# DETERMINANTS OF CASSAVA PRODUCTION IN KOLOKUMA/OPOKUMA LGA, BAYELSA STATE, NIGERIA

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## ABSTRACT

It has long been argued that increasing cassava production is necessary to increase food supply and decrease rural poverty, particularly in sub-Saharan Africa, where a sizable portion of the rural population suffers from malnutrition and food insecurity and where achieving food security is inextricably linked to reversing agricultural stagnation and protecting the nation's resource base. The study analyzed the determinants of cassava production in Kolokuma/Opokuma LGA, Bayelsa state, Nigeria. Eighty structured questionnaires were distributed to randomly chosen cassava farmers in the study area in order to accomplish this. According to the results, 81.1% of cassava farmers were female, and their average age was 49. Of them, 65.5% were married and had an average family size of six members. In one way or another, 85% were educated. The results also revealed that their average farm size was 0.9 hectares, their average farming experience was 13 years, and 72.5% of their labor was a combination of hired and family labor. With a net farm income (NFI) of ₦766,022.00, the total returns were ₦892,762.00, and the total cost of production per hectare was ₦126,740.26.00. The 12% rate of return on investment suggests that the study area's cassava production is profitable. Multiple regression analysis with a significant level of 5% and 1% revealed that gender and farm size were the major determinants of cassava production. The study also noted that two main constraints to cassava production were a high frequency of flooding and a lack of land.

**Keywords**: Determinants, Cassava Production

## INTRODUCTION

According to the Food and Agricultural Organization (FAO, 2005), agriculture has been the main engine of the Nigerian economy over the years, employing roughly 70% of the labor force and contributing more than one-third of the country's GDP. With its contribution to the GDP increasing from 36.5 percent in 2009 to 41.48 percent in 2009 and 44.40 percent in 2011, the sector made an impressive contribution to the GDP. However, because of the GDP's rebasing, agriculture's current contribution is 21.91 percent (Atuanya & Augie, 2014).

Popular root crop cassava originated in South and Central America and was brought to Africa in the sixteenth century (Information and Communication Technology Agency [CTA], 2001). Its products and by-products are widely used, making it a major staple for the majority of Nigerians (Kingsley et al. 2014). According to Abang and Agom (2004) cassava consumption is widespread throughout the nation. The crop can grow and be available year-round because it is easily adapted to soil and climate conditions. Researchers estimate that Nigeria produces 59 million tons of cassava, making it the largest producer in West Africa. Nigeria has emerged as the world's leading producer of cassava due to its production, which accounts for 20.4% of the global output since 2017 (Olutosin & Sawicka, 2019; Adetarami et al., 2022). FAO data 2005, reports that Nigeria ranks low in terms of yield compared to major cassava producers Brazil, Thailand, and Indonesia, with average yields per hectare of 10.8, 13.43, 16.8, and 12.02 tons, respectively.

It has long been argued that increasing cassava production is necessary to increase food supply and decrease rural poverty, particularly in sub-Saharan Africa, where a sizable portion of the rural population suffers from malnutrition and food insecurity and where achieving food security is inextricably linked to reversing agricultural stagnation and protecting the nation's resource base (Adeyemon et al., 2010; Matata et al., 2008).

The terms "determinants" refer to the requirements that must be met in order for cassava production to take place and without which it cannot be carried out. In order to determine how these factors will impact and contribute to upscaling production, it is imperative that this study be acknowledged and conducted. Nigeria leads the world in cassava crop production, yet despite this, the nation imports a sizable amount of cassava-derived products, including flour, starch, and sweeteners (FAOSTAT, 2015).

One of the many inherent obstacles preventing the study's food security aim from being realized is the scarcity of land. The environment of Bayelsa is riverine; several of its settlements are nearly (and in many cases entirely) encircled by water (Oyeindoubra & Morgan, 2020). Yield and productivity are often influenced by a multitude of factors; to determine the degree of their impact, it is required to collect and analyze information on these factors. In rural studies, it is challenging to obtain complete and accurate data on the factors influencing cassava output since rural farmers do not keep proper farm records. In-depth understanding of the characteristics that facilitate production is provided by a closer examination of the determinants of cassava production in Kolokuma/Opokuma L G. A.

The aim of the study was to examine the determinants of cassava production in Kolokuma/Opokuma L.G.A, Bayelsa State, Nigeria.

## MATERIALS AND METHODS

The Kolokuma/Opokuma Local Government Area (KOLGA) in Bayelsa State, Nigeria, was the study's Area One of the eight LGAs that comprise Bayelsa state, Nigeria is KOLGA. Located between latitude 5° 08"N and longitude 6° 18"E lies

Kolokuma/Opokuma. Its headquarters are located in the Kaiama town. Its size is 361 km2, its population was 77,292 at the time of the 2006 census (National Population Commission [NPC], 2006), and by 2022, its population is expected to have increased to 118,000 at a 2.5% annual growth rate. She is a member of the Kolokuma and Opokuma clans. Kolokuma/Opokuma, which consists of cities and villages, borders the Yenagoa LGA. The Ijaw language is widely spoken in the area while the religion of Christianity is the widely practiced religion in the area (Alagoa et al., 2005). Popular festivals held in Kolokuma/Opokuma include the Efi fishing festival, OndeFiyaiSiiko festival and Odiogoribauge international festival. The inhabitants engage in farming and crops commonly grown in the area are fluted pumpkin, okra, plantain, banana, sweet pepper, cassava, yam and maize.

A two-staged sampling technique was adopted. The first stage involved the random selection of eight (8) communities namely; Odi. Kalama, Sampou, Okoloba, Sabagreia, Kaima, Oyobu and Ofonibiri. The Second stage involved a random selection of ten (10) cassava famers from the sampling frame provided by the Agricultural Development Programme (ADP) from each community making a total of eighty (80) cassava farmers. The data for this study was analyzed using descriptive statistics such as, frequency and means, budgetary model and multiple regression analysis.

The gross margin analysis is taken as the difference between total revenue and total variable cost of production

$$GM = TR - TVC \qquad (1)$$
$$Profitability = TR - TC \qquad (2)$$

Where TR is Total Revenue, TVC is Total Variable Cost and TC is Total Cost.

This was used to achieve objective (ii)

**Multiple Regression Analysis**

The implicit form of the regression model used is specified as follows

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 + e) \qquad (3)$$

The model is specified in its explicit form as follows

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + U \qquad (4)$$

where Y is quantity of cassava (tonnes/hectare), $X_1$ is gender, $X_2$ is age, $X_3$ is educational level, $X_4$ is marital status, $X_5$ is family Size, $X_6$ is farming experience, $X_7$ is size of farm, $X_8$ is cropping system, $X_9$ is labour type, $X_{10}$ is type of organic fertilizer and U is the error term. This was used to achieve objective (iii).

**RESULTS AND DISCUSSION**

**Socio-Economic Characteristics of the Respondents**

Table 1 shows that a greater percentage (81.1% ) of the respondents were females. This demonstrates that women are significantly involved in cassava production in KOLGA of Bayelsa state. Women are mostly involved in the production, processing, and marketing of cassava.   This result is consistent with Kingsley et al. (2014) who noted the high involvement of females in cassava production as compared to their male counterparts. The high involvement may be because of the fact that males in the study area are involved in other forms of occupation such as lumbering, crafts etc. The mean age of the farmers was 49 years meaning that most of the cassava farmers in the study area are in their productive age. This outcome is in agreement with the work of Enimu et al. (2015) that majority of them were in their productive age ; as such , they could easily be engaged in field crop production to cater for their needs and that f their families.. The result further revealed that 85% of the respondents had at least primary education; this result is comparable to that reported by Shelu et al. (2017), who stated that at this level of literacy, information may be spread among the farmers easily thereby enabling extension agents to educate the farmers more easily about better on new technologies and innovations in cassava production.   A mean household size of size persons was recorded; this implies a fairly large household. Children in large households today rarely help with farm work since they are more focused on school and other social activities.  The results also shows a mean of 14 years framing experience; this implies that most of the respondents have been involved in cassava production for reasonable amount of years which also indicate a substantial wealth of experience. The result is in line with Oyeindoubra and Morgan (2020) who reported that farmers with more years of experience in terms of farm operations are better compared to farmers with few years of experience.

**Table 1: Socio-economic Characteristics of the Respondents ( N= 80)**

| Variables | Frequency | Percentage(%) | Mean |
|---|---|---|---|
| **Sex** | | | |
| Male | 15 | 18.9 | |
| Female | 65 | 81.1 | |
| **Age (years)** | | | |
| 20 -30 | 2 | 6.25 | |
| 31- 40 | 14 | 17.5 | |
| 41 -50 | 15 | 18.8 | |
| 51 -60 | 44 | 55 | |
| 61 -70 | 2 | 2.5 | 49 |
| **Educational Level** | | | |
| No formal Education | 12 | 15.0 | |
| Primary | 20 | 25.0 | |
| Secondary | 34 | 42.5 | |
| Tertiary | 14 | 17.5 | |
| **Family size** | | | |
| 1 -3 | 9 | 12.2 | |
| 4 – 6 | 64 | 80.0 | |
| 7 – 9 | 7 | 8.8 | 6 |
| **Farming Experience (years)** | | | |
| 1 – 5 | 6 | | |
| 6 – 10 | 19 | 7.5 | |
| 11- 15 | 9 | 23.8 | |
| 16- 20 | 46 | 11.2 | 14 |

Source: Field survey, 2023.

**Analysis of Estimated Cost and Returns for Plantain Production**

Table 2 summarizes the costs and returns of cassava production per hectare in KOLGA, Bayelsa State. Budgetary analysis was used to assess the profitability of cassava cultivation. The findings indicate that in the study area, the total fixed cost (TFC) of cassava production was more than the total variable cost (TVC). The outcome additionally reveals that the overall fixed cost was N58,423.6, or 46% of the total cost of production, and the total variable cost was N68,380, or 54% of the total cost (TC) of cassava production.

Nonetheless, the production of cassava resulted in a total cost of N126,740.26 while net farm income (NFI) was earned at N766,002. The profitability of cassava farming in the studied area is confirmed by this finding. This result is comparable to that of a study conducted by Ojiako et al. (2018), which found that gross revenue was N277,400 in his study. However, when farmers implemented improved production techniques, that amount could increase to N330,536, or over 120% more. The results of this study, together with those of Ojiako et al. (2018), suggest that cassava production in the research area is a profitable venture.

**Table 2: Cost and Returns of Cassava Production (per hectare)**

| Items | Average Cost (N)/Hectare | Returns/Hectare |
|---|---|---|
| **Revenue** | | 892,762 |
| Average yield of cassava (kg/h) | 16.23 | |
| Average cost of cassava (kg) | 55,000 | |
| **Variable cost** | | |
| Planting materials | | |
| Labour | | |
| Transport | 26,665 | |
| Harvesting | 8,604 | |
| Chemicals | 3,453 | |
| **Total variable cost** | 8,456 | |
| **Gross Margin (TR-TVC)** | 21,130 | |
| **Fixed cost** | 68,308 | |
| Rent for land | 824,454 | |
| Wheel barrow w | | |
| Cutlass/hoes | 21,447 | |
| Bags/ropes | 18,516 | |
| Depreciation of fixed assets | 12,558 | |
| **Total fixed cost** | 2,751 | |
| **Total cost (TVV + TFC)** | 3,160.26 | |
| **Net farm income (TR-TC)** | 58,432.26 | 766,022 |
| **Rate of returns on investment** | 126,740.26 | 12% |

Source: field survey, 2023.

**Determinants of Cassava Production**

Table 3 was used to estimate four functional forms (linear, semi-log, double log, and exponential) for the analysis of the determinants of cassava production in the area. Due to its high $R^2$ value, the number of explanatory variables that are significant, and the degree to which the estimates conform to predetermined expectations, the double log model was selected as the lead equation among these. The findings indicate that the area's cassava production was significantly influenced by gender and farm size. At 5%, the gender coefficient (-1.957) was significant and negative. This

suggests that a decrease in the number of females involved in the cassava production process could result in a drop in cassava production. The outcome was in line with the apriori prediction, and the farm size co-efficient (3.754) was positive and significant at 1%. This finding suggests that there will be a considerable rise in cassava production in the research area if this factor is increased above its current level. According to the estimated R-squared, the independent variables account for 38% of the changes in the total yield of cassava, with random error (U) in the model accounting for the remaining 62% of the variation.

**Table 3: Determinants of Cassava Production Analysis**

| Coefficient/variables | Linear | Semi-log | Double-log | Exponential |
|---|---|---|---|---|
| **Constant** | 11.589 | 11.517 | 2.465 | 2.451 |
| | (12.115)*** | (18.310)*** | (53.449)*** | (34.680)*** |
| **Gender** | -0.448 | -0.448 | -0.059 | -0.031 |
| | (-1.635)* | (-1.635)* | (-1.957)** | (-1.547) |
| **Age** | -0.0066 | 0.011 | 0.007 | 0.000 |
| | (-0.062) | (0.043) | (0.377) | (-0.020) |
| **Educational Level** | 0.256 | 0.537 | 0.030 | 0.019 |
| | (2.203)** | (2.205)** | (1.870)* | (2.202)** |
| **Marital Status** | 0.103 | 0.123 | 0.010 | 0.008 |
| | (0.848) | (0.408) | (0.459) | (0.889) |
| **Family Size** | -0.103 | -0.33 | 0.000 | -0.007 |
| | (-0.445) | (-0.79) | (-0.013) | (-0.419) |
| **Farming experience** | 0.031 | -0.50 | 0.006 | 0.002 |
| | (0.287) | (-0.187) | (0.285) | (0.301) |
| **Farm Size** | 0.359 | 0.726 | 0.050 | 0.026 |
| | (4.493)*** | (4.017)*** | (3.751)*** | (4.452)*** |

| | | | | |
|---|---|---|---|---|
| **Cropping System** | 0.039 | 0.045 | 0.010 | 0.003 |
| | (0.359) | (0.218) | (0.663) | (0.362) |
| **Labour type** | 0.004 | 0.062 | 0.002 | -0.001 |
| | (0.032) | (-0.229) | (0.120) | (-0.049) |
| **$R^2$** | 0.275 | 0.233 | 0.328 | 0.321 |
| **Adjusted $R^2$** | 0.242 | 0.146 | 0.181 | 0.234 |
| **F-value** | 3.803 | 2.693 | 2.946*** | 3.684 |
| **SE** | 0.83982 | 0.89123 | 0.6416 | 0.06206 |
| **Observations** | 80 | 80 | 80 | 80 |

Source: field survey, 2023.N/B, ***significant at 1%, ** significant at 5%, and * significant at 10%

**Constraints associated with cassava production**
Table 4 Shows the constraints faced by cassava farmers in the study area in order of their severity which determines cassava production. From the table, it is evident that high rate of flooding, inadequate credit facilities and high cost of labor are the most prevailing problems faced by farmers in cassava production thus, they are ranked first, third and fourth. This result corresponds with the findings of Kuye, (2015), who observed a similar report. The areas in which the constraints were not very severe in the study area includes; inadequate storage facilities, inadequate market information, lack of good planting vine, insufficient land, pest and diseases and cost of transportation.

**Table 4: Constraints Associated with Cassava Production**

| S/N | Constraints | Frequency | Percentage (%) | Rank |
|---|---|---|---|---|
| | Inadequate storage facilities | 56 | 70 | 7th |
| | Inadequate market information | 66 | 83 | 4th |
| | Lack of good planting vine | 66 | 83 | 4th |
| | Lack of land/insufficient land | 47 | 59 | 8th |
| | Lack of labour/high cost of labour | 73 | 91 | 3rd |
| | Little or no capital to start | 61 | 76 | 6th |
| | High spread of pest and diseases | 44 | 55 | 9th |
| | High cost of transportation to market | 62 | 76 | 7th |
| | High rate of flooding | 80 | 100 | 1st |
| | Inadequate credit facilities | 80 | 100 | 1st |
| | Total | 635*** | | |

Source: field survey, 2023.
Note: ***Multiple Responses

**CONCLUSION**
The study's results indicate that the two main determinants of cassava production in the studied area are gender and farm size. Despite the fact that cassava farming is profitable in the study area, the main obstacles faced by cassava farmers there were high labor costs and poor finance facilities.

**RECOMMENDATIONS**
Agricultural Extension Organizations should be aware of the factors, such as a high rate of floods, insufficient land, a lack of credit facilities, and a high labor cost, that are restricting the production of cassava in the study region and endeavor to increase the services they provide to these underserved areas. Also farmers in the research region are also recommended to use more productive resources, like larger farms, more manpower, and improved varieties, in order to increase productivity. The government can also purchase huge tracts of land and lease them to cassava farmers at a discounted rate to alleviate the issue of land fragmentation. This strategy would improve access to land while lowering the cost of land renting.

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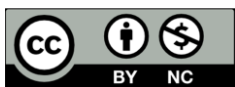
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