# ANALYSIS OF THE DETERMINANTS OF PLANTAIN SUPPLY BY SMALL HOLDER FARMERS IN OSUN STATE, NIGERIA

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## ABSTRACT

*This study analyzed the determinants of supply among plantain farmers in Osun State, Nigeria. A four-stage sampling technique was adopted for this study. The first stage involved a purposive selection of Ife Agricultural zone due to its high plantain production and marketing activities in the area. The second stage involves the random selection of Ife North and Ife South Local Government Areas (LGAs) from the four LGAs that make up the Agricultural zone. The third stage involved the random selection of six) villages from each of the selected local governments making a total of 12 villages. Thereafter, 10 plantain farmers were randomly selected from each of the 12 villages. In all, 120 farmers were used for the study and data were collected using a semi-structured questionnaire. The data were analyzed using descriptive statistics and Ordinary Least Square Regression model. The results of the study revealed that 69.2% of the sampled farming household heads were male. The significant factors influencing the decision to supply plantain in the study area were distance to market, current market price, household size, quantity processed and farm size. The current price of plantain, quantity processed and farm size were positively significant suggesting a direct relationship while household size and distance to market were found to be negatively significant suggesting an inverse relationship with supply. It is therefore recommended that farmers should be encouraged to increase the supply of plantain by providing adequate and easy means of processing and disposing their product to curb loss as well as making up a centralised price both at the farm-gate level and at the market.*

***Keywords**:* **Determinants, Plantain, Factors, Supply.**

## INTRODUCTION

People in both the developing and developed world consider plantain as an important staple (Akinyemi, Aiyelaagbe and Akyeampong, 2010; Ekunwe and Ajayi, 2010). It meets their day-to-day food requirement in the form of chips, flour, flakes, cakes, fried plantain, roasted plantain and so many other forms of culinary thereby contributing to the fight against food insecurity/poverty. Plantain represents more than 25% of the food energy requirement and 10% calorie for over 70 million people in the region of the Sub-Saharan Africa and its lengthy harvesting period ensures a constant supply of this staple (Kainga and Seiyabo, 2012). It has the ability to improve living standard and when fully explored, can be a sole source of income for both the current and potential investors thus becoming essential to economic growth and poverty eradication (Tetang, 2006). Plantain was first discovered in South East Asia and Western pacific region (John & Marchal, 1995). It belongs to the family of "Musaceae" and is of two types: "*Musa acuminata*" (genome AA) and "*Musa balbisiana*" (genome BB). Its production requires an optimum temperature of $30^0$C, mean monthly rainfall of 100mm, soil pH of 4.5-7.5 and a partly drained sandy-loam soil (Ajiboye and Olaniyan, 2016).

Despite its vast resources and potentials, Nigeria is still suffering from food insecurity and low per capita consumption (Bala, 2016). This obvious food shortages and its accompanying problems majorly emanates from the under-development of the Nigerian agricultural sector. Idachaba (2004) explained that food insecurity could be caused by demand-side factors as well as the supply-side factors. These supply side factors involve those factors that relate to the farmers and all the distribution chain actors as well as processes and policies (governmental and non-governmental) involved in making products available to the final consumers. He further argued that the dwindling agricultural production in Nigeria is a confirmation of its unattractiveness. This he explained was evident in the low returns to farmer's effort and meagre compensation being paid to them which is majorly due to the under-developed nature of the market. As a result, farmers are discouraged to go into a large-scale production but have rather chosen to produce on a small scale to curb their loss given the perishable nature of the crop in study. All these have contributed to reducing the supply of this crop and its potential in contributing to bringing down food and nutritional insecurity. Therefore, to step up the production of this crop, it is important to understand the prime movers of farmers' decision to supply the crop. This is because when these factors are tuned in such a way that would favour or compensate their efforts, increased production would be encouraged. In the light of the foregoing, the study seeks to contribute its own quota in bridging this gap in knowledge by seeking to determine the factors that encourage or discourage the supply of plantain among smallholder farmers in the study area.

## MATERIALS AND METHODS

### Study area

The study area is Osun State. The state is divided into four zones by Osun State Agricultural Development Programme (OSSADEP). These are; Osogbo Agricultural zone, Ife Agricultural zone, Ijesha Agricultural zone and Iwo Agricultural zone. The dominant occupation and economic activities of the people centre on farming, agro allied productions, trading, artisanship, school administration, teaching and cottage industries. The dominant crops produced are plantain, cocoa, palm oil and kernels, banana and kolanuts among others (OSSADEP, 1997).

### Sampling procedure

A four-stage sampling technique was adopted for this study. The first stage involves the purposive selection of the Ife agricultural zone due to its high involvement in plantain production and marketing. This zone in Osun State is generally known as the home of plantain. Ife agricultural zone consist of four local governments; Ife North, Ife South, Ife East and Ife Central local governments. The second stage involves the random selection of Ife North and Ife South. The third stage involves the random selection of six (6) villages from each of the selected local governments making a total of twelve (12) villages. Lastly, 10 plantain farmers were randomly selected from each of the twelve (12) villages making a total of 120 plantain farmers used for the study. Primary data were used for this study and collected from the farmers using a semi-structured questionnaire augmented by interview schedule.

### Analytical technique:

The data were analyzed using descriptive statistics and the Ordinary Least Square regression analysis. Descriptive statistics was used to analyze the socio-economic characteristics of the respondents while regression, as used by Osondu, (2015), was used to analyze the determinants of supply among the smallholder plantain farmers.

### *Ordinary Least Square Regression Model*

Regression analysis was used to analyze the determinants of supply among the plantain farmers in the study area. It is implicitly expressed as:

$$Y_i = f(X_1, X_2, X_3 \ldots X_8, e)$$

Where:

Y = Quantity supplied in tonnes

$X_1$ = Land size (ha)

$X_2$ = Current market price (Naira/tonne)

$X_3$ = Distance to market (kilometres)

$X_4$ = Access to credit (1 = yes; 0 = No)

$X_5$ = Household Size

$X_6$ = Quantity processed (Kg)

$X_7$ = Farming experience (years)

$X_8$ = Quantity of Labour (man-day)

e = error

Four functional forms were employed in the analysis of relationship in the supply of plantain by the method of Ordinary Least Squares. They were the exponential, semi-log, linear and double log. Explicitly, they are expressed as:

Linear:

$$Y_i = f(\beta_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + e)$$

Semi-Log:

$$logY = f(\beta_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + e)$$

Double-Log:

$$logY = f(\beta_0 + B_1logX_1 + B_2logX_2 + B_3logX_3 + B_4logX_4 + B_5logX_5 + B_6logX_6 + B_7logX_7 + B_8logX_8 + e)$$

Exponential:

$$lnY = f(\beta_0 + B_1lnX_1 + B_2lnX_2 + B_3lnX_3 + B_4lnX_4 + B_5lnX_5 + B_6lnX_6 + B_7lnX_7 + B_8lnX_8 + e)$$

As suggested by Bollen & Long, (1992), the following were considered in selecting the best model for this study

- The highest coefficient of determination ($R^2$);
- Highest number of significant variables;
- The sign (negative or positive) of the significant variables and
- Conformity to apriori expectation.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of sampled farmers

**Table 1: Socio-economic characteristics of farmers**

| Description | Number of Farmers (N=120) | Percentages (%) |
|---|---|---|
| Sex | | |
| Male | 83 | 69.2 |
| Female | 37 | 30.8 |
| Marital status | | |
| Married | 99 | 82.5 |
| Single | 7 | 5.8 |
| Divorced | 10 | 8.3 |
| Separated | 4 | 3.3 |
| Age of farmer | | |
| 21-30 | 8 | 6.7 |
| 31-40 | 32 | 26.7 |
| 41-50 | 44 | 36.7 |
| 51-60 | 24 | 20 |
| >60 | 12 | 10 |
| Highest level of education | | |
| No formal education | 33 | 26.8 |
| Primary | 30 | 25.2 |
| Secondary | 48 | 40.3 |
| Tertiary | 9 | 7.5 |
| Farming experience | | |
| <5 years | 9 | 7.5 |
| 5-10 years | 23 | 19.2 |
| 10-15 years | 16 | 13.3 |
| 15-20 years | 41 | 34.2 |
| >20 | 31 | 25.8 |
| Primary occupation | | |
| Farming | 60 | 50.0 |
| Trading | 45 | 37.5 |
| Civil servant | 12 | 10.0 |
| Others | 3 | 2.5 |

**Source: Survey result, 2016.**

Table 1 shows the socio-economic characteristic of the respondents in the study area. The majority of the farmers were male indicating that the enterprise is labour intensive. The average age of the farmers was 46 years indicating that most of the plantain farmers were in their active/prime age. Majority of the farmers (82.5%) were married. This suggests the availability of family labour to the farmers. Furthermore, majority (73.2%) of the farmers had some level of formal education, indicating the possibility of the presence of a good and informed decision-making ability. The average years of experience in farming of plantain was13 years. The primary occupation of about 50% of the sampled respondents was farming.

**1. Determinants of the supply of plantain:**

The semi-log function was chosen as the lead equation model on the basis of conventional statistical and econometric criteria as stated in the methodology. The value of the coefficient of multiple determination obtained and its statistical test at 10%, 5% and 1% indicates that the size of farm, quantity processed, distance to market, current market price, and household size explain about 82.10% of the variation in the quantity of plantain supplied to the market by the farmers. Current price of plantain, quantity processed and land size were positively significant while household size and the distance to market were found to be negatively significant to the supply of plantain. The coefficient of current market price of plantain (2.530E-005) was positively significant at 10% indicating that the higher the market price, the higher the increase in the supply of plantain to the market and vice-versa. With a good prevailing price, the farmer has the tendency of commercializing all he or she produces. The farmers would be willing to sell their product rather than consume if they know it will fetch them more money. This goes with the findings of Eronmwon, Alufohai & Ada-Okungbowa, (2014). The coefficient of quantity processed was also positive (1.007) meaning that the quantity supplied increases as quantity processed increases. This probably stems from the fact that farmers are able to process their product into forms that will fetch them more money or into storable form to be later disposed when prices are favourable. The coefficient of household size has a negative sign (-0.013) and was significant at 10%. This means the greater the household size, the lower will be the supply of this product to the market. This is logical as farmers with larger households utilize more of his/her output to first satisfy its family needs especially when current market price is not favourable. The coefficient of farm size (0.011) was positively significant at 5% level. Farmers with larger farmland have more to supply to the market due to their larger scale of production while farmers with smaller land supply less. This agrees with the findings of Okoje (2014). Finally, distance to market was negatively significant at 1%. Meaning the greater the distance, the less they supply to the market and vice-versa. Farmers residing in remote areas with a considerable distance to market may choose to consume their product when they consider the cost of transporting them or the meagre price offered by the rural assemblers.

**Table 2: Determinants of supply of plantain**

| Variables | Linear | Semi log | Cobb Douglas | Exponential |
|---|---|---|---|---|
| (Constant) | -17.371*** | 0.995*** | -1.045 | -6.112E+107 |
| | (-3.510) | (10.094) | (-4.535) | (-0.005) |
| PRICE | 0.003*** | 2.530E-005* | 0.210 | 6.311E+103 |
| | (3.815) | (1.892) | (3.475) | (2.546)** |
| DIST TO MKT. | 0.045 | -0.002*** | -0.005 | -7.7975E+85 |
| | (0.612) | (2.514) | (-0.228) | (-1.294) |
| LAND SIZE | 1.333** | 0.011* | 0.003 | -3.549E+97 |
| | (2.930) | (1.660) | (0.093) | (-0.075) |
| HOUSEHOLD SIZE | -0.225 | -0.013* | -0.043 | 6.722E+106 |
| | (-0.641) | (-1.773) | (-1.935) | (5.318)*** |
| YEAR OF EXP | 0.477* | 0.018 | 0.266 | 4.722E+096 |
| | (1.808) | (3.433) | (5.577) | (0.054) |
| QTY PROCESSED. | 0.615 | 1.007*** | 0.002 | 1.137E+103 |
| | (1.117) | (2.623) | (0.367) | (2.005) |
| ACC TO CRED. | -0.577 | 0.000 | -0.022 | 2.250E+107 |
| | (-0.272) | (-0.011) | (-1.365) | (2.757) * |
| QTY. OF LABOUR | 0.001 | -0.005 | 6.029E-005 | -3.160E+97 |
| | (3.815) | (-1.327) | (0.046) | (0.0364) |
| $R^2$ | 0.735 | 0.821 | 0.442 | 0.257 |
| No. of observation | 120 | 120 | 120 | 120 |

**Source: Survey result, 2016**

*NB: The values in parenthesis are absolute value of t-ratio; (***) at 1%, (**) at 5%, (*) at 10%*

## CONCLUSION AND RECOMMENDATIONS

Majority of the plantain farmers in the study area were of the male gender and in their active age. significant factors influencing the farmers' decision to supply plantain to the market in the study area were the distance to market, current market price, quantity processed, household size, and land size. Current price of plantain, quantity processed and land size were positively significant suggesting a direct relationship while household size and distance to market were found to be negatively significant to the supply of plantain suggesting and inverse relationship between the variable.

In line with the result of this study, the following are therefore recommended:

1) Government should create an organization that buys perishable crops in bulk from the farmers and from traders, offering prices that complement their efforts so as to foster further investment. This will go a long way in pacifying the problems of low product pricing and distance to market.

2) Licensing and sale regulatory bodies of the government that will help in controlling the activities of plantain traders andother crops are highly recommended. When such a body exists, there would be a kind of centralized and coordinated operation in the market which will curb the problem of low producer price that ultimately deterproduction.

3) Processing facilities can also be supplied to the farmers as it obviously increases the supply of plantain.

**REFERENCES**


Ajiboye G. A. and Olaniyan J. O (2016). Characteristics and suitability evaluation of the "white soils" of Etung local government area for oil palm and plantain production. Department of Soil Science and Land Management, College of plant Science and Crop Production, Federal University of Agriculture Abeokuta, Abeokuta, Ogun State Nigeria. **Agrosearch** 16(2): 25-40

Akinyemi, S.O.S., Aiyelaagbe, I.O.O., Akyeampong, E. (2010). Plantain (Musaspp.) Cultivation in Nigeria: A Review of Its Production, Marketing and Research in the Last Two Decades. Department of Horticulture, University of Agriculture, Abeokuta, Nigeria. National Horticultural Research Institute, P.M.B. 5432, Ibadan, Nigeria. Acta Hort. 879, ISHS 2010.

Bala, F. K. (2016). Analysis of Women Ginger Production as A Means for Achieving Farm Household Food Security in Kaduna State, Nigeria (Doctoral Dissertation).

Bollen, K. A., & Long, J. S. (1992). Tests for structural equation models: Introduction. *Sociological Methods & Research*, *21*(2), 123-131.

CGIAR, (2012). Banana and plantain. CGIAR Research Programs. Retrieved June 20, 2014, from http://www. CGIAR.ca/banana and plantain.

David .B. Stanley .F. and Rudiger .D., (1984): economics Published by McGraw-Hill Book Company, (UK) Limited.

Ekunwe, P. A., and Ajayi, H. I. (2010). Economics of Plantain Production in Edo State Nigeria. ***Research Journal of Agriculture and Biological Sciences,*** 6(6), 902-905.

Eronmwon, I., Alufohai, G. O., and Ada-Okungbowa, C. I. (2014). Structure, conduct and performance of plantain marketing in Edo State, Nigeria. ***Journal of Applied Sciences and Environmental Management***, *18*(3), 437-440.

Food and Agriculture Organization (2003). World plantain production; FAOSTAT Data. http://faostat.fao.org/site/339/default.aspx. Food and Agriculture Organization of the United Nations, Rome.

Food and Agriculture Organization AGROSTAT Database (2004): Food and Agriculture Organization of the United Nations. Production year book. FAO Rome.

Food and Agriculture Organization FAOSTAT (2006): FAO Statistics Division 2006. Food and Agriculture Organization of the United Nations. Production Year book, FAO Rome.

Food and Agriculture Organization FAOSTAT (2011): Plantain Production Quantity in Nigeria 1961-2009. Food and Agriculture Organization of the United Nations. FAO Rome.

Gold C. S, M. W Ogenga-Latigo, W. Tushemereirwe, I Kashaija and C. Nankinga. 1991. Former perception of banana pest constraints in Uganda: Results from a rapid rural appraisal, (Eds Gold C.S and B. Gemil), proceedings Res. Coord. Meeting for biological and integrated control of the highland banana pests and diseases in Africa. Cotonous, Benin, IITA Ibadan, Nigeria.

Idachaba, F.S. (2004): Food Security in Nigeria: Challenges Under Democratic Dispensation, 9th ARMTI Annual Lecture, Ilorin, 24/3/2004.

IITA (Nigeria)/LUND (Sweden), 2003.African food crisis – the Nigerian case study. In association with International Institute of Tropical Agriculture. Afrint project, September 2003.

Jeger, M.J., S. Eden-Green, J.M. Thresh, et al. 1995. Banana diseases. *InS*. Gowen, ed., Bananas and Plantains, pp. 317-381. Chapman and Hall, London, U.K.

John, P and Marchal, J. (1995). Ripening and Plantains. Chapman and Hall, London, pp 434 – 467.

Kainga, P. E., & Seiyabo, I. T. (2012). Economics of plantain production in Yenagoa local government area of Bayelsa State. *Journal of Agriculture and Social Research (JASR)*, *12*(1), 114-123.

Okoje, J. D. L. (2014). Estimation of cost and return of plantain production in Orhionwon Local Government Area, Edo State, Nigeria. *Asian Journal of Agriculture and Rural Development*, *4*(2), 162.

Olatunji, G.B., Omotesho, O.A., Ayinde, O.E and Adewumi, M.O., (2012). Empirical Analysis of Agricultural Production and Inflation Rate in Nigeria (1970-2006). Department of Agricultural Economics and Farm Management, University of Ilorin, Kwara State Nigeria. **Agrosearch** 12(1): 21 - 30

Osondu C.K., (2015). The market performance and determinant of net returns to artisanal fish in Ndibe beach, Afikpo North Local government, Ebonyi state. Nigeria. Department of Agricultural Economics and Extention, Abia state University, Umuahia. **Agrosearch** 15(1): 1-28.

Phillip, D., Nkonya, E., Pender, J., and Oni, O. A. (2009). Constraints to increasing agricultural productivity in Nigeria: *A review* (No. 6). International Food Policy Research Institute (IFPRI).

Swennen, R., (1990). Plantain Cultivation Under West Africa Conditions: A Reference Manual. Institute for Tropical Agriculture, Ibadan, Nigeria.

*TAXON,* (2013). World Checklist of Selected Plant Families, Royal Botanic Gardens, Kew.

Tetang, T.J., (2006). Processing and marketing of Musa: constraints and opportunities for SMEs in Cameroon. Musafrica. 17:21-23.