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Influence of Poverty Gap and Severity Index on Production among Cassava based Farmers in Southern Nigeria

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ABSTRACT

Background: Poverty has been a prevailing challenge among individuals and farmers most especially in the Nigerian economy. The study analyzed poverty status of cassava farmers in Agrarian cassava region in Cross River State, Nigeria.

Methods: A multistage sampling technique was adopted in selecting 120 respondents using structured questionnaire between 2019 and 2022. Data obtained were analyzed using both descriptive and inferential statistics.

Result: Results showed that the poverty line estimated across all gender was ₦ 17,770.80 and 64.15% of the male farmers were non-poor while 35.85% of them were poor. Male recorded the highest poverty head count ratio (P_0) of 0.358. The poverty gap (P_1) and severity of poverty (P_2) among male farmers were 9.8 and 4.8 per cent, respectively. Similarly, poverty head count (P_0), poverty gap (P_1) and severity of poverty (P_2) for female farmers was 32.8%, 9.7% and 4% respectively. Drudgery/ inadequate access to modern equipment (2.74), high cost of labour (2.64), high perishability of cassava (2.60), high cost of transportation (2.55), fluctuation in prices (2.43) and lack of improved variety (2.38) were the serious constraint faced by cassava farmers during their production in the study area. Policies should be directed towards enhancing farmer income and reducing income inequality through access to credit facility for cassava based farmers.

Key words: Cassava farmers, Poverty status, Production constraints.

INTRODUCTION

Agriculture is the economic stronghold of many households in Nigeria including Cross River State. It contributes about 45 per cent of GDP and employs nearly two-thirds of the country's total labour force and it is the source of livelihood for about 90 per cent of the rural population and provides raw materials for agro-allied industries (Chauvin *et al.* 2012).

Despite the huge agricultural endowment and potential of Nigeria, hunger still characterizes the majority of the population. About 64.4% and 83.7% of the population live below the poverty line of US$1.25 and US$2 per person per day, respectively (Edet and Etim, 2018). Nigeria faces a lot of poverty crises including that of attaining food security, which was one of the millennium development goals (FAO, 2003). Some of these challenges are caused by natural resources (soil, water and climate), faulty micro economies, agricultural policies, bad economy, *etc*. hence, smallholder farmers in Nigeria are poverty stricken thereby putting the household welfare of the farmer at risk of survival.

Poverty is a situation of low income and/or low consumption and people are considered poor when their measured standard of living is below a minimum acceptable level of poverty known as poverty line (Olaopa *et al*, 2006). However, in Cross River State, where above 80% of the populations are rural dwellers, poverty has reached an alarming rate and possible mitigation measures must be put in place to ameliorate this deplorable social condition. It has been established that majority of the poor in Nigeria and Sub-Sahara Africa live in rural areas and depend on agriculture as their principal means of survival (UNDP, 2012).

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Therefore it is essential that significant increases in agricultural productivity be supported and achieved at rural household level (World Bank, 2017) and this can only be achieved if the factors that determined poverty status of the farm households are empirically determined and addressed.

Conceptual framework

The orthodox Western views of poverty, reflected in the "Vicious circle" hypothesis states that a poor person is poor because he is poor and may remain poor, unless the

person's income level increases significantly enough to pull the person in question out of the poverty trap. Such improvement can only be real and sustained, if and only if, the population growth is checked and the "limits to growth" are eliminated. Another theory that further clarify the phenomena of poverty and contributing factors is the theory of "cycle of poverty" (vicious circle of poverty) as expressed by Nurkse which has significance in theory is the "State is poor because he is poor" (poor in a poor country is poor because it is poor). According to Nurkse (in Jhingan, 2004). The poverty gap ratio or the income gap ratio is the difference between the poverty line and mean income of the poor, expressed as a ratio of the poverty line (Bhavana, 2022; FAO, 2018). The squared poverty gap index measures the severity of poverty as the degree of inequality amongst the poor themselves. This index is a weighted sum of poverty gaps (as a proportion of the poverty line), where the weights are the proportionate poverty gaps themselves. The act of squaring the poverty gap gives greater weight to the poverty gap of the poorest households since their poverty gap will be larger.

Absolute poverty measures acute deprivation in the form of severe food insecurity, premature death, ill-health, illiteracy, homelessness, lack of basic needs of life (Ikejiaku, 2009; Mowafi and Khawaja, 2005; United Nations Development Programme, 2012). It is usually measured based on income or nutrition (Gandolfi and Neck, 2010; Zongsheng and Yunbo, 2005). If a person's income falls below the international poverty line of 1 USD.90 per day, he or she is in absolute poverty.

Relative poverty is when a person is regarded as poor in comparison to other persons in his or her society (Gandolfi and Neck, 2010; Nisha and Komal, 2022; Dhived *et al,* 2022). For example, within the European Union, an individual is considered relatively poor if his or her income is less than 60% of the region's median income (Dhongde and Minoiu, 2010; Gweshengwe *et al*., 2020).

MATERIALS AND METHODS

Study area

The study was a pilot study carried out by the Department of Agricultural Economics, Faculty of Agriculture and Wild life, University of Calabar, Nigeria from July 2019 to July, 2022 in Akamkpa agrarian region in Cross River State. The area is purposively chosen because it contains many cassava processing units. The estimated population of Akamkpa was 151,125 (NPC, 2006). Akamkpa lies on 8° 10″N of the Equator and 4°10″E, of the Greenwich meridian. The area lies within the tropical rain forest region and has a high uniform temperature, heavy seasonal rainfall and high humidity. The mean annual temperature is 26.20°C. The highest temperature is experience in March with a mean of 28.70°C while the lowest temperature is experienced in August with a mean of 24.30°C.The mean annual rainfall is 2,247 mm.

Sampling technique

Multi stage, purposive and simple random sampling techniques was employed in selecting the sample size for the study. The first stage was purposive selection of Akamkpa LGA as the major farming area in the Calabar agricultural zone. In the second stage, four (4) clans (Awi, Mbarakom, Uyanga and Ojuk) were randomly selected from ten (10) clans in Akamkpa. Thirty (30) cassava farmers were selected from each of the four clans making a total of one hundred and twenty (120) farmers.

Analytical framework

Primary data was collected from the selected cassava processors through a well-structured interview schedule. Data collected was subjected to descriptive analysis such as frequency counts, tables, percentages to analyze socio-economic characteristics of respondents, Foster Greer Thorbecke (FGT) analysis to investigate poverty level, budgetary analysis.

Model specification

Foster, Greer and Thorbecke (FGT) poverty measures

The Foster, Greer and Thorbecke (FGT) poverty decomposition model was used to estimate the poverty head count (Incidence), poverty depth and poverty severity *i.e*. P0, P1 and P2 respectively. The three measures are based on a single formula but each index puts a different weight on the degree to which a household or individuals fall below the poverty line.
The FGT poverty index is given by:

$$P\alpha\ (y,z) = \frac{1}{N}\sum_{I=1}^{N}(Z\text{-}Y_i/_z)_\alpha \qquad .....(1)$$

Where:
n= Total number of households in population.
q= Number of poor households.
Z= Poverty line for the household.
Yi=Household income.
α= Poverty aversion parameter and takes on value 0, 1, 2.
$\frac{z\text{-}y_i}{z}$= Proportion short all in income below the poverty line.

$$P_1 = \frac{1}{2}\sum_{I=1}^{N}\frac{z\text{-}y_i}{z} \qquad .....(2)$$

This is called poverty depth or poverty gap index, which measures the extent to which individuals fall below the poverty line as a proportion of the poverty line:

$$P_1 = \frac{1}{n}\sum_{I=1}^{N}\frac{z\text{-}y_i^2}{z} \qquad .....(3)$$

This is poverty severity index which measures the squares of the poverty gaps relative to the poverty line.

RESULTS AND DISCUSSION

Table 1 showed that majority (55.8%) of the respondents were female, while 44.2% were male. This implies that more

females are involved in cassava farming than males. The finding is in line with that of Abang and Agom (2004) who reported that female were mostly engaged in cassava farming than male in Cross River State. Cassava is very important in this region because it remains the main source of staple food for the generality of the populace here.

Table 1: Socio-economic characteristics of respondents.

Variable		Frequency	Percentage
Gender	Male	53	44.2
	Female	67	55.8
	Total	120	100
Age	≤ 30	52	43.3
	31-40	40	33.3
	41-50	16	13.3
	51-60	10	8.3
	>60	2	1.7
	Total	120	100
Marital status	Single	30	25.0
	Married	73	60.8
	Divorced	4	3.3
	Widowed	13	10.8
	Total	120	100
Experience	≤ 5	66	56.7
	6-10	47	39.2
	11-15	5	4.2
	Total	120	100
Education	No formal	20	16.7
	Primary education	29	24.2
	Secondary education	54	45.0
	Tertiary education	17	14.2
	Total	120	100
Household size	≤ 5 persons	76	63.3
	6-10 person	36	30
	> 10 persons	8	6.7
	Total	120	100
Farm size	≤ 3	67	55.8
	4-7	43	35.8
	>7	10	8.3
	Total	120	100
Sources of capital	Personal saving	20	16.7
	Banks	28	23.3
	Co-operative	70	58.3
	Family and friends	2	1.7
	Total	120	100
Member of association	Yes	41	34.2
	No	79	65.8
	Total	120	100
Extension visit	Yes	63	52.5
	No	57	47.5
	Total	120	100
Income	<20,000	-	-
	20,001-50,000	16	13.3
	50,001-100,000	43	35.8
	>100,001	61	50.8
	Total	120	100

Source: Computed by author from field survey data (2019-2022).

The table showed that most of the respondents were less than 30 years which was about 43.3% of the total sample, with a mean of approximately 35 years. This implied that cassava farming is being practiced by younger age farmers. This result is consistent with the findings of Enimu *et al.* (2016), who reported that mean age of farmers in their study area was within the range obtained in this study.

The result shows that majority of the respondents were married (60.8%), while the others were either single (25%), divorced (3.3%) or widowed (10.8%). The implication of the prevalence on married respondents is an indication that there is a tendency for large household size which by extension translates into available labour for farm work.

Further result showed that majority (56.7%) of the respondents had less than 5 years farming experience, 39. 2% had between 6-10 years of farming experience while 4.2% had 11-15 years farming experience. The approximated average farming experience is 5 years.

Poverty status of cassava farmers in the study area

Table 2 shows the measure of poverty between male and female farmers in the study area. The table also presents the results of the FGT analyses. The respondents were segregated into poor and non-poor household. Generally, 65.8% of the farmers were non-poor while 34.2% of them were poor (Table 2). The poverty line estimated across all zones for this study was 17,770.80. The poverty head count or incidence (P_0), poverty gap or depth (P_1) and squared poverty gap or severities (P_2) were also calculated and the result indicated P0 of the respondents to be 0.342 which implies that 34.2% of the respondents were poor. This poverty is closely related to what World Bank (2017) found in rural poverty in Nigeria in 2013 which was 48.49 per cent. The poverty gap or depth (P_1) which is the distance between farmer's expenditure and the poverty line was 0.097.

This implies that on the average, 9.7% (₦1,723) of the poverty line is require to bring an average poor person out of poverty to be considered non poor. The squared poverty gap or severity (P_2) which measures the distance of one poor person and another was 0.044. This implies that 4.4% of farmers were severely poor. The cost of producing 1 ton/ ha of cassava was found to be ₦16,234.00. A ton/ha of cassava can be process to produce 3 basins of garri which is sold for N8000 per basin producing an income of N7,776 per ton of cassava produced as income.

The male respondents were segregated into poor and non-poor household. The results showed that 64.15% of the male farmers were non-poor while 35.85% of them were poor (Table 2). Male recorded the highest poverty head count ratio (P_0=0.358) implying that 35.8% of male farmers in the study area are poor since they live below the relative poverty line of ₦17,770.80. This is probably due to the fact that the area is populated with persons having limited alternative source of income apart from farming. In addition, subsistence farming dominates the area. The poverty gap (P_1=0.098) signifies that 9.8% of the male farmers live on less than two thirds of the poverty line and more than 1/3 of the poverty line will need 9.8% of the expenditure to take individuals up to the poverty line. This figure was higher among male farmers in the area than female farmers. The severity of poverty (P_2=0.048) among male farmers was 0.048, implying that 4.8% of the poor farmers live on less than one third of the poverty line.

Similarly, the female respondents were segregated into poor and non-poor household. The results showed that 67.16% of the female farmers were non-poor while 32.84% of them were poor (Table 2). Similarly, poverty head count (P_0) for female farmers was 0.328, which implies that 32.8% of the respondents were poor. The poverty depth (P1) which is the distance between farmer expenditure and the poverty line was 0.097 and this implies that 9.7% of the poverty line (₦1,724.45) is require to bring an average poor person to the poverty line. The squared of poverty gap or severity (P2) which measures the distance of one poor person and another was 0.040. This implies that 4% of female farmers were severely poor. The result indicated that poverty situation were more among male farmers than their female counterpart. Edet and Etim. (2018) also obtained head count index and poverty gap of 56.9% and 48.0% respectively.

Production constraints of cassava farmers

Table 3 shows the constraints faced by cassava farmers in order of their severity, militating against efficient cassava production. A weighted mean value of 2.37 was used as the critical value for comparing the order of severity. From the table, it was evident that drudgery/ inadequate access to modern equipment (2.74), high cost of labour (2.64), high

Table 2: Poverty status of cassava farmers in cross river state.

Variables	Overall	Male	Female
Poor households	41 (34.2)	19 (35.85)	22 (32.84)
Non-poor households	79 (65.8)	34 (64.15)	45 (67.16)
Poverty incidence (P_o):	0.342	0.358	0.328
Poverty depth (P_1)	0.097	0.098	0.097
Poverty severity (P_2)	0.044	0.048	0.040
Poverty line (₦)	17,770.80		

Figures in parenthesis are percentages of poor and non-poor households.

Source: Computed by author from field survey data (2019-2022).

Table 3: Constraint faced by cassava farmers during their production.

Constraints	Very serious (3)	Serious (2)	Not serious (1)	Cum	Mean	Rank
High cost of transportation	91 (273)	4 (8)	25 (25)	306	2.55*	4th
Fluctuation in prices	82 (246)	8 (16)	30 (30)	292	2.43*	5th
High perishability of cassava	72 (216)	48 (96)	-	312	2.60*	3rd
High cost of inputs	77 (231)	12 (24)	31 (31)	286	2.38*	6th
Inadequate farmland	54 (162)	6 (12)	60 (60)	234	1.95	11th
Poor soil fertility	51 (153)	14 (28)	55 (55)	236	1.97	10th
Pests and diseases attack	72 (216)	11 (22)	37 (37)	255	2.13	9th
Poor marketing outlets	72 (216)	15 (30)	33 (33)	279	2.33	7th
Lack of improved variety	76 (228)	13 (26)	31 (31)	285	2.38*	6th
Inadequate capital	69 (207)	19 (38)	32 (32)	277	2.31	8th
Drudgery/ inadequate access to modern equipment	97 (291)	15 (30)	8 (8)	329	2.74*	1st
High cost of labour	97 (291)	3 (6)	20 (20)	317	2.64*	2nd

Weighted mean, 2.37, (X ≥2.37= constraints to cassava farmers, X<2.37= Not a constraint), *= areas in which improvement are needed, Cum= Cumulative frequency.

Source: Field Survey Data, (2019-2022).

perishability of cassava (2.60), high cost of transportation (2.55), fluctuation in prices (2.43) and lack of improved variety (2.38) were the serious constraint faced by cassava farmers during their production in the study area. The result obtained is consistent with that obtained by Oludayo (2015) who identified high cost of inputs and inadequate extension service as the constraints faced during cassava production. Eminu *et al. (*2016) conducted similar study and obtained the same result. Abang and Agom (2004) identified lack of standard marketing board as one of the constraints faced by cassava farmers. The area in which the constraint was not serious includes inadequate farmland (1.95), poor soil fertility (1.97) and poor marketing outlets (2.33).

CONCLUSION

The result obtained from this research showed that poverty situation was more rampant among male farmers compared to their female counterpart. For instance, 35.85% of male farmers were poor while 32.84% were poor among female cassava farmers. Male were poorer than female in the study area with poverty head count (P_0), poverty gap (P_1) and severity of poverty (P_2) values of 35.8%, 9.8% and 4.8% While those obtained for female were P0 (32.8%), P_1 (9.7%) and P_2(4%). Drudgery/inadequate access to modern equipment, high cost of labour, high perishability of cassava, among other factors were the serious constraint faced by cassava farmers during their production.

It was thus recommended that since the majority cassava farmers were found to be poor, government policies that aims at reducing poverty should be pursued. Such policies should be directed towards enhancing farmers income and reducing income inequality through the granting of tax exemption to full time farmers, enhancing the acquisition of vocational trainings and skills of farmers and ensuring access to micro credit as a ways out.

Conflict of interest: None.

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