDI 0.453 which is below Sub-Saharan Africa's average of 0.463, clearly suggesting that Nigeria is still one of the 40 poorest nations in the world. Several factors were attributed to the worsening case of poverty in Nigeria; changing socioeconomic, political, environmental conditions as rural inhabitants (Olutayo, 2009). Well as unstable and decreasing income, low rate of capital accumulation and declining agricultural output due to the rapidly changing climatic conditions in Nigeria have continued to exacerbate the living conditions of several households especially those of rural inhabitants (Olutayo, 2009). Besides, huge income inequality between the poor and the rich, bad governance, corruption, high unemployment rate, rapidly growing population and poor infrastructural developments also contribute to the escalation of poverty. Despite the fact that the past and present Nigerian governments have initiated and implemented numerous policies and poverty alleviation programmes to tackle the scourge, their efforts have yielded little or no result as the situation of the poor continue to worsen day by day. Extremely high level of poverty can have grave consequences on individuals and the nation at large, it is dehumanizing and detrimental

to economic growth, it can ignite and incite the impoverished population to various forms of social vices, crisis and crimes as means of survival. In view of above to achieve this goal, a comprehensive knowledge of the poverty profile and its determinants both at household and regional level are imperative because characteristics such as age and gender of households, educational status of household head and other socio economic factors are fundamental factors that could have an impact of poverty status of Female headed farming households in Nigeria (Osinubi, 2003). This is the central focus of this research work, the result will help in making an informed decision by policy makers on specific factors and regions to focus on in order to achieve rapid improvement in reduction of extreme poverty.

Research Questions

This study intends to provide answers to the following research questions:

- What is the poverty status among female headed cassava farming households in Federal Capital Territory, Nigeria?
- What are the income distributions and inequalities among female headed cassava farming households in the study area?
- What are factors influencing poverty status of female headed cassava farming households in the study area
- What are the coping strategies against poverty and income inequality of female headed cassava farming households in the study area?

Objectives of the Study

The broad objective is to evaluate poverty status, income inequality and socio-economic characteristic of female headed farming households in Federal Capital Territory, Nigeria. The specific objectives were to:

- determine the poverty status among female headed cassava farming households,
- determine the income distributions and inequalities among female headed cassava farming households,
- evaluate factors influencing poverty status of female headed cassava farming households,
- identify the coping strategies against poverty and income inequality of female headed cassava farming households in the study area.

MATERIALS AND METHODS

The Study Area

The study was carried out in Federal Capital Territory, Nigeria. It was carved out in 1976 from parts of Nasarawa, Niger, and Kogi States in the central parts of Nigeria. The territory is located just off the confluence of the River Niger and Benue River. It is bounded by the state of Niger to the west and north, Kaduna to the northeast, Nasarawa to the east and south, and Kogi to the southwest (Dawan, 2000). There are six Area Councils in Abuja namely: Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area Councils. Federal Capital Territory has total land area of about 8,000 Sq. Kilometers with a total population of 776,298 people at the 2006 census (NPC, 2006). It is located at the extreme South west near the flood plain of River Gurara which transverses the territory from North to South at an elevation of 70m above sea level. The area lies between Latitudes $07^0.57'$N and Longitudes $07^0.7'$E. The vegetation combines the best features of the southern tropical rain forest and guinea savanna of the North. This reflects the full transitional nature of the area as between the Southern forest and Northern grassland which have the woods and shrubs respectively. The soil is reddish with isolated hills filled by plains and well drained sandy clay loams which supports farming of the major crops such as sorghum, millet, melon, yam, soybean, benniseed, cassava and rice cultivation (Abuja ADP, 2004). The duration of sunshine ranges from 8 to 10 hours per day. The average rainfall per annum is 163.2mm. The original settlers are Gwari, Koro, Bassa, Gade and the Hausa Fulani as well as immigrants' population of other Nigerians and expatriates. It is the industrial zone of the Federal Capital Territory and over 26 headquarters of Federal agencies are situated in the Area Council including the University of Abuja and a Specialist hospital.

Sampling Technique and Sampling Size

This study employed purposive sampling method to select Federal Capital Territory, Nigeria. First, because of the proximity of the area to the base of the researcher. Secondly, the female headed farming households are many in the area. This followed a preliminary survey carried out in the area. Multi-stage sampling method was used to select the target respondents (household-head). In the first stage, two (2) area Councils were randomly selected using ballot –box method, they were Kwali and Gwagwalada. In the second stage, six (6) wards were randomly selected using ballot-box, they were: Tunga-maje, Kutunku, Gwako, Ashara, Kilankwa, and Kwali. In the third stage, twenty-one (21) villages were randomly selected using ballot-box method. From equation (3.1) a proportionate-random sampling method was used to select a sample size of three hundred and three (303) households from the sample frame of one thousand, two hundred and forty-three (1243) household heads in the two area councils.

Yamane (1967) will be used to select the sample size:

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

Where,

n = Sample Size (Units)

N= Sample Frame (Units)

e=Level of Precision (5%)

Method of Data Collection

Primary data were used. Data were collected with the use of questionnaire, interview schedule, and Focus Group Discussion (FGD). Enumerators were recruited and trained on the contents of the questionnaire and interviewing process. Thereafter, primary data were collected through the administration of well-structured questionnaire by the team of trained enumerators. Information collected include; age, sex, marital status, household head, income, household size sources of livelihood etc.

Method of Data Analysis

The following analytical tools will be used to achieve stated objectives

- Descriptive Statistics,
- Foster-Greer-Thorbecke (FGT) Poverty index,
- Gini Coefficients,
- Probit Model Analysis
- Principal Components Analysis (Factor Analysis)

Descriptive Statistics

Descriptive statistics such as frequency distribution, mean, standard deviation, percentages, graphs and tables was used to describe the variables and socioeconomic characteristics of the respondents. It was used to achieve part of specific objectives (i) & (v).

Foster-Greer-Thorbeck (FGT) Poverty Index

The most widely used poverty indices are measures proposed by Foster, Greer-Thorbecke (1984) as used by (Duniya and Sanni, 2015). These three poverty indices measures are: the poverty headcount ratio, the poverty gap and squared poverty gap. These poverty indices measure the basic desirable property of poverty. The FGT model is given as;

$$p_{\alpha i} = \frac{1}{n}\sum_{i-1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha} \quad \ldots\ldots\ldots (2)$$

Where:

$P\alpha$ = is the FGT poverty index for the ith sub-groups,

N= The total number of female headed households in the population,

Y_i= The per capital expenditure of ith households,

Z = The poverty line,

q = The number of the sampled household population below the poverty line and,

α = The degree of aversion and take on the value of 0,1,2

Poverty Head Count Ratio

The headcount ratio measures the incidence of poverty and it is obtained as:

$$p_0 = \frac{1}{n}\sum_{i-1}^{q}\left(\frac{z-y_i}{z}\right)^0 = \frac{q}{n} \quad \ldots\ldots\ldots (3)$$

when ($\alpha = 0$)

$P\alpha = p_0$ n= poverty incidence or head count ratio

Where

q = The number of individuals below poverty line

n = The number of individuals in reference population.

Poverty Gap

When α is equal to 1, it shows uniform concern and equation becomes

$$p_1 = \frac{1}{n}\sum_{i-1}^{q}\left(\frac{z-y_i}{z}\right)^1 \quad \ldots\ldots\ldots\ldots (4)$$

This measure the depth of poverty (the proportion of expenditure shortfall from the poverty line) according to Hall and Patrinos (2005), it is otherwise called the poverty gap or expenditure gap- the average difference between the income and the poverty line. The poverty gap index p_1 was used to measure the depth of poverty of the female headed cassava farming households in the study area.

Square Poverty Gap

When α is equal to 2 distinctions is made between the poor and the poorest, that is, the severity of poverty (Foster, Greer and Thorbecke, 1984) and (Assadzadeh and Paul, 2003). The equation becomes.

$$p_2 = \frac{1}{n}\sum_{i-1}^{q}\left(\frac{z-y_i}{z}\right)^2 \quad \ldots\ldots\ldots (5)$$

The equation gives a distribution sensitive FGT index of the distribution of expenditure among the poor. This measure takes account of the incidence of poverty, depth of poverty and the inequality amongst the poor. 2/3 of mean per capital household expenditure MPCHE was used as the poverty line, the extreme poor (those spending <1/3 of MPCHE), moderately poor (those spending <2/3 of MPCHE and the non-poor (those spending >2/3 of MPCHE).

This was used to achieve part of specific objective (i)

Gini Coefficient

To determine the income distribution and income inequalities among cassava farming female headed households, the Gini coefficient was applied. The Gini Coefficient formula is in line with Wilson *et al* (2010);

Madu (2006); Damgaard and Weiner (2000). Income inequality will be measured using the Gini-coefficient. Following Morduch and Sicular (2000).

The Gini- Coefficient is stated thus:

$$G.C = 1 - \sum_{i=1}^{k} X_i Y_i \dots \dots \dots \dots (6)$$

Where,

$G.C$ = Gini-Coefficient (Units)

X_i = Proportions of Non-Poor Female Headed i^{th} Class of Cassava Farming Households, (Units)

Y_i = Cumulative Proportion of the Income of Non-Poor Female headed in the ith Class of Cassava Farming Households (Naira)

$\sum$ = Summation Sign

k = Observed values

Gini Coefficient (GC) Varies from Zero (0) to 1.

$$0 \leq GC \leq 1$$

Where,

0 = Implies Perfect Equality in the Distribution of Income

1 = Represent Perfect Inequality in the Distribution of Income

This will be used to achieve specific objective (ii)

Probit Model Analysis

The Probit Model is stated thus:

Y= f (X$_1$, X$_2$, X$_3$, X$_4$, X$_5$, X$_6$, X$_7$, X$_8$, X$_9$, X$_{10}$, U$_i$) .... (3.6)

$$Y_i = b_0 + \sum_{i=1}^{10} b_i X_i + e_i \dots \dots \dots \dots (7)$$

The explicit function is stated thus:

Y$_{ij}$= b$_0$ + b$_1$X $_1$ + b$_2$X$_2$ + b$_3$X$_3$ + b$_4$X$_4$ + b$_5$X$_5$ + X$_6$ + b$_7$X$_7$ + b$_8$X$_8$ + b$_9$X$_{9+}$b$_{10}$X$_{10+}$ e$_i$ .... (9)

Where,

Y_{ij} =Poverty Status (1, Poor; 0, Otherwise)

X_1 = Age of Household Head (Years)

X_2 = Gender Dummy (1, Female; 0, Otherwise)

X_3 = Educational Level (0, Non-Formal; 1, Primary; 2, Secondary; 3, Tertiary)

X_4 = Household Size (Number of Persons)

X_5= Household Income (Naira)

X_6 = Marital Status (1, Married; 0, Otherwise)

X_7 = Farm Size (Hectares)

X_8 =Access Credit Dummy (1, Yes; 0, Otherwise)

X_9 = Extension Services Dummy (Number of Extension Contact in a Month)

X_{10} = Source of Livelihood (1, Farming;2, Business; 3, Employed)

b$_0$ = Constant Term

b$_1$- b$_{10}$ = Regression Coefficients

e$_i$ = Error Term

This was used to achieve specific objective (iii)

Principal Component Analysis

Constraints faced by female headed Cassava farming households was subjected to Principal Component Analysis or Factor Analysis. The principal Component Analysis is stated thus:

$$x = (x_1, x_2, x_3, \dots, x_p \dots \dots \dots \dots \dots \dots (10)$$
$$\alpha_K = (\alpha_{1k}, \alpha_{2k}, \alpha_{3k}, \dots \alpha_{pk}) \dots \dots \dots \dots (11)$$
$$\alpha_k^T X = \sum_{j=1}^{p} \alpha_{kj} X_j \dots \dots \dots \dots \dots \dots \dots . (12)$$
$$Var = [\alpha_k^T X] \ is \ Maximum \dots \dots \dots . . (13)$$

Subject to:

$$\alpha_k \alpha_K = 1 \dots \dots \dots \dots \dots \dots \dots (14)$$

and

$$cov \ [\alpha_1^T X - \alpha_2^T X] = 0 \dots \dots \dots \dots (15)$$

The variance of each of the principal components are:

$$Var[\alpha_k^T X] = \lambda_k \dots \dots \dots \dots \dots . (16)$$
$$S = \frac{1}{n-1} (X - X)(X_i - \overline{X}_i)^\mathsf{T} \dots \dots \dots (17)$$
$$S = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X}_i (X_i - \overline{X}_i)^\mathsf{T} \dots \dots \dots \dots (18)$$

Where,

X= Vector of p Random Variables

α_k = Vector p Components

λ_κ = Eigen Value

T = Transpose

S = Covariance Matrix

This was used to achieve specific objective (iv)

RESULTS AND DISCUSSION

Table1 shows the result of the socio-economic characteristics of the female headed cassava farming households in the study area. From the result, about 59.73% of the female headed cassava farming households

were between the ages of 31 and 50 years. The mean value was 49 years. This implies that most of the female headed cassava farming households were energetic, resourceful, in their youthful age. This implies that the household head may be more industrious and capable of undertaking several livelihood strategies. This result is in line with the findings of Odusina (2014). Also, 31.35% of the female headed cassava farming households were married. About 13.20% of them were single. The findings with Igbalajobi (2013). About 9.90% of the female headed cassava farming households in the study area had tertiary education, 13.20% had secondary education, and 86.8% had primary education. This implies that majority of the female headed cassava farming households in the study area had completed the minimum 6 years of schooling. Hence had formal education and may be able to read and write in English language fluently. Education is good for adoption of innovations (improved technologies and research findings) by the female headed cassava farming household because it may be relatively easier to introduce a new technology to the female headed cassava farming households in the study area. The findings agree with the findings of Sallawu *et al* (2016). The mean household size was about 11.61 persons. This depict that on average the household sizes of female headed farming households in the study area was about 12 persons. The size of the household might be because of the labour needed for cultural practices and livelihood activities in the study area. Furthermore, larger household sizes can serve as source of family and increase food insecurity. The results agree Adebayo (2012) who reported that the larger the family size the lesser the food availability to each person within the household. The average farm size was 2.42 hectares. This shows that the farming households are subsistence in nature. Farm size is a reflection of own-food production ability and source of incomes for the family. It is believed that increase in farm size will result in increased food production which ultimately, increased likelihood of household food security. About 71.29% of the sampled female headed farming households had access to credit in the study area. This result indicates that agricultural loans were relatively accessible to households in the study area. The study reveals it a ratio 3:1 in terms of access to credit. This agrees with the findings of Akpan *et. al.*, (2013). Furthermore, majority (79.54%) of the female headed farming households in the study area had contact with an extension agent. This shows that the female headed farming households had information on improved technologies, innovation, and research findings. According to Adeniyi *et al* (2015), extension services are very essential to the improvement of farm productivity and efficiency among household. Also, 66.01% of the female headed farming households were members of cooperative society, while 39.99% of the female headed farming households did not belong to any cooperative society. This may greatly aid their ability to pull their resources together for agricultural

production. Membership of clubs, association or cooperative societies help household with opportunity to obtain bulk purchases credit, receive inputs at subsidized or at cheaper rates; and to obtain important and recent information concerning their farming activities. The mean years of female headed farming households experience was about 19.71 years, that is, on the average a female headed cassava farming household' in the study has about 20 years of experience in farming. This means that the female headed cassava farming household in the study area may be able to make sound decisions as regards resource allocations and management of their farms. This result is in line with the report of Sallawu *et al* (2016) that classified households with 14 years of farming experience are regarded as "experienced household". The mean annual income was ₦374, 868. This implies that which means on average the female headed farming households earns on average ₦374, 868 from female headed farming activity per annum.

Poverty Status of Female Headed Cassava Farming Households in the Study Area

The poverty line used for this study was collected from monthly maximum and minimum per capital expenditure (MPCE) of the sampled female headed cassava farming households as shown table 2. Two third (₦9, 009.37) of the monthly per capita expenditure of the sampled female headed farming households was used as poverty line in the same method as the index developed by Foster *et al* (1984) and used by Omonona *et al* (2007). This is the minimum cost of eliminating poverty (poverty line), this shows the amount that could be transferred to the poor to bring their expenditure up to the poverty line. The poverty of the female headed farming households which included poverty head count or incidence ($_0$), poverty gap or depth ($_1$), and squared poverty severity ($_2$) were analyzed using Foster, Greer and Thorbecke (FGT) index ($0 \leq P \leq 1$). The ($_0$) for the entire households was 0.666. This means that 66.6% of the female headed cassava farming households in the study area were poor. Which means that's about 172 households were poor and 131% households were non-poor. The poverty gap index (P_1) usually referred to as the depth of an average poor person from the poverty line was 0.366 which means 36.6% of the female headed farming households in the study area were poor, the poverty severity (P_2) which measures the distance of each poor person to one another was found to be 0.247. This means that among the poor households, 24.7% were severely poor. The average per capital expenditure (PCE) was (₦13, 514.06) for the sampled female headed farming households. The poverty line obtained is above ₦7, 599.26 as reported by Folorunso (2018) in Plateau State Nigeria, and also above (389.2 Ethiopian Birr) (₦ 4,737.23) Afar Regional State, Ethiopia as reported by Araya and Gabriel (2014), and above ₦6,224.96 reported by Adekoya (2014) in Ogun State. Furthermore, 56.77%

Table 1. Socio-Economic Profiles or Characteristics of the Female Headed Cassava Farming Households in the Study Area

Variables	Frequency	Percentage	Mean (Std. Dev)
Age (Years)			
< 30	13	4.29	
31–40	48	15.84	**49.06 (10.79)**
41–50	133	43.89	
> 50	109	35.97	
Marital Status			
Single	40	13.20	
Married	95	31.35	
Widow	112	36.96	
Divorced	56	18.48	
Educational Status			
Primary	147	86.80	
Secondary	40	13.20	
Tertiary	30	9.90	
No Formal Education	86	28.38	
Household Size (Units)			
≤ 5	27	8.91	
6–10	105	34.65	
11–15	110	36.30	
≥ 16	61	20.13	**11.61 (5.23)**
Farm Size (Hectares)			
≤ 1.9	41	13.53	
2.00 – 2.90	144	47.52	**2.42 (0.84)**
3.0 – 5.00	118	38.94	
Access to Credit			
Yes	216	71.29	
No	87	28.71	
Extension Contact			
Yes	241	79.54	
No	62	20.46	
Cooperative Membership			
No	103	39.99	
Yes	200	66.01	
Years of Experience			
< 10	37	12.21	**19.71 (9.64)**
11≤20	120	39.60	
21–30	106	34.98	
≥ 31	40	13.20	
Total Annual Income (N)			
≤ 500, 000	231	76.00	
500, 001 ≤ 1, 000, 000	54	18.00	**374, 868**
1, 000, 001 ≤ 1, 500, 000	11	4.00	
1, 500, 001 ≤ 2, 000, 000	7	2.00	
Total	**303**	**100.0**	

Source: Field Survey (2022) Computed Using STATA 14

of the female headed farming household were poor this means that the incidence of poverty was more among the female headed farming household in the study area.

Income Inequality/Income Distributions Among Female Headed Cassava Farming Households

Table 3 summarized the total annual sales made by female headed cassava farming households and was categorized with an interval of ₦500, 000. The results show that 76% of female headed farming households who fell into annual income below 500, 000 Naira actually control 40% of the market share. 18% of female headed farming households who are in the category of 500, 001 – 1, 000, 000 Naira annual incomes control 36% of the

market share. Furthermore, 4% of the female headed farming households who are in the category of 1, 000, 001– 1, 500, 000 Naira annual income controls 2% of the market share. The Gini coefficient was 0.62 and shows that inequality and distribution of income among female headed cassava farming households. Gini coefficient value of 0.62 which is closer to 1 shows income gap and unequal income distributions among the female headed cassava farming households in the study area. This result is line with Anthony et al, (2021) who reported that the value of G.C greater than 0.35 is high signifying that there is inequality in the distribution of income.

Table 2. Poverty Status of Female Headed Farming Households in the Study Area

Indicators	FGT
Poverty Incidence (P_0)	0.666
Poverty Depth (P_1)	0.366
Poverty Severity (P_2)	0.247
Mean Expenditure (Naira)	13, 514.06
Minimum Expenditure (Naira)	555.556
Maximum Expenditure (Naira)	250, 000.00
Source: Field Survey (2022) Computed Using STATA 14	

Maximum Likelihood Estimate shows that the Log Likelihood was -142.95, while Chi-Square value was 128.56 and were significant at 1% levels of probability. This implies that the overall effect of the explanatory variables included in the model were statistically significant and responsible for the variation in the poverty status among the female headed farming households. The coefficient of determinations (Pseudo R Square) was 0.3102 (31.02%). This indicates that 31.02% of the variations in the poverty status (i.e. dependent variable) was explained by the explanatory variables included in the regression model. However, as noted in Gujarati and Porter (2009), in models with binary dependent variables, goodness of fit is of secondary importance. What matters are the signs of the regression coefficients of the explanatory variables and their statistical and/or practical significance? Marital status had negative coefficient and was significant at 1% probability level. This implies that a unit change in marital status will result to about 0.001% marginal decrease in the poverty status among the female headed farming households. This may be so because if the female headed farming were married it is expected that they were better informed about poverty coping strategies and also the presence

Table 3. Income Inequality/Income Distributions Among Female Headed Cassava Farming

Households					
Income (Naira)	Frequency	Proportion (Xi)	Relative Income	Proportion (Yi)	XiYi
Below 500, 000	231.00	0.76	538, 500.00	0.40	0.30
501, 000 – 1, 000, 000	54.00	0.18	4, 100, 000.00	0.36	0.06
1, 000, 001 – 1, 500, 000	11.00	0.04	1, 470, 000.00	0.13	0.00
1, 500, 001 – 2, 000, 000	7.00	0.02	1, 250, 000.00	0.11	0.00
Sum	**303.00**	**1.00**	**11, 358, 500.00**	**1.00**	**0.38**
Gini Coefficient = 0.62					
Source: Field Survey (2022) Computed Using STATA 14					

Factors Influencing Poverty Status Among Female Headed Cassava Farming Household in the Study Area

Maximum Likelihood Estimates (MLE) of the Probit Model presented in Table 4 shows that out of the nine (9) explanatory variables included in the Probit model, the coefficients of marital status (P<0.01), educational level (P<0.05), household size (P<0.01), income (P<0.10), and source of livelihood (P<0.10) were statistically and significant factors determining poverty status among the female headed farming households in the study area. Positive sign on a parameter indicates their direct relationships, hence higher values of the variable tends to increase the likelihood of poverty status. Similarly, a negative sign of coefficient implies an inverse relationship, hence higher or additional value of the variable tend to decrease the likelihood or probability of poverty status among female headed farming households.

male counterpart will have a great contribution to the household's income. The coefficient of educational level of the female headed farming households was negative and statistically significant at 5% level of probability. The result means that educational level was a significant factor in determining the poverty status of the female headed farming households in the study area. The marginal effect was 0.145 which is about 14.5%. This implies as 1% increase in access to education or acquire more educational qualifications would lead to a 14.5% decrease in poverty among female headed farming tends to acquire more educational qualification. The coefficient of household sizes of the female headed farming households measured was positive and statistically significant at 1% level of probability. The result implies that household sizes was a significant factor in determining the poverty status of the female headed farming households in the study area. Household size increases the probability of being

Table 4. Results of the Maximum Likelihood Estimate (MLE) of the Probit Model

Variables	Coefficient	Standard Error	t-Score	Marginal Effect
Marital Status ($_1$)	-0.546	0.110	-4.990***	-0.001
Age ($_2$)	0.004	0.013	0.330	-0.073
Farm Size ($_3$)	-0.020	0.125	-0.160	0.062
Access to Credit ($_4$)	0.070	0.218	0.320	0.000
Education Level ($_5$)	-0.276	0.117	-2.370**	-0.145
Household Size ($_6$)	0.232	0.033	6.920***	0.005
Income ($_7$)	0.000	0.000	-1.830*	-0.019
Extension Visit ($_8$)	-0.375	0.261	-1.440	-0.100
Source of Livelihood ($_9$)	0.403	0.236	1.700*	0.107
Constant	-0.240	0.584	-0.410	

Significant at P≤0.05, *** - Significant at P≤0.01; * - Significant at P≤0.10; Log-Likelihood = -142.95***; Pseudo=0.3102, Chi-Square = 128.56

Source: Field Survey (2022) Computed Using STATA 14

poor and this could be because an increase in household size directly or indirectly reduces income per-head (per-capita income) as well as reduce the standard of living of the households. The marginal effect was 0.005 which depict a 0.5% increase in poverty status as household size increases by 1%. The coefficient of income was negative and was statistically significant at 10% level of probability in determining poverty status of female headed farming household in the study area. The marginal effect was 0.019. Sources of livelihood had positive coefficient and was significant at 10% level of probability in determining poverty status of female headed farming households in the study area. The marginal effect was 0.107.

data set for factor analysis. This result is in line with Noor *et al.* (2015). Table 5 further revealed the results of the perceived coping strategies employed by female headed households in mitigating the effects poverty in the study area. The coping strategies were ranked in the order of magnitude according to the eigen-value. The study shows that of all the strategies employed trading enterprise was ranked 1st as the coping strategy with the highest eigen-value; cassava flour/garri processing was ranked 2nd, and palm/ groundnut oil pressing was ranked 3rd respectively. These findings were in consonance with empirical studies carried out by Seinfeld and Polsky (2006).

Table 5. Results of Principal Component Analysis of Poverty and Income Inequality Coping Strategies Used by Female Headed Cassava Farming Households in the Study Area

Component Mean (Std Dev)	Eigen-Value	Difference	Proportion	Cumulative
Trading Enterprise	5.69778	3.53333	0.3799	0.3799
Cassava Flour/Garri Processing	2.16446	0.938924	0.1443	0.5241
Palm/ Groundnut Oil Pressing	1.22553	0.231055	0.0817	0.6059
Bartlett Test of Sphericity				
Chi-Square = 1854.745***				
Rho	= 1.0000			
KMO	= 0.839			

Source: Field Survey (2022) Computed Using STATA 14

Coping Strategies Against Poverty and Income Inequality of Female Headed Cassava Farming Households in the Study Area

From the result presented on Table 5 the number of principal components retained using the Kaiser criterion, is three (3) that is where the Eigen Value is 1 and above. At this component 60.59% of the variations has been explained by the components captured in the model. The Kaiser-Meyer-Olkin measures of sampling adequacy (KMO) of 0.839 and Bartlett test of sphericity of 1854.745 was statistically significant at 1% level of probability and demonstrated the feasibility of employing the

CONCLUSION

Majority of the female headed cassava farming households were poor with a given poverty line 9, 009.37 Naira. About 56.77% of the female headed farming households were poor. The Gini coefficient was calculated to be 0.62. There are high income gap or income inequality among female headed cassava farming households. Marital status, educational level, household size, income, and sources of livelihood were the significant factors influencing poverty status among the female headed farming households in the study area. Trading enterprises, cassava flour/garri processing, and

palm/ groundnut oil pressing were the major coping strategies employed by the female headed households against poverty and income inequality.

Recommendations

The following policy recommendations were made from this study:

(i)   Policies that will help create more credit access/ Programs in terms of loan at low interest rates for women should be implemented at all tiers of government to help mitigate and reduce the poverty among female headed Cassava farming household. Female farmers that are heading families should be given priority being that the household depends on their succecces.

(ii)   Programs should be put in place to help counsel women generally on the benefits of family planning. This will help reduce the large household sizes common among female headed farming households and rural farmers in general.

(iii)   Access to educational for women, adult-education, and girl-child education should be encouraged and implemented.

(iv)   Women should also be encouraged to diversify their sources of livelihood this will help them to have a relative equality or balance in their income levels all year round.

(v)   Trading enterprise, cassava flour/garri processing, and palm/ groundnut oil pressing sub-

sectors should be encouraged by governments.

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