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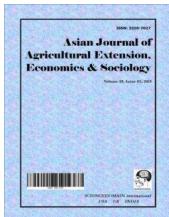
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Small Holder Commercial Groundnut Production and Its Effect on Poverty Alleviation in Dass, Nigeria

S. S. Mailumo^{1*}, K. I. Okeke-Agulu¹, G. C. Onuwa¹ and A. Muktar¹

¹*Department of Agricultural Extension and Management, Federal College of Forestry, Jos, Plateau State, Nigeria.*

Authors' contributions

This work was carried out in collaboration between all authors. Author SSM designed the study, managed the literature searches, edited the manuscript and supervised the entire work. Authors KIOA and GCO performed the statistical analysis and wrote the first draft of the manuscript. Author AM supervised the data collection process. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2017/36790

Editor(s):

(1) Muhammad Yaseen, Department of Agricultural Extension & Rural Development, University College of Agriculture, University of Sargodha, Pakistan.

Reviewers:

(1) Juliet Libanda, Jiangsu University of Science and Technology, China.

(2) Abdulhameed Girei, Nasarawa State University, Nigeria.

Complete Peer review History: <http://www.sciedomain.org/review-history/21280>

Received 15th September 2017

Accepted 28th September 2017

Published 7th October 2017

Original Research Article

ABSTRACT

The paper examined small holder commercial groundnut production and its effect on poverty status of groundnut farmers in Dass Local Government Area of Bauchi State. Data for the study were collected using questionnaire administered to the respondents who were selected using random sampling technique. The data collected were analyzed using commercialization index, Foster Greer and Thorbeck (F.G.T) and Tobit regression model. The result showed that most of the small holder farmers grow their groundnut for commercial purpose ostensibly to raise their income portfolio. From the FGT analysis, the poverty line was constructed to be at per capital monthly expenditure equal (₦7,752.22). The poverty count index (P_0) for the household was 60%. This means that 60% of the farming households in the study area were poor. The Tobit regression result showed that the variable poverty status was negatively significant. This implies that enhancing the farmer's status will probably lead to an increased in commercialization. On the other hand, education, part-time occupation and distance to market were positively significant. It is therefore recommended that to alleviate the poverty status of the farmers, they should be encouraged to see groundnut farming as a business and not as subsistence venture. In this regard, infrastructural facilities (market stalls and

*Corresponding author: E-mail: drmailumo247@gmail.com;

roads) should be provided. Also, an enabling environment for small scale industries that utilized groundnut should be facilitated by the government. This will encourage the farmers to produce more and in return earn more, and consequently improve their socio economic well-being.

Keywords: *Small holder; commercial; groundnut; production; effect; poverty.*

1. INTRODUCTION

The teeming human population in Nigeria is exerting pressure on the national food and protein requirements over the years, this trend is progressively increasing. Therefore, there are calls for increased domestic food production in order to bridge the gap between aggregate supply and demand [1]. Commercial transformation of subsistence agriculture is an indispensable path way towards economic growth and development for many agriculture dependent developing countries [2].

Sustainable household food security and welfare also require commercial transformation of subsistence agriculture [3]. Commercial production of groundnut is likely to result in welfare gains through the realization of comparative advantages of economics of scale and from dynamic technological, organizational and institutional change effects that arise from the flow of ideas due to exchange based interaction [4]. According to a study by [5] farmers with high degree of market engagements have better potential of enjoying better standard of welfare. Similarly [6] noted that enhancing the degree of commercialization and poverty status of smallholders can have more impact on reducing poverty status than promotion of few large ventures.

Commercialization enhance the links between the input and output side of agricultural markets. Commercialization entails markets orientation (agricultural production decision destined for market based on market signals) and market participation (offered for sale and use of purchased inputs) [7]. Empirical evidence indicates that commercialization of small holder farms has the potential to enhance income and welfare outcomes and take smallholder out of poverty if constraining factors such as lack of capital, basic skills (farming and commercialization) high transaction cost, lack of infrastructure, lack of information and lack of education could be eliminated [8].

According to [9], groundnut is grown on 26.4 million hectares worldwide with a total production

of 36.1 million metric tonnes. Groundnut production in Nigeria as further expressed by [10] covers an area of about 1.0 to 2.5 million hectares annually and yield in the range of 500 – 300kg/ha. Groundnut served as a considerable income earner for poverty alleviation and one of the most popular commercial crops in Nigeria, for food security and wealth creation. It is pertinent to note that the issue of analysis of small holder commercial production of groundnut is very important to investment decision by rational investors. It is in view of this that this research was carried out to analyse the effect of small holder commercial groundnut production on poverty status of famers in Dass Local Government Area of Bauchi State, Nigeria.

2. METHODOLOGY

2.1 The Study Area

Dass local government area was created in 1976. It is located in the south western part of Bauchi State and is one of the smallest in size. It is about 58 km from the state capital. It has a land mass of 456,731 km² [11]. Dass Local Government Area is located in the Northern Guinea Savannah Zone of Nigeria between latitude 9°45' and 10°15' north and longitude 9°15' and 9°14' east, with an estimated population (projected to 2016) of 126,015 using the prevailing growth rate of 3.43% [12]. From the aerial view, Dass is surrounded by mountains and deep valleys. In this valley most of the area located has a gentle mild temperature with annual maximum and minimum temperature of 13-32°C. The area experiences distinct wet and dry season influenced by the south westerly and northeasterly winds. The mean annual rainfall is 1150 mm with duration of 150-60 days. Dass L.G.A is mainly an agricultural area where crops such as groundnut, maize, millet, rice, cowpea, soybeans and a wide variety of vegetables are grown. Livestock kept include sheep, goats, cattle and poultry.

2.2 Sampling Procedure and Sample Size

Preliminary survey was conducted to identify the farmers in the study area. The sample size for

the study was selected using the random sampling technique regardless of their background; this was done so as to remove any element of bias. Out of eleven (11) districts, three (3) were purposively selected for sampling; the districts are Dott, Wandi and Bundott. The choice of these districts was informed by the prevalence of groundnut farmers. In each of the district, (40) respondents were selected, this gave the overall sample size of 120 from all the three districts.

2.3 Data Collection

The main source of information was primary data. The data was collected through the administration of questionnaire complemented by interview during the survey period. The questionnaire was design based on the objectives of the study.

2.4 Data Analysis

The data analysis was achieved using a combination of descriptive statistic, commercialization index, Foster, Greer and Thorbeck (FGT), and Tobit Regression.

2.5 Models Specification

2.5.1 Crop commercialization index

The household commercialization index (HCI) to determine household level of commercialization [13,14]. The index measures the ratio of the gross value of groundnut sales by household i in year j to the gross value of total groundnut produced by the same household i in the same year j expressed as a percentage. The index measures the extent to which household crop production is oriented towards the market. A value of zero would signify a totally subsistence oriented household and the closer the index is to 100, the higher the degree of commercialization. The advantage of this approach is that commercialization is treated as a continuum thereby avoiding crude distinction between "commercialized" and "non-commercialized" households. This effectively brings subsistence food production to the center of discussions about commercialization. The HCI is given as:

$$HCI_i = \frac{\text{Gross value of crop sales by household } i \text{ in year } j}{\text{Gross value of all crop production by household } i \text{ in year } j} \times 100 \quad (1)$$

2.5.2 Foster, Greer and Thorbeck (FGT)

The Foster, Greer and Thorbeck [15] weighted poverty index was used to determine the poverty status of the farmers. The P_α measures the poverty status or different dimension of the indices of poverty, (P_0) , (P_1) and (P_2) and was used for measuring individual head count, depth and severity of poverty respectively. The measure was able to accomplish this, through the weight given by the index to the severity of poverty. There are three measures all based on the formula but each index puts different weight on the degree in which a household or individual falls below the poverty line.

This measure was useful due to its decomposability among sub group. To define the consumption or household expenditure, this was arranged in ascending order, from poverty (Y_1), next poorest (Y_2) with the least poor (Y_q).

The poverty index is defined mathematically as follows:

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

Where

α = the FGT index and takes values 0, 1 or 2
 n = total number of households
 q = number of households below the poverty line
 Z = poverty line
 Y_i = the MPAEHE of the household in which individual i^{th} lives

Three members of the FGT index are:

1. Suppose $\alpha = 0$: This equals the headcount ratio, the index measures no aversion to poverty:

$$P_0 = \frac{1}{n} \sum_{i=1}^q \left[\frac{(z - y_i)}{z} \right]^0 = \frac{q}{n} = H \quad (3)$$

2. Suppose $\alpha = 1$: the P_α is the headcount times the average expenditure shortfall:

$$P_1 = \frac{1}{n} \sum_{i=1}^q \left[\frac{(z - y_i)}{z} \right]^1 = HI \quad (4)$$

Here, $P^\alpha = \text{Headcount} \times \text{average income shortfall}$

In other words, it measures the depth of poverty (the proportion of the expenditure shortfall from

the poverty line). It is otherwise called the poverty gap between the i^{th} poor farming household and the poverty line.

3. The FGT poverty measure for $\alpha \geq 2$, this weighs the poverty of the poorest individual more heavily than those just slightly below the poverty line. Squaring the gap between their expenditure and the poverty line in order to increase its weight in the overall poverty measure does this:

$$P_2 = \frac{1}{n} \sum_{i=1}^q \left[\frac{(z - y_i)}{z} \right]^2 \quad (5)$$

This measure, unlike the first two $P\alpha$ measures is sensitive to the distribution of expenditure among the poor. Here, the $P\alpha$ is the weighted sum of individual expenditure shortfalls where income gaps themselves are the weights. Thus, the expenditure gap ratios of poorer households weigh more importantly in the calculation of $P\alpha$ than the expenditure gap ratios of less poor households.

2.5.3 The Tobit regression

The Tobit model is expressed following [16]. Tobit decomposition framework examined the effect of changes in the explanatory variables (X_i) on the probability of producing groundnut for commercial or subsistence use. The Tobit Model can be mathematically expressed as:

$$V_i = \begin{cases} V_1 = \beta X_i + \varepsilon_i & \text{if } V_1 > V_1^* \\ 0 = \beta X_i + \varepsilon_i & \text{if } V_1 \leq V_1^* \end{cases} \quad (6)$$

Where:

- V_i = the dependent variable, it is discrete when the small holder farmers produce groundnut for commercial purpose and continuous when otherwise.
- $i = 1, 2, \dots, N_i$, where N_i is the total number of groundnut farmers.
- X_i = vector of explanatory variables
- β = vector of unknown parameters
- ε_i = independently distributed error term.

The empirical model used for determining factors that influenced the commercialization of groundnut production among small holder farmers in Dass, Bauchi State, Nigeria is specified as:

$$V_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \varepsilon_i \quad (7)$$

Where:

V_1 = limited dependent variable, it is the commercialization index (an index of 0.50 – 1.00 = groundnut for commercial purpose and 0.01 – 0.49 = groundnut for subsistence purpose)

X_i = the independent variables specified as determinants of commercializing groundnut and defined as follows:

X_1 = Age of the respondents (years)

X_2 = Gender

X_3 = Marital status

X_4 = Educational level (years)

X_5 = Household size (number)

X_6 = Farming experience (years)

X_7 = Farm size (ha)

X_8 = Part time occupation

X_9 = Distance to nearest market (km)

X_{10} = Poverty status (1=Non poor, 0=poor)

3. RESULTS AND DISCUSSION

3.1 Groundnut Commercialization

The result in Table 1 shows the level of commercialization by the respondent in the study area. The total output produced by the farmers was 364,400 kg while the total output sold by the farmers was 326,100 kg with the total groundnut consumed by the farmers as 38,300 kg. This indicates that the quantity of groundnut sold is greater than the total quantity consumed by the farmers as shown by their respective ratios. This implies that since the ratio of the groundnut sold is approaching 1, it indicates a high degree of commercialization [17].

Table 1. Crop commercialization of the respondents

Variables	Quantity (kg)	Gross value (N)	Ratio
Groundnut consumed	38300	6,587,600	0.11
Groundnut sold	326100	56,089,200	0.89
Total groundnut produced	364400	62,676,800	1.00

Source: field survey 2016

3.2 Poverty Status

The poverty line used for this study was derived from the monthly maximum and minimum per capital expenditure (MPCE) of the sampled household shown in Table 2. Two third (₦7,752.22) of the monthly PCE of the sampled household was used as poverty line. The poverty of the farming households which included poverty head count or incidence (P_0), poverty gap or depth (P_1) and squared poverty severity (P_2) were analyzed. The (P_0) for the entire households was 60%. This means that 60% of the farming household in the study area was poor. The poverty gap index (P_1) usually referred to as the depth of an average poor person from the poverty line was 36%. The poverty incidence (P_2) which measures the distance to each poor person to one another was found to be 0.12. This means that among the poor households 12% were severely poor. This shows that the poor households were not equally poor but vary in their degree of poverty. The average per capital expenditure (PCE) was (₦11628.33), while the maximum (PCE) was found in the study at (₦56,953.33) and the minimum per capital was (₦2,04.63) of the respondents respectively.

Table 2. Household poverty profile and indices

Poverty	Frequency	Percentage
Non-poor	48	40.0
Moderate poor	54	45.0
Core poor	18	15.0
Total		
FGT poverty indices		
Poverty incidence	60.0	
Poverty depth	0.36	
Poverty severity	0.12	
Average PCE	11628.33	
Min PCE	2040.63	
Max PCE	56953.33	
Std. Deviation	11843.8	
Coefficient of variation	1.02	

Poverty line (2/3) = 7752.22

Source: Data analyzed from field survey, 2016

3.3 Factors Influencing Intensity of Groundnut Commercialization

Age of the respondents: The age of the respondents had negative but significant relationship with commercialization at 1%. This implies that there is a probability that the quantity of groundnut sold in the market will reduced as

the age of the farmer's increases in the study area.

Educational status: The coefficient education of the farmers measured was positive and statistically significant at 1% level. The result implies that education was significant factor in determining the commercialization of groundnut by farmers in the study area. The coefficient tells us that an increase in the educational level of the farmers will probably lead to an increased in the commercialization of groundnut by the farmers. This implies that as farmers education increase, they tend to increase the quantity of groundnut sold in the market ostensibly because educated farms tend to take agriculture as a business beyond the subsistence level.

Part time Occupation: Part occupation of the respondents was positively significant to groundnut commercialization at 5%. This implies that as the increase the farmers take up occupations in addition to farming, their income is increased. This could be channeled into cash crop (groundnut) production.

Distance to market: Distance to market by the respondents was significant and positively related to commercialization at 1%. This implies that farmers who reside farther from the market probably farm more and consequently sale most of their groundnut compare to those that reside closer to the market. Perhaps most of those that reside closer to the urban markets tend to embrace some other vocations and take to farming as a part time activity just to produce enough for the family consumption.

Poverty status: The coefficient of poverty status was significant at 1% level and had negative relationship with groundnut commercialization. This implies that the decrease in poverty among farmers will increase the intensity of groundnut commercialization by the farmers in the study area. This means that the higher the poverty the lower the quantity of groundnut sold at the market by the respondents. This is true because poor farmers don't have the resources to increase their farm acreage and they can't afford inputs that could possibly increase their yields. All these combine to explain the negative relationship between commercialization and poverty status of the farmers. It could therefore be deduced that to alleviate the poverty status of the farmers, they should be encouraged to see groundnut farming as business and not as subsistence venture.

Table 3. Distribution based on the factors influencing intensity of groundnut commercialization

Variable	Coefficient	Standard error	t-value
Constant	1.5418	0.8192	1.88
Gender	-0.1433	0.2809	-0.15
Age	-0.1893	0.0190	-9.90***
Marital status	0.1536	0.1528	1.01
Education	0.2009	0.0227	8.08***
Household size	0.0288	0.0505	0.57
Farming experience	-0.0262	0.0267	0.32
Part time occupation	0.0958	0.0443	2.15**
Farm size	-0.0254	0.1380	-0.18
Cooperative participant	0.1479	0.2031	0.73
Distance to market	0.1834	0.1058	3.12***
Poverty status	-0.074	0.039	-2.693***

***significant at 1%, ** significant at 5% log likelihood = - 175.26524

Source: Data analyzed from field survey, 2016

4. CONCLUSION AND RECOMMENDATIONS

The paper examined small holder commercial groundnut production and its effect on poverty status of groundnut farmers in Dass Local Government Area of Bauchi State. The result indicates that the quantity of groundnut sold is greater than the total quantity consumed by the farmers as shown by their respective ratios. The result of the poverty revealed that the (P_0) for the entire households was 60%. This means that 60% of the farming households in the study area was poor. The Tobit regression showed that education status, part time occupation and poverty status positively affected groundnut commercialization in the study area, while age and poverty status negatively affected commercialization. It is therefore recommended that to alleviate the poverty status of the farmers, they should be encouraged to see groundnut farming as a business and not as subsistence venture. In this regard, infrastructural facilities (market stalls and roads) should be provided. Also, an enabling environment for small scale industries that utilized groundnut should be facilitated by the government. This will encourage the farmers to produce more and in return earn more, and consequently improve their socio economic well-being.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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