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Effect of maize production on poverty reduction among maize farmers in Makurdi local government area of Benue state, Nigeria

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Abstract

The study assessed the effect of maize production on poverty reduction among maize farmers in Makurdi Local Government Area of Benue State, Nigeria using a multi-stage sampling technique to select 100 maize farmers as respondents. Data for the study were analyzed using both descriptive and inferential statistics. The result of the factors influencing production of maize in the study area revealed that farming experience (0.052) significant at 1%, off-farm income (1.35) significant at 1%, soil type (0.346) significant at 5%, rain-fed and irrigation (0.334) significant at 10% and season (0.60) significant at 1% were all positive and statistically significant which implied that they have influence on the production of maize. Most (67.0%) of the maize farmers are males with the mean age of 41.76 years. It was further revealed that most (60.0%) maize farmers in the study area are above the poverty line. On the effect of maize production to poverty reduction, the coefficient of increased income (1.05017) and improved standard of living (0.83657) were positive and significant at 10% level of probability poverty reduction among maize farmers. Contribution of maize production to income generation among maize farmers revealed that source of food (82.0%) is the major contributor to income generation in the study area. The study concluded that increased income and improved standard of living as the result of maize production reduced poverty among the maize farmers. It was therefore recommended that Government should provide irrigation, improved yield and disease resistant varieties to farmers to enhance maize production in the area.

Keywords: Effect; Maize production; Poverty Reduction; Maize farmers

1 Introduction

Maize is one of the main cereals cultivated, consumed, and marketed in Nigeria. Maize or corn *(Zea mays L.)* is an important annual cereal crop belonging to the family *Poaceae*. *Zea* is an ancient Greek word meaning "sustaining life", and *mays* is a word from Taino meaning "life-giver". The word "maize" comes from the Spanish connotation "maiz", which is the best way of describing the plant (Kumar and Jhariya, 2013). It is considered a staple food in many parts of the world. It is the third leading crop in the world after rice and wheat (Terungwa and Kalu, 2019). Maize is grown in all parts of Nigeria, and it now forms part of the staple food in Nigeria. It contributes about 33% to household food consumption (Minot, 2010). Its importance has increased recently because of the federal government's restriction on imported flour (Audu and Aye, 2014).

According to the World Bank (2014), poverty is a multidimensional phenomenon which is described as pronounced deprivation in well-being with other aspects encompassing the psychological pain of being poor. It can also be viewed

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as low income, low consumption, and a situation when the measured standard of living is below a minimum acceptable poverty level (Upev *et al.,* 2021). In Nigeria, poverty is increasing despite the country's sixth position as the world's largest oil exporter. The incidence and depth of poverty over the past few decades in the country have continued to worsen (Ahmadu and Alufohai, 2011), becoming worse than the rates in most countries of the world (Kanayo, 2014) Poverty incidence in Benue State is very high. According to Global data Lab report for Benue State 2018, the percentage household International Wealth index (IWI) value (under 70) stood at 88.6, under 50 stood at 68.5 while under 35 stood at 43.8. Nigeria Data Portal by National Bureau of Statistics states that poverty incidence in Benue for 2004 was 55.3% and 74.1% for 2010, and food poor was 48.5 percent. Poverty alleviation is a process which improves the standard of living of the poor, thus, reducing the proportion of individuals or households living below an acceptable minimum standard of living. According to Kraai (2015), poverty alleviation aims at reducing the negative impact of poverty on the lives of poor people in a sustainable way.

To curb the incidence of poverty and food insecurity in the country, successive governments embarked on various policies and programmes aimed at boosting agricultural production (Olatunji *et al.,* 2012). This is because agriculture remains the primary source of livelihood for the majority of the rural poor in the country. Maize production is one of the means of alleviating poverty among farmers. This is because maize is among the most important staple foods in Nigeria. It accounts for about two-thirds of the calorie intake of the country's population (Mohammed *et al.,* 2013). Also, studies on maize in different parts of Nigeria show the increasing importance of the crop amidst growing utilization by food processing industries and livestock feed mills (Jimoh *et al.,* 2014). In most parts of Nigeria, the crop has grown to be cultivated for commercial purposes to generate income and improve the welfare of the farming populace (Oladejo and Adetunji, 2012).

Jato & Kalu, I. (2019) concluded in his study on the rate and causes of poverty in rural Benue state of Nigeria: a multidimensional approach that the major determinants of rural poverty in Benue State are living standards, health status, and educational status of the households. Therefore, any intervention that will enhance household the standard of living will eventually reduce poverty.

It against this backgrounds that this study seeks to provide answer to this research questions

- What are the socio-economic characteristics of maize farmers in the study area?
- What factors influence the production of maize in the study area?
- What is the estimated relative poverty line among maize farmers?
- What is the contribution of maize production on the poverty status of maize farmers?
- What is maize production's effect on maize farmers' income generation of maize farmers?

In the course of this study, two hypotheses were tested;

- Hypothesis (Ho1): The socio-economic characteristics of the maize farmers have no effect on their poverty status in the study area.
- Hypothesis (Ho2): Maize production does not significantly affect poverty reduction among maize farmers in the study area

There are many literatures on maize production domestically and internationally such as Audu and Aye (2014) asserted that maize is not only a source of income to its producers, but it provides employment to millions of people engaged in its production. Similarly, Ahmadu and Alufohai (2011) stated that maize production is also a source of foreign exchange earnings for the government. These benefits indicate that maize production has contributed significantly to the improvement in the poverty status of maize farmers.

Kudi *et al.,* (2010) explained that level of education, household size, farming experiences, access to credit and yield of improved maize varieties were found to be significantly related to the adoption of improved maize varieties. According to Komolafe *et al.,* (2014), age, marital status, level of education and farming experiences were found to be significantly related to the adoption of improved crop practices. Marital status, educational level and household size of the maize farmers were found to be significant to the adoption of improved maize varieties (Umar *et al.,* 2014). Similarly, Idrisa *et al.* (2012) reported that education, yield, access to credit and extension contact were found to be significantly related to the adoption of improved maize seeds among farmers. by Bamire *et al.,* (2007), it was observed that increased yield in maize production was associated with expanded land area. Audu *et al.,* (2008) in their study of socioeconomic characteristics and resource use in maize production among maize farmers in Nigeria found that labour, capital and fertilizers were found to have significant influence on the output of maize.

Ahmadu and Edeoghon (2018) studied maize production's effect on farmers' poverty alleviation in Edo State, Nigeria. They found that without income from maize production, the farmers had a poverty incidence (the percentage of farmers living below the poverty line) of 97%. This decreased to 70% when income from maize production was added, representing a 27% reduction. Their result compares favorably with the findings of NBS (2012), which reported relative poverty of 72.5% and 73.2% for Edo State and Nigeria, respectively. The poverty depth of the farmers without and with income from maize production was 63% and 39%, respectively, indicating that maize production contributed to a 24% reduction in the poverty gap of the farmers. The severity of poverty among the farmers was as high as 40% without maize production and this decreased to 16% with maize production. This indicates a disparity (distance) in poverty level among the farmers without income from maize production than when income from maize production was added.

The effects of maize production on income generation of maize farmers are enormous. Ahmadu and Edeoghon (2018) found that the most important benefit from maize was rare cases of hunger in the respondents' family. Maize contributes significantly to average annual food production, total food availability, caloric intake and total food demand among households in Nigeria

In most parts of Nigeria, the crop has grown to be cultivated for commercial purposes to generate income and improve the welfare of the farming populace (Oladejo and Adetunji, 2012). Similarly, Ahmadu and Edeoghon (2018) found that without income from maize production, the farmers had an average annual income from other sources of N548,197.00 while with maize production, the average annual income of the respondents increased to N717,213.00, representing about a 24% increase. Of all the sources of income available to the respondents, maize's contribution was the highest (24%). Similarly, the average per capita income of the farmers increased from N215.00 without maize production to N281.00 with maize production. This also accounted for about 24% increase. This shows that maize production, though on a small-scale level, had contributed significantly to improving both the general income level and the per capita income of the respondents. Furthermore, Fasoranti (2008) quoted in Adesiyan (2015) in a study reported that maize farming was profitable in Akoko North-East and South West Local Government Areas of Ondo-State with gross margin and net returns of N2,637.80 and N2,141.00 respectively in the previous farming year, thus contributing to the income of the maize farmers. From the reviewed literature above, the effects of maize production on poverty reduction in Benue State and its effects on the income generation of maize farmers has not been evidenced. This what this study seeks to achieve

1.1 Conceptual and Analytical Framework

Figure 1. Shows the conceptual framework for the study. The schema shows the relationship between poverty reductions (dependent variable), intervening variables and factors affecting maize production (independent variables).

Reduction of poverty can be made possible through maize production which is affected by the age of the farmers, sex, farming experience, educational status of the farmers, number of hectares cultivated, use of chemicals (fertilizer, herbicides etc) and non-farm income of the farmers. These independent variables can lead to increased income, assessable and sufficient food supply, employment opportunities, improved living standards, and increased foreign exchange, amongst others. These intervening variables are subsequent effects of maize production on poverty reduction. The abundance or scarcity of these intervening variables can reduce or increase the poverty status of the maize farmers.

This is represented schematically below.

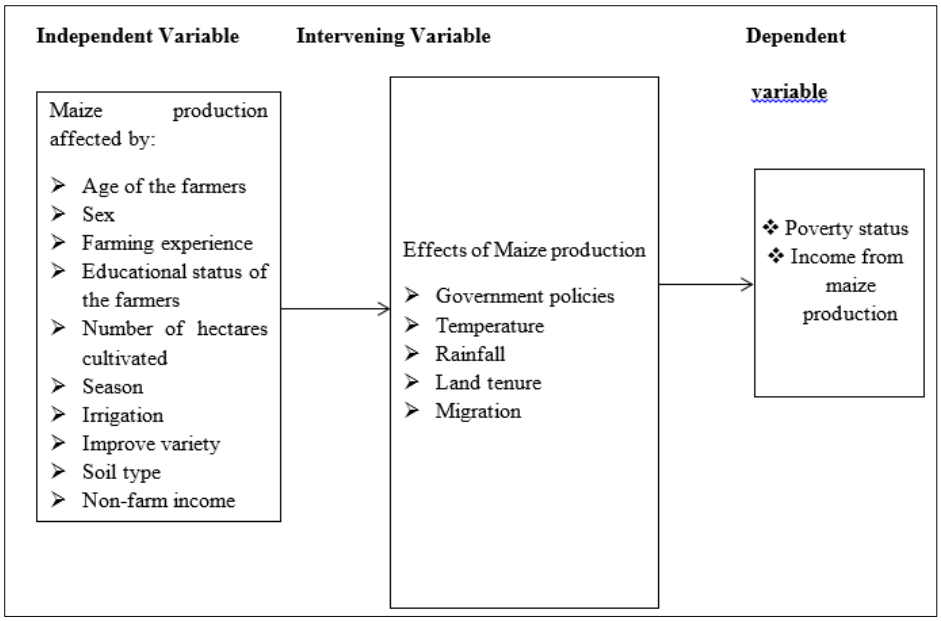

Figure 1 Conceptual framework of showing the effects of maize production on poverty reduction Source: author's conceptualization

1.2 Analytical framework

In this study, logistic regression and Poverty Index analysis were used to predict a binary outcome and determine the Poverty incidence in the state. Logistic regression is a statistical analysis method to predict a binary outcome, such as yes or no, based on prior observations of a data set. A logistic regression model predicts a dependent data variable by analyzing the relationship between one or more existing independent variables. For example, a logistic regression could be used to predict whether a political candidate will win or lose an election or whether a high school student will be admitted or not to a particular college. These binary outcomes allow straightforward decisions between two alternatives.

1.2.1 Poverty index analysis

The Foster-Greer-Thorbecke (FGT) poverty indexes were used to determine the incidence, depth and severity of poverty among the respondents. This analysis was based on the p–alpha ($P\alpha$) poverty measure proposed by Foster Greer and Thorbecke (1984) which is expressed as:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}\binom{z-gi}{z}^{a}$$

Where: Z = Poverty line;
gi = Per capita income of the ith farmer;
q = Number of respondents below the poverty line;
N = Sample size;
α = 0, 1 and 2 which represent the incidence, depth and severity of poverty respectively.

2 Material and methods

2.1 Research Design

The study employed survey design using structured questionnaire to collect data from the respondents.

2.2 Area of the study

The study was carried out in Makurdi Local Government Area of Benue State. Makurdi is the capital of Benue State, located in central Nigeria. The study area falls under Benue North-West Senatorial District alongside Buruku, Guma,

Gboko, Gwer West, Gwer East and Tarka local government areas. Makurdi local government area shares boundaries with Guma to the North-East, Gwer East to the South, Gwer West to the West, and Doma local government area of Nassarawa State to the North-East. It has an area of 820km^2 and with population growth rate of 2.6%, it has a projected population of about 365,000 in 2021 (www.statista.com). The local government comprises of 11 council wards: Agan, Ankpa/wadata, Bar, Central/south Mission, Clerks/market, Fildi, Mbalagh, Modern Market, North Bank I, North Bank II and, Wailomayo.

The climate is tropical with dry and cold windy harmattan weather from November to March and rainy/wet season from April to October. The average temperature range is between 32^{0}C and 35^{0}C with an annual rainfall of 1500mm-1800mm per annum (Encyclopedia Britannica, 2020). Farming is the major occupation of the people with about 75% of the population engaged in farming activities which are mostly subsistence in nature, other occupations such as fishing, civil services, artisans and marketing are also important. Makurdi has a vast and fertile landmass used by the farming population that treasure agriculture as the bedrock of its livelihood (FAO, 2018). The major crops produced in Makurdi Local Government area include rice, maize, yam, soybeans, sorghum, and vegetables which makes the study area suitable for the research. In addition, tree crops such as citrus, mango, and cashew are also grown.

2.3 Population / Sample Size and Techniques

The population of this study consists of all the maize farmers in Makurdi Local Government Areas, Benue State. The study adopted a multi-stage sampling technique. First, a purposive sampling technique was used to select five (5) wards in Makurdi Local government area based on their high participation in maize farming. The second stage involved a simple random selection of one community from each selected council wards. Finally, a proportion of 5% (0.05) was used to get the sample size from the sample frame; this gives every member of the population a fair chance of being selected. Thus, a total of 100 respondents were selected.

Table 1 Sample Size Selection Plan

S/No	Council Wards	Villages/Communities	Sample Frame	Sample Size (5%)
1	Ankpa/Wadata	Adaka	600	30
2	Bar	Kanshio	340	17
3	Mbalagh	Mbakuhe	280	14
4	North Bank I	Pila	450	23
5	Modern Market	Ugoh	330	16
	Total		2000	100

Source: Field survey 2021

2.4 Method of Data Analysis

Data for the study were analyzed using both descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages and mean were used to describe objective I and V; multiple regression was used to analyze objective II, objective IV was analyzed using logistic regression while objective III was achieved using relative poverty line analysis. However, hypothesis I was tested using logistic regression model while hypothesis II was tested using ordinary least square (OLS) model

2.5 Variable and Model Specification

2.5.1 Multiple regression models

The various multiple regression models are explicitly represented below:

Linear model

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_{11}x_{11} + U_1 \quad \ldots\ldots (1)$$

Double log model

$$lnY1 = b_0 + b_1lnx_1 + b_2lnx_2 + b_3lnx_3 + b_4lnx_4 + \ldots\ldots b_{11}lnx_{11} + U_1 \quad \ldots\ldots (2)$$

Semi-log model

$$Log(Y) = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + \ldots\ldots b_{11}x_{11} + U_1 \quad \ldots\ldots (3)$$

Exponential model

$$Y = b_0 + b_1^{x1} + b_2^{x2} + b_3^{x3} + b_4^{x4} + \ldots\ldots b_{11}^{x11} + U_1 \quad \ldots\ldots (4)$$

Where:
Y = Maize Production (income in Naira)
X_1 = Age of the farmers (years)
X_2 = Household size (number of people)
X_3 = Farm size (hectare)
X_4 = Farming experience (years)
X_5 = Off-farm income (Naira)
X_6 = Soil type
X_7 = Labor availability
X_8 = Mechanization
X_9 = Season
X_{10} = Irrigation or Rain-fed
X_{11} = Improve Varieties
U_1 = Error/disturbance term

2.5.2 Logit regression

Logit regression was estimated to poverty status of Maize Farmers in the study area. The logit function can be defined following Pindyck and Rubinfeld (1998,) in its inverse logistic form as:

$$Prob(Y_i=1)=Ln\left(\frac{P_i}{1-P_i}\right)= \beta_0 + \beta_1X_{1i} + \beta_2X_{2i} + \beta_3X_{3i} + \beta_4X_{4i} + \beta_5X_{5i} + \beta_6X_{6i} + \beta_7X_{7i} \quad \ldots\ldots (5)$$

Where, Y= poverty status (1 not poor and 0 otherwise)
X_1=Quantity of output produced (total revenue in Naira)
X_2=level of education of farmers (years)
X_3=age of the farmers (years)
X_4= farming experience (years)
X_5=size of household (number)
X_6=farm size (hectares)
β=estimated parameters, including the constant term (β_0).

2.6 Relative Poverty Line

The poverty line was defined based on the Mean Per Capita Income (MPCI) of the respondents (Coudouel *et al.,* 2014). A relative approach in which a respondent is regarded as poor relative to other respondents within the maize production industry in the study area will be used. The poverty line was used to dichotomize the respondents into poor and non-poor. The respondents with per capita income less than the MPCI will be classified as poor while those with per capita income equal to and greater than the MPCI as non-poor.

The Foster-Greer-Thorbecke (FGT) poverty indexes were used to determine the incidence, depth and severity of poverty among the respondents. This analysis was based on the p–alpha ($P\alpha$) poverty measure proposed by Foster Greer and Thorbecke (1984) which is expressed as:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}\binom{z-gi}{z}^{\alpha} \quad \ldots\ldots (6)$$

Where: Z = Poverty line;
gi = Per capita income of the ith farmer;
q = Number of respondents below the poverty line;
N = Sample size;
α = 0, 1 and 2 which represent the incidence, depth and severity of poverty respectively.

2.7 Measurement of Variables

- **Age:** this was measured by indicating the respondents' chronological age in years
- **Gender:** was measured by indicating the respondents' gender in terms of male and female.
- **Household size:** this was measured by number of people living together in one house;
- **Educational Level:** was measured by the number of years spent in school;
- **Off-Farm income:** this is the total income accrued from other activities or engagement outside farming activities.
- **Membership of cooperative group:** this means social participation. It was measured by the respondents' indicating yes (for membership) and no (for non-membership)
- **Farm size**: this was measured in hectares (ha), it will indicate the number of hectares used in cultivating maize;
- **Contact with extension agents:** Contact with extension agents enables farmers to be aware of new technologies and innovations. This was measured by number of visits by extension agents.

3 Results and discussion

3.1 Socioeconomic Characteristics of the Respondents

The socioeconomic variables (table 2) of the respondents examined include: age, gender, marital status, level of education, farming experience, farm size, amount of credit received, off-farm income, number of extension contact, years of cooperative membership and amount of credit received.

Table 2 Socioeconomic Characteristics of Maize Farmers in the Study Area (n=100)

Variables	Frequency(F)	Percentage (%)	Mean (x)
Age (Years)			
<= 30	14	14.0	42
31 – 45	55	55.0	
46 – 60	28	28.0	
61+	3	3.0	
Gender			
Male	33	33.0	
Female	67	67.0	
Education Level			
No Formal Education	10	10.0	
Primary Education	29	29.0	
Secondary Education	39	39.0	
Tertiary Education	22	22.0	
Marital Status			
Single	17	17.0	
Married	74	74.0	
Divorced	6	6.0	
Widowed	3	3.0	
Farm Size (Hectare)			
1	12	12.0	2
2	55	55.0	

3	33	33.0	
Household Size			
<= 2	13	13.0	6
3 – 5	27	27.0	
6 – 8	46	46.0	
9+	14	14.0	
Farming Experience (years)			
<= 5	34	34.0	11
6 – 13	23	23.0	
14 – 21	36	36.0	
22+	7	7.0	
Off-Farm Income (₦)			
<= 30000	76	76.0	18210
30001 – 70000	19	19.0	
70001 – 110000	4	4.0	
110001+	1	1.0	

Source: Field Survey, 2023

3.2 Factors Influencing Production of Maize in the Study Area

The result of the certain factors influencing production of maize in the study area is presented in table 3. The exponential model (with superscript @) was selected as the lead equation because it has highest R^2 (coefficient of determination) and more significant variables. The R^2 of 0.645 implies that 64.5% of the variables influencing the production of maize is explained by the explanatory variables included in the model.

The coefficient of farming experience (0.052) was positive and significant at 1% level of probability. This implies that increase in farming experience will lead to an increase in production of maize *ceteris paribus.* This can be attributed to the fact that as the farmer increases in experience, he acquired more knowledge through regular practice and experimentation that increase productivity. This connotes with Ajah and Nmadu (2012) that farmers with more farming experience enhance maize production.

The result also revealed that the coefficient of off-farm income (1.347) is positive and significant at 1% level of significance. This implies that an increase in off-farm income of the respondents increase the production of maize. Farmers with more off-farm income tend to have more capital to purchase farm inputs, thus embark more on large scale production which leads to increased production. This is in line with Audu and Aye (2014) who observed that the farmers who engaged in off-farm activities had more money to purchase improved maize varieties which could lead to increased production

The coefficient of soil type (0.346) is positively significant at 5% level of significant. The implication is that good soil type increase productivity of maize. This can be attributed to the fertility of the soil, the topography, type of soil and the compatibility with the maize crop. This is in agreement with Issa *et al.* (2016).

The coefficient of maize been grown all season (0.601) is positive and significant at 1% probability level. This implies that the ability of maize to be grown in both dry and raining season can lead to increase in maize production. This can be attributed to the fact that there will be sufficient output due to turnover from different times of planting. This is in agreement with Tajamul, *et al.* (2016). Issa *et al.* (2016) report that which indicated that cereal like maize can be cultivated in both dry and wet seasons.

The coefficient of Rain-fed and Irrigation (0.334) is positively significant at 10% probability level. The implication is that both the practice of rain-fed farming and irrigation practice can lead to increase in production of maize. This may be due to the fact that supplementing rainfall in the times of drought can help in reduce to rate of loss due to

unavailability of moisture in the soil. This gives credence to Kumar and Jhariya (2013) who asserted that maize is the most important cereal fodder and grain crop under both irrigated and rain-fed agricultural systems in the semi-arid and arid tropics.

Table 3 Regression Analysis of the Factors Influencing Maize Production

Variables	Linear	Exponential@	Double Log	Semi-Log
Age	3743.242(0.065)	0.011(0.167)	0.275(0.074)*	71524.64(0.059)*
Household size	14598.386(0.056)*	0.047(0.126)	0.716(0.046)**	218381(0.014)**
Farm Size	-14500.202(0.568)	-0.015(0.883)	-0.092(0.663)	-49663.7(0.341)
Farming Experience	5795.087(0.068)*	0.052(0.000)***	0.385(0.001)**	26260.78(0.352)
Off-Farm Income	2.995(0.000)***	1.347(0.000)***	0.092(0.000)***	17030.43(0.000)***
Soil Type	56028.222(0.089)*	0.346(0.010)**	-0.116(0.773)	-9186.52(0.926)
Labor Available	32047.617(0.417)	0.253(0.112)	-0.39(0.621)	165453.6(0.393)
Mechanization	-31686.644(0.400)	0.053(0.726)	-1.954(0.165)	-299306(0.385)
Grown all Season	107351.963(0.005)***	0.601(0.000)***	-1.298(0.055)*	-259702(0.117)
Rain-fed/Irrigation	25291.619(0.547)	0.334(0.050)*	-0.603(0.067)*	-84240.1(0.294)
Improve Varieties	15480.197(0.766)	0.289(0.169)	-0.047(0.906)	9825.747(0.920)
Constant	-200640.2790.069)	9.394(0.000)	7.907(0.000)	-762083(0.010)
F-stat	7.662	14.563	10.531	5.247
R^2	0.489	0.645	0.568	0.396

Figures in parentheses are p-values; *** = significant at 1%, ** = significant at 5%, * = significant at 10%; Source: Field Survey, 2023

3.3 Relative Poverty Line among Maize Farmers

Table 4 shows the relative poverty line among maize farmers. The result revealed that the MPCHE (Mean Per Capita Household Expenditure) is ₦72115.16. Household spending below the MPCHE is regarded as being poor and spending above the MPCHE is regarded as non-poor. The result revealed that most (60.0) of the respondents are non-poor, 23.0% are moderately poor while 17.0% are poor. This implies that most maize farmers in the study area are above the poverty line. This contradicts the findings of the study by Terungwa and Kalu (2019) who reported that there is high level of poverty among the rural people of Benue State.

Table 4 Results of Relative Poverty Line among Maize Farmers

Variables	Frequency (F)	Percentage (%)
Poor	17	17.0
Moderately poor	23	23.0
Non-Poor	60	60.0
Total	100	100.0
Poverty Line		
MPCHE	₦72115.16	

MPCHE = Mean Per Capita Household Expenditure; Source: Field Survey, 2023

3.4 Effect of Maize Production on Poverty Status in the Study Area

Table 5 shows the logistic regression results on the effect of maize production on poverty status of the maize farmers in the study area. The table revealed that only 2 independent variables contribute to poverty status of farmers. The log

likelihood value is -60.343849; and the associated Chi-square value is statistically significant at 10 % level of probability. This implies that the model can be relied upon to explain probability of improving poverty status in the study area.

The result revealed that the coefficient of increased income (1.050172) is positively significant at 10% probability level. The implication is that increase in income from maize production may likely leads to the probability of maize farmers not being poor. This may be due to the fact that income can be generated from sales of maize output which will positively upset poverty status. Maize contributes significantly to average annual food production, total food availability, caloric intake and total food demand among households in Nigeria (Kamara *et al.* 2014). The coefficient of improved standard of living (0.8365732) is positive and significant at 10% level of probability to poverty status. This implies that an increase in the standard of living of maize farmers may likely reduce poverty among maize farmers. This can be attributed to the fact that increased standard of living is also manifested by large scale production which will lead to increase in income generation of the farmers. This is in line with Oladejo and Adetunji (2012) opined that maize production is a very good source of income to the farmer. In most parts of Nigeria, the crop has grown to be cultivated for commercial purposes to generate income and improve the welfare of the farming populace thus, poverty reduction.

Table 5 Effects of Maize Production on Poverty Status among Maize Farmers

Variables	Coef	Std. Err.	Z-stat	P>|z|
Increased Income	1.050172*	0.5758926	1.82	0.068
Source of Food	0.1353647	0.6510658	0.21	0.835
Foreign Exchange Earner	0.1800438	0.4733231	0.38	0.704
Source of Employment	0.4284401	0.5325026	0.80	0.421
Raw Material	0.4396052	0.481717	-0.91	0.361
Sources of Livestock Feed	-0.7956864	0.5665883	-1.40	0.160
Improves Standard of Living	0.8365732*	0.4821782	1.73	0.083
Constant	-0.3833958	0.9026178	-0.42	0.671
Log likelihood	-60.343849			
Prob > chi2	0.0527			

* = significant at 10%; Source: Field Survey, 2023

Table 6 Contribution of Maize Production on Income Generation of the Respondents

Variables	Frequency (F)	Percentage (%)	Rank
Source of Food	82	82.0	1st
Increased Income of the Farmer	73	73.0	2nd
Raw Materials for Industries	71	71.0	3rd
Source of Employment	63	63.0	4th
Improve Standard of Living	58	58.0	5th
Source of Foreign Exchange	55	55.0	6th
Livestock's Feed	49	49.0	7th

Source: Field Survey, 2023

3.4.1 ***Hypothesis (Ho_1):*** *The socio-economic characteristics of the maize farmers have no effect on their poverty status in the study area.*

Logistic regression was run using seven explanatory variables to determine the effect of socioeconomic characteristics of maize farmers on their poverty status as presented in table 7. The log likelihood value is -29.514997; and the

associated Chi-square value is statistically significant at 1 % level of probability. This implies that the model can be relied upon to explain probability of maize farmers' poverty status in the study area. Furthermore, the significant of the associated Chi-square at 1 % level of probability implied that maize producers' socio-economic characteristics significantly influenced their poverty status in the study area, hence the null hypothesis which state that "the socio-economic characteristics of the maize farmers have no effect on their poverty status in the study area" is rejected.

The coefficient of household size (0.7326078) is positive and statistically significant to poverty status. Implying that increase in the number of household size may leads to poverty reduction in the study area.

The result revealed that the coefficient of annual income (1.050172) is positively significant at 10% probability level. The implication is that increase in annual income may likely reduce poverty among maize farmers. This can be attributed to the fact that increased standard of living is also manifested by large scale production which will lead to increase in income generation of the farmers. This is in line with Oladejo and Adetunji (2012) opined that maize production is a very good source of income to the farmer. In most parts of Nigeria, the crop has grown to be cultivated for commercial purposes to generate income and improve the welfare of the farming populace thus, poverty reduction.

Table 7 Effects of Socioeconomic Factors on Poverty Reduction

Variables	**Coef.**	**Std. Err.**	**Z-stat**	**P>|z|**
Gender	0.2787905	0.7191109	0.39	0.698
Age	0.0187777	0.0536171	0.35	0.726
Household size	0.7326078*	0.2430953	-3.01	0.003
Farm size	0.0298677	0.5235026	0.06	0.955
Farming experience	-0.1214235	0.1286255	-0.94	0.345
Annual Income	0.0000248*	7.87e-06	3.15	0.002
Educational level	-0.3139825	0.3786347	-0.83	0.407
Constant	0.9263471	2.0539	0.45	0.652
Prob > chi^2	0.0000			
Log likelihood	-29.514997			

Source: Field Survey, 2023

3.4.2 ***Hypothesis (Ho_2):*** *Maize production does not significantly affect poverty reduction among maize farmers in the study area*

Table 8 Effects of Maize Production on Poverty Reduction

Poverty	**Coef**	**Std. Err.**	**Z-stat**	**P>|z|**
Income from maize	0.0000124***	2.53e-06	4.89	0.000
Constant	-2.119895***	0.5223389	-4.06	0.00
Prob > chi2	0.0000			
Log likelihood	-44.090031			

***Significant at 1%; Source: Field Survey, 2023

Logistic regression was run using income from maize production as explanatory variable to determine the effect of maize production on poverty reduction among maize farmers as presented in table 8. The log likelihood value is -44.090031 and the associated Chi-square value is statistically significant at 1 % level of probability. This implies that the model can be relied upon to explain probability of maize farmers' poverty status in the study area. Hence the null hypothesis ii which state that "maize production does not significantly affect poverty reduction among maize farmers in the study area" is rejected. This implied that income from maize production significantly reduced poverty among maize farmers in the study area.

4 Conclusion

The study also concludes that farming experience, off-farm income, soil type, rain-fed and irrigation and season are the factors influencing production of maize in the study area. It was also concluded that most maize farmers in the study area are above the poverty line.

Furthermore, increased income and improved standard of living were the contribution of maize production to poverty reduction of the maize farmer. Finally, source of food is the major contribution of maize production to income generation among maize farmers in the study area.

Recommendations

- Maize farmers should intensify the use of irrigation to compensate rainfall as this will help improve the output of maize and hence, improve the poverty status of the maize farmers.
- Farmers should embark on agronomic practices like farrowing, crop rotation, shifting cultivation amongst others which improves the fertility of the soil thereby improve maize output.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest.

Statement of informed consent

A survey of maize farmers was carried out with their consent as it was stated in the introductory letter as strictly for the purpose of research.

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