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EXPORT TREND OF NIGERIAN ORNAMENTAL FISH INDUSTRY (2005-2012)

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Abstract
The ornamental fish sector is extensive and form an important aspect of global international trade in Fisheries. Inspite of being in the fore front of export in Africa, Nigerian remains resilient, undeveloped and unappreciated of the industry. This study aims to (1) identify the various indigenous and exotic ornamental fish species being exported from Nigeria (2) to provide an overview of the trends in the Nigerian ornamental fish export industry.70 indigenous fish species and exotic fish species have been found to get exported from Nigeria (Koroye, 2010; Areola, 2004). The export trend of the industry for seven years (1995 - 2012) shows a declining state which also reflected in the Annual and Compound Annual Growth Rate. Ornamental fish industry has enormous potential in tropical countries like Nigeria. The trade can be expanded by developing new technologies and new policies which will help in attaining a sustainable and viable industry and open a vibrant foreign exchange earnings for the country.

Keywords: Nigerian, Export, Annual Growth Rate, Compound Growth Rate

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1.0 INTRODUCTION

Nigeria is presently at a critical period of transformation; changing from the overdependence on oil-based economy to a diversify Agrarian-economy. Agriculture is in the fore front of option available to us and Fisheries play a prominent role in this sector. The ornamental fish sector is extensive and form an important aspect of international trade in Fisheries. The global trade in ornamental fish and associated aquarium accessories is in excess of USD 7109 each year (Andrew, 2006).

Aquarium fish keeping as a hobby has a long history dating back to many centuries. Introduction of civil aviation after the Second World War expanded the hobby to a global industry (Tissera, 2010). Though the global ornamental fish trade is relatively small, it has a significant contribution to the trade in freshwater and marine aquatic products. The global ornamental fish trade in retail is worth more than US $ 8 billion (MPEDA, 2010) while the exports was around US $ 337 million (FAO, 2008). According to Rana (2007) Singapore continues to be the biggest exporter and also remains the Asian hub for ornamental fish while, US, EU and Japan are the major importers with Czech Republic having a prominent place in EU in ornamental fish trade.

Nigeria is blessed with an abundant variety of fish species some of which have been exported over the years (Areola, 2003). These fish species are taken either from the wild or cultured. Large quantities of fish and fishery products are exported from Nigeria in different forms and which have been sources of foreign exchange earnings. An estimate value of exports in the fishery sub-sector stood at approximately US48, 212,070 and over US500, 000 for ornamental live fishes (Areola, 2004).

Ornamental fish trade in Nigeria is still at its infancy (Areola, 2003). Nigeria is highly endowed with both fresh and marine fishery resources. It is generally believed that if these resources are rationally managed and exploited, the country can attain self-sufficiency in fish production (Ita *et al.*, 1985). There are an estimated 12,478,818 Hectares of inland water bodies made up of reservoirs, lakes, rivers, ponds and perennial swarms and some 741,509 Hectares of brackish waters. At present, only about 5,476 Hectares of this water are utilized for fish

culture (Sikoki and Oyero, 1994 cited in Ada *et al*., 2016). Fresh water fishes that are commercially important ornamental fresh water fish families in Nigerian waters include the Mormyridae (43 species); Cyprinidae (32 species); Mochokidae (27 species; Characidae (25 species) and Cichlidae (19 species). About 100 species of ornamental live fish have been identified to be regularly exported from Nigeria. There is no stock assessment of the different species but records do show that ornamental livie fish export has been carried out over forty (40)

years in Nigeria (Areola, 2004; Koroye, 2010). It was started by some Americans who invested in the identification and location of these species in different water bodies. Most of the Nigerian ornamental fish are also consumed as food thereby creating a conflicting interest and hence creating pressure on their population. Globally, the impact of this sector according to FAO is US174 million as at 1998 (Bartley, 2000). In ornamental fish trade the need is for large number of species or varieties in large quantities (Sane, 2007).

The study aims to list some of the various indigenous and exotic ornamental fish species getting exported from Nigeria and also to provide an overview of the trends in the Nigerian ornamental fish export industry. Though some workers have already listed the ornamental fish species exported from Nigeria, this work aims to update the list and as well present the trend of the business in Nigeria.

2.0 Methodology

The study was carried out between 2012 and 2013. The method for data collection consisted of information gathering from various ornamental fish exporters in Nigeria using a structured questionnaire. The survey was conducted to get the details of the fish species getting exported. From about 59 exporters only 26 were ready to co-operate with the survey. Besides the survey, various documents such as databases, reports, manuscripts and articles were also used to collect information. Secondary data was also collected from Nigerian Aviation Handling Company (NAHCO) of the Muritala Mohammed International Airport. The export data obtained from NACHO, were used to compute the annual growth and compound annual growth (Siegel, J.G., 1997). Annual growth and compound annual growth were computed to assess the growth of the ornamental export industry.

Annual Growth Rate= (This Year-Last Year)/Last Year
Compound Annual Growth Rate= ((Last Year/First Year) ^ (1/N-1))-1

Where, n=number of years

3.0 RESULTS AND DISCUSSION

From the findings, Nigeria export about 40 native and exotic fish species of ornamental fish to foreign markets which include both freshwater and marine species. The majour indigenous species are: Gnathonemus petersii; Heterotis niloticus; Calamoichys calabaricus; Chana obscura; Polypterus spp.; Schilbe mystus; Gobiocichlia wonderi; Barbus occidentalis; Hemichromis bimaculatus; Pantodon buchholzi; killifishes (Table 1). This is an indication that the country is blessed with abundance of these fishes as agreed upon by Ukaonu, *et al*., (2011).

Some exotic fish species found to be exported from Nigeria as ornamental fish include Atya gabonensis; Periophtalmus barbarous; Gymnacus niloticus; Xenomystus nigri; Brycinus longippinus; Protopterus annectens;. Among the 146 native fish species, 124 were freshwater fish and 22 were marine fish species. Among the indigenous freshwater species the largest number of species (43 species) belongs to the family Mormyridae. 32 species were found to belong to Cyprinidae. 27 species were found to belong to family Mochokidae. 25 species were found to belong to the families Characidae while 19 species belong to Cichlidae.

However, the trade statistics from NAHCO, indicates that the export rate of ornamental fish is declining (Fig 1). The annual growth rate and compound annual growth rate also indicates a decline in the exports (Table 4) though the exports increased twice it substantially declined after 2007-2008. The reasons could be due to drastically

trade restriction on exportation of ornamental fish. The total volume of ornamental fish exported in 2006 was 1,292,259 at the volume of $711,804.37. While in 2007 the value dropped to 1,132,286 at the value of $662,611.35 (Table 3). Another reason could be the downward trend in the share of commercial banks lending to the agricultural sector (Salami and Arawomo, 2013). This in conjunction with double digit value on credit facility available to farmers discourage them from getting such facilities that would have enable them do their business very well.

Table 1: Some common ornamental fish in Nigeria and their market values

Common name	Scientific name	Unit price ($)
Long nose	*Gnathonemus petersii*	0.8
Short nose	*Marcusenius angolensis*	0.5
Dolphin fish	*Mormyrus longirostius*	1.5
Polypterus	*Polypterus lapradi*	3
Polypterus	*Polypterus endlicheri*	10
Puffer	*Tetraodon fahaka*	0.8
Lusoso	*Distichodus maculates*	3
Sting ray	*Dasyatis margarita*	150
Lates	*Lates niloticus*	15
Giraffe nose	*Auchenoglanis occidentalis*	2
Megalops	*Megalops atlanticus*	20
Snake head	*Channa obscura*	0.4
Apple cat	*Synodontis eburnensis*	0.5
Megalops	*Megalops atlanticus*	20
Red tail tiger	*Hydrocynus goliathus*	15
Diamond fish	*Denticeps clupeoides*	1
Bagrus	Bagrus bayad	3
Knife fish	*Xenomystus nigrii*	0.5

Source: Field survey

Table 2: Total fish exported and their value in USD

Year	Total number of fish exported	Value in USD
2005	458563	212949.9
2006	1292259	711804.32
2007	1132286	662611.35
2008	97344	554959.35
2009	706195	487768
2010	919961	551976.6
2011	646967	388180.2
2012	484088	324694.75

Source: field survey.

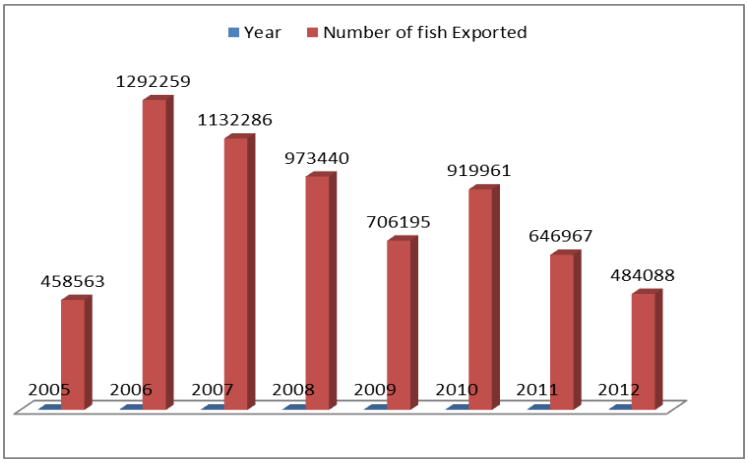

Fig. 1: a chart showing the export trend of ornamental fish in Nigeria between 2005 -2012

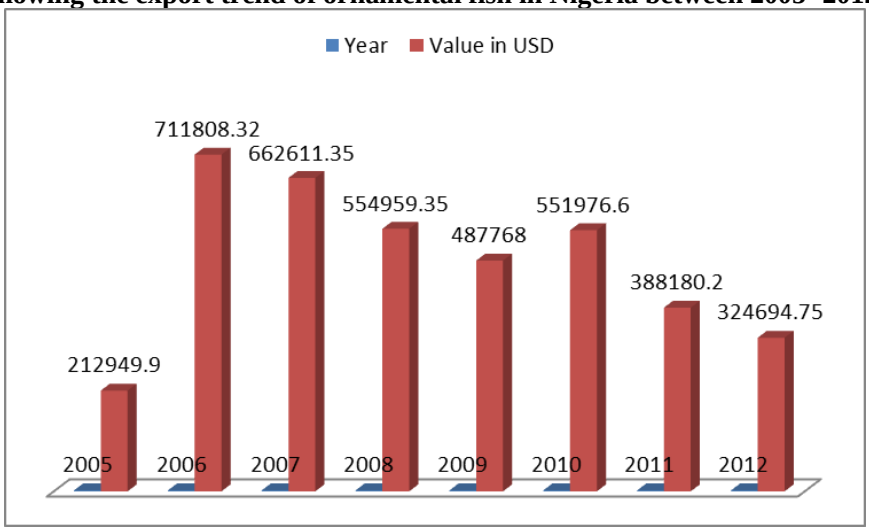

Fig. 2: a chart showing export trend of ornamental fish in terms of value in US dollar

Table 3: Annual Growth Rate and Compound Growth Rate

Year (%)	Annual Growth (%)	Compound Annual growth rate
2005-2006	234.3	12.85
2006-2007	- 6.91	- 1.01
2007-2008	- 16.25	- 2.49
2008-2009	- 12.11	- 1.82
2009-2010	13.16	1.77
2010-2011	- 29.68	- 4.88
2011-2012	- 16.36	- 2.50

4.0 CONCLUSION AND RECOMMENDATIONS

Ornamental fish industry is at its infancy and has enormous potential in Nigeria. There are huge deposits of both freshwater and marine ornamental products in the country. There should be proper monitoring of the exploitation

of wild fish and coral stocks for the aquarium trade so as to be able to conserve the country's natural resources. To expand the trade, new technologies will need to be developed in order to commercially breed rare species, as well as marine culture. Proper fish health management and quarantine regimes will also have to be adopted. Besides these, to achieve an ornamental fish industry which is sustainable, government should also take into care the interests and welfare of the stakeholders associated with the industry.

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POVERTY STATUS OF WOMEN IN RURAL FARMING HOUSEHOLDS IN IWO LOCAL GOVERNMENT OSUN STATE, NIGERIA

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Abstract
Poverty is prevalent among the rural populace with women, especially those in rural households being more vulnerable than men. This study examined the poverty status of the women in rural farming households in Iwo Local Government Area, Osun State, Nigeria employing the Foster-Greer-Thorbecke (FGT) approach. Data were collected from 120 household using multistage sampling procedure. The data was analysed using descriptive statics, FGT and logit regression analysis. Descriptive results revealed that majority of the respondents were middle-aged, non-literate, married, average household sized, experienced and small holders farmers and not member of credit association, FGT analysis showed that head count index, poverty gap index and poverty severity index were 0.580, 0.331 and 0.132 respectively, indicating a high level of poverty among the rural women. Logit regression results revealed that age and household size were negative determinants of the poverty, while household expenditure and farming experience were positive determinants of poverty. The study concluded that there is high level of poverty among the rural women, hence there is need to enhance the economic situation of the rural women through rural development policies that will empower them to have access to qualitative education, participate in credit associations, and build their capacity through skill training.

Keywords: Poverty status, rural households, FGT approach, logit regression, Osun state
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Introduction

World Bank (2007) defines extreme poverty as living on less than $1.25 (PPP) per day, and moderate poverty as less than $2 a day. It estimates that in 2001, 1.1billion people had consumptions levels below $1 a day and 2.7billions lived on less than $2 a day. A dollar a day, in nations that do not use the dollar as currency, does not translate to living a day on the amount of local currency as determined by the exchange rate. Rather it is determined by the purchasing power parity, which would look at how much local currency is needed to buy the same things that a dollar could buy in the United States.

Poverty in its most extreme form is a lack of human needs such as adequate and nutritious food, clothing, housing, clean water and health services (United Nations, 2010). Extreme poverty can cause terrible suffering and death, and even modest levels of poverty can prevent people from realizing many of their desires (World Bank, 2007). The world's poorest people are many of whom live in developing areas of Africa, Asia, Latin America and eastern Europe struggle daily for food, shelter, and other necessities (UNDP, 2003). They often suffer from severe malnutrition, epidemic diseases outbreaks, famine and war. In wealthier countries such as the United States, Canada, Japan, and those in Western Europe, the effects of poverty may include poor nutrition, mental illness, drug dependence, crime and high rates of diseases (Encarta 2009).

Human Development Report by UNDP (2005) revealed that Nigeria was rated as one of the poorest among the poor countries of the world, the Human Poverty Index (HPI) value was estimated at 38.8%. In 2005, the country was ranked 75th among 103 developing countries in the world. According to Fitch Report (2016) and United

Nation Development Programme (UNDP) 2016 indicated that the poverty level in Nigeria is on the rise andhas reached a peak of 72% in 2016. Past studies have argued that women are at the center of poverty (Moghadam, 2005; Buvinic and Gupta 1994; Buvinic et al, 1983 and Buvinic 1997). Women specifically find it more difficult, if not impossible, to have access to loans from financial institutions, in which their male counterparts can easily get the same help (World Bank, 2007). Buvinie, (1995) noted, this accounts for a disturbing global trend; the feminization of poverty. When the yardstick used to measure the degree of people's poverty is their level of well-being, women are traditionally found to be more impoverished than men (Buvinic (1997). This situation is worse in developing countries like Nigeria (World Bank, 2007).

Agriculture can be an important engine of growth for poverty reduction (World Development, 2008). However, the sector is underperforming in many countries in part because women, who are often a crucial resource in agriculture and the rural economy, face constraints that reduce their productivity (World Bank, 2003). Aggregate data show that women comprise about 43 percent of the agricultural labor force globally and in developing countries (FAO, 2011). Past studies indicated that in Africa, estimates of the time contribution of women to agricultural activities go up to 60-80 percent in some countries (Awotide *et al*, 2010; FAO, 2011; World Bank, 2003). Overall, the labor burden of rural women exceeds that of men, and includes a higher proportion of unpaid household responsibilities related to preparing food and collecting fuel and water (UNIDO, 2009).

The arising poverty among the rural populace in developing countries has retard economic development in this areas (UNIDO, 2010).The most vulnerable group in these regions are women and children (source). Women are often the most vulnerable since it is their responsibility to ensure children and family welfare (Awotide *et al*, 2010). It is a known fact that about 68% of the extreme poor are dependent on agriculture and lives in the rural background (World Bank, 1997; NBS, 2012).

Although several studies (Edoumiekumo *et al*., 2014; Olowa, 2012; Awe and Ojo, 2012 and Oyedepo, 2016have been conducted on poverty in Nigeria, only very few have examined the poverty status of women in rural farming households. This study seeks to determine the poverty status of women rural farming households in Nigeria using Iwo Local Government Area, Osun State Nigeria as a case study.

Methodology

The study was conducted in Iwo local government area of Osun State, Nigeria. Iwo local government area was purposively selected for the study being one of the largest local government areas in the state, with a high concentration of rural settlements (source). Data used in this study were obtained from primary sources. The data were collected with the aid of structured interview schedule. The interview schedule is structured with questions to collect information on socio- economic characteristics of the respondents and relevant information on poverty status of women in the rural farming households. The data was aggregated for statistical analysis.

Multi stage sampling procedure which involves the use of sampling techniques in stages of sampling was used in the study. The first stage involved the random selection of five (5) towns in the local government area. In the second stage, twelve (12) communities were randomly selected from the selected five (5) towns. Finally, ten (10) respondents were selected from each community making a total of one hundred and twenty (120) respondents as the sample for the study.

Data in this study were analyzed using descriptive and multiple regression statistics. The descriptive statistics that were employed include mean, frequency and percentages. This is used to describe socio-economic characteristics of the respondents. The P-alpha measure proposed by Foster et al. (1984) was used in analyzing poverty status of the women in the rural farming households. They include the head count index (P_o), poverty gap index (P_1), and poverty severity index (P_2). Following Foster et al. (1984), IFAD (1993) and UNIDO (2010), the formulae are given as;

$P_{\alpha i}^{1} = \frac{1}{\cap}\sum_{i=1}^{q}\left[\frac{(z-y)}{z}\right]^{\alpha}$ …….(1)

When α = 0, $P_0 = \frac{1}{\cap}\sum_{i=1}^{q}\left[\frac{(z-y)}{z}\right]^{0} = \frac{q}{n}$ …… Poverty Incidence or head count (2)

When α = 1, $P_1 = \frac{1}{\cap}\sum_{i=1}^{q}\left[\frac{(z-y)}{z}\right]^{1}$ …….....Poverty gap or depth (3)

When α = 2, $P_2 = \frac{1}{\cap}\sum_{i=1}^{q}\left[\frac{(z-y)}{z}\right]^{2}$ ……Poverty severity (4)

Where Z is the poverty line, defined as the two thirds mean per capital households monthly expenditure; q is the number of poor households while n is the total number of household; Y is the per capital expenditure of the nth household while α is the poverty aversion parameter. This takes the values 0 to 2 as shown above to mean poverty incidence, poverty depth/gap and poverty severity respectively.

The multiple regression technique was used to determine the significant variables affecting the poverty status of women in the rural farming households in the study area.
The explicit model that used in the study is expressed as:

$Y = b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e_t$
Where, Y represent poverty index for nth household.
X_1 represent farm size (hectares)
X_2 represents household size (number of people)
X_3 represents household income (₦)
X_4 represents household food expenditure (₦)
X_5 represents farming experience (years)
X_6 represents educational level (years)
X_7 represents gender of the household head
X_8 is age of the respondents in years
e_t represents the stochastic error term.
The coefficients b_1 to b_8 of the parameters of the model (X_1 to X_8) were estimated using the ordinary least square technique.

Results and Discussion
This section presents and discusses the results of descriptive, FGT, and inferential analysis carried out in the study.

Socio-economics characteristics of the rural women
The socio-economic characteristics considered in this study include age, educational status, marital status, household size, farm size, farming experience and membership of co-operative societies. The results of the descriptive analysis are hereby presented.

Age
Table 1 shows the distribution of the respondents according to their age. The table reveals that majority (54.17%) of the rural women are between the ages of 31-50 years, with a mean age of 44 years. This result implies that most of the rural women are middle aged and are still in their economically active years. They can be engaged in farm and non-farm income generating activities which may affect their poverty status.

Educational Status
The distribution of the rural women according to their educational status is shown in Table 1. Data in the table shows that most (70.00%) of the rural women had no formal education, while 17.50% and 8.33% of the rural women had primary and secondary education respectively. Only 4.17% of the rural women had tertiary

education. These results imply that there is a very low level of formal education among the rural women. This might deprive them of having access to information to improved farming techniques which may improve their productivity and income; making them more vulnerable to poverty.

Marital Status

The distribution of the rural women according to their marital status is shown in Table 1. The table shows that most (70.00%) of the rural women are married, 12.50% are separated, (7.50%) are widowed, 5.00% are single, while 5.00% are divorced. These results imply that the vast majority of the rural women are married and therefore, saddled with social and economic responsibilities which may affect their poverty status.

Household Size

Table 1 shows the distribution of the rural women according to their household size. The table reveals majority (97.50%) of the rural women have 1-10 persons in their household, while 2.50% of the rural women have 11-15 persons in their household. The mean household is 5 persons. These results imply that most of the rural women have an average sized household and may rely on hired labour for their farm and non-farm income generating activities which will adversely affect their income; and hence, their poverty status.

Farm Size

The distribution of the rural women according to their farm size is shown in Table 1. The table indicates that most (78.33%) of the rural women had their farm size in the range of 1-4 acres, while (18.33%) of the rural women had farm size ranging between 5 to 8 acres. The mean farm size is 3.6 acres. These results imply that most of the rural women are small holder farmers. The subsistence nature of their farming activities may limit their farm income, making them prone to poverty

Farming Experience

The distribution of rural women according to their years of farming experience is shown in Table 1. The table reveals that most (79.17%) of the rural women had been in farm business for 1 to 19 years, while 15.00% of the rural women had been farming for 20 to 29 years. The mean years of farming experience is 10.88years.The implication of these results is that most of the rural women had a vast experience in farm business, and therefore generate income from their farm to improve their poverty status.

Membership of Credit Institutions

Table 1 shows the distribution of the rural women according to their membership of credit institutions. The table shows that most (76.67%) of the rural women are not members of any credit institutions. Only (23.33%) of the rural women are members of credit institutions. The implication of this result is that they may not have access to farm credit for expansion of their farm and non-farm income generating activities which may adversely affect their poverty status.

Table 1: **Socio-economic characteristics of the rural women (n = 120)**

Variable		
Age	**Frequency**	**Percentage**
21-30	22	18.33
31-40	26	21.67
41-50	39	32.50
51-60	23	19.17
61-70	8	6.67
71-80	2	1.67
	Mean age = 44.00 years	

Educational status	**Frequency**	**Percentage**
No formal education	84	70.00
Primary	21	17.50
Secondary	10	8.33
Tertiary	5	4.17
Marital status		
Single	6	5.00
Married	84	70.00
Separated	15	12.50
Divorced	6	5.00
Widowed	9	7.50
Household size		
1-5	84	70.00
6-10	33	27.50
11-15	3	2.50
Household size mean = 5 persons		
Farm size (acres)		
1-4	94	78.33
5-8	22	18.33
9-12	3	2.50
13-16	1	0.83
Mean farm size = 3.6 acres		
Years of farming experience		
1-9	54	45.00
10-19	41	34.17
20-29	18	15.00
30-49	6	5.00
>50	1	0.83
Mean years of farming experience = 10.88 years		
Membership of credit institutions		
Non-member	92	76.67
Members	28	23.33

Source: Field Survey, 2017.

Poverty status of women in the rural farming households

One of the objectives of the study is to determine the poverty status of women in rural farming households in the study area. The results of the poverty line, poverty status and poverty indices are presented in this section.

Poverty line

The relative poverty index (RPI) approach was used to estimate the poverty line in the study. The poverty line was computed from the formula.

$$Fi = \frac{\text{per capital expenditure for the nth household}}{\text{2/3 per capital expenditure of all household}}$$

The value of poverty line was ₦3398.54 for this study. This result implies that any household with monthly expenditure below this value (₦3398.54) is classified as poor, while those with monthly expenditure above this value (₦3398.54) are classified as non-poor.

Poverty status

Table 2 shows the distribution of the rural women according to their poverty status based on the poverty line (₦3398.54). The table reveals that most (57.50%) of the rural women are poor with monthly mean expenditure of ₦2006.6 which is below the poverty line ((₦3398.54). while 42.50% of the rural women are non-poor, having a monthly mean expenditure of ₦9279.40 which is above the poverty line (₦3398.54). The total monthly mean expenditure of rural women is ₦5097.81.

Table 2: Distribution of the rural women according to their poverty status

Head count	Frequency	Mean (₦)	Percentage
Non poor	**51**	**9279.4**	**42.5**
Poor	**69**	**2006.6**	**57.5**
Total	120	5097.81	100.00

Poverty line = ₦3398.54
Source: Field Survey, 2017

Poverty indices
The results of FGT indices of poverty (head count, poverty gap and poverty severity) is presented in this section.
Poverty incidence (Head count)
The index shows the proportion of the rural women that are poor. Results in Table 3 indicated that the poverty incidence (Head count) is 0.58. This result implies that 58% of the rural women area below the poverty line of ₦3398.54.

Poverty Gap
Poverty gap measures the extent or depth of poverty. It measures how far the poor are below the poverty line. This poverty gap index for this study as show in Table 4 is 0.331. This shows that on average, every poor rural woman is ₦0.331 below the poverty line (₦3398.54). The product of this index and poverty line determine how much is needed to escape poverty for this study, ₦0.331 X ₦3398.54 = ₦1,125.59.This imply that every poor rural women in the study area needed ₦1,125.59 to escape poverty.

Poverty Severity
The poverty severity index measures the severity of poverty among the poor. It shows the poorer of the poor. The poverty severity index for this study as shown in Table 4 is 0.132. This result imply that every poor rural woman is ₦0.132 poorer that the poor rural woman above her.

Table 4: Poverty indices of the rural women

Indices	**Coefficient**
Poverty Incidence (Head Count)	0.58
Poverty Gap	0.331
Poverty Severity	0.132

Source: Field Survey, 2017

Multiple Regression Analysis
The results of multiple regression analysis to determine the factors influencing the poverty status of rural women in farming household in the study area is presented in Table 5. From the table, the coefficient of determination ($R^{2)}$ is 0.872 and F-statistics (184.50) is significant at 1% level, showing that the model used in the study has a good fit. The coefficient of household size (X_2) is negative and significant at 1% level. This implies that the larger the household size, the lower the level of poverty of the rural women. This is affirmed by the factthat larger household size is more likely to generate large income and, hence reduce poverty significantly. Similarly, the coefficient of age (X_3) is negative and significant at 10% level. The implication of this result is that the older the rural woman, the lower their poverty. These results can be attributed to the ability of older women to diversify and manage their household income and expenditure than younger women. However, the coefficient of

household expenditure is positive and significant at 1% level. The implication of this result is that the higher the household expenditure, the lower the level of poverty among the rural women.

In addition, the coefficient of farming experience (X_3) is positive and significant at 5% level, showing a direct relationship between the level of poverty among rural women and their farming experience. The implication of this result is that a rural woman with low farming experience tends to be poorer than rural woman with high farming experience. Finally, the coefficient of educational status (X_6) is positive and significant at 5% level. These imply that rural women with lower level of formal education are poorer than women with high level of formal education. This is affirmed by the fact that an educated rural woman tends to respond to training and innovations that will improve their farm income.

Table 5: Results of Multiple Regression Analysis

Variables	Coefficients	Standard Error	T-values	P>[t]
Constant	4868.778	981.584	4.960	0.000
Farm size (ha) (X_1)	-93.437	101.451	-0.920	0.359
Household size (X_2)	-641.535*	103.496	-6.200	0.000*
Household income (X_3)	-0.001	0.011	-0.850	0.397
Household expenditure (X_4)	0.212*	0.085	24.810	0.000*
Farming experience (X_5)	44.758	28.811	1.550	0.123* *
Educational level (X_6)	83.065**	35.185	2.360	0.020**
Age of respondents (x_8)	-40.548***	22.041	-1.84 0	0.068** *

R-squared = 0.879, Adjusted R-squared = 0.871, F = 184.50*
(*) significant at 1%, (**) significant at 5% and (***) significant at 10%
Source: Data Analysis, 2017.

Conclusion and Recommendations

Findings from the study revealed that the respondents were middle-aged, married, poor, illiterate, experienced small holder farmers, with average-sized household size. They are not members of co-operative societies or any other credit institutions. The significant determinants of the poverty status of the rural women were age, house hold size, household expenditure and farming experience.

The study concluded that there is high level of poverty among the rural women, hence there is need to enhance the economic situation of the rural women through rural development policies that will empower them to have access to qualitative education, participate in credit associations, diversify their sources of income, and build their capacity through skill training.

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ASSESSMENT OF CASSAVA PRODUCTION BY WOMEN FARMERS IN IWAJOWA LOCAL GOVERNMENT AREA OF OYO STATE

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Abstract
The study assessed cassava production by women farmers in Iwajowa Local Government Area of Oyo state. Systematic sampling technique was used to collect data from 157 respondents. Data collected were analyzed using frequency counts and percentage. The mean age of women cassava growers in the study area was 44 years. Majority (79.0%) had formal education ranging from primary to tertiary education. The mean acreage of land cultivated by the respondents was 4.8 acres. The respondents acquired land majorly by inheritance. Women cassava growers in the study area mostly (75.8%) hired labour for cassava production. Personal savings and cooperative societies were the two prominent sources of credit for investment in cassava production by the women cassava growers. Capital inadequacy and poor market were identified as the major constraints inhibiting women cassava growers' and productivity in the study area. Women cassava growers were producing cassava at relatively small scale considering the size of land cultivated and other production variables. Agricultural bank should be established in the study area to ease access to credit and timely disbursement of loan which is essential as a good intervention to break the vicious cycle of low productivity resulting from low investment.

Keyword: Assessment, cassava, production, woman and farmers.

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Introduction

Participation in cassava production and processing has no gender differentiation as both male and female are involved at all level of production, while females are mostly involved in the processing (Apata, 2019). Women are mostly marginalized and sidetracked in the scheme of things while much emphasis is being laid on men by interventions either from government agencies and non-governmental organizations (Apata *et al*, 2018). The peculiarity of women in productive activities necessitated having empirical investigation into their socio-economic parameters as they influence their access to farm inputs, access to capital for investments, and coping strategies against unfavourable weather conditions and other risks and uncertainties (Andreassen *et al*, 2018). Women in Nigeria face enormous challenges in agricultural production. Some of these challenges are those associated with their socio-economic variables while some have to do with environmental and institutional factors (Apata, 2019). Access to agricultural information on improved varieties, chemicals for controlling pests and diseases, needed information on marketing and accessibility of credit facilities from formal sources are prominent encumbrances facing by women cassava farmers (Okereke, 2013). Past studies argued that in Nigeria, women to a greater extent do not have equal access to production resources with their male counterpart (Ajala, & Gana, 2015).

Land as a key factor in cassava production has cultural bottleneck as lands are mostly bequeathed to man through inheritance, while women are mostly at the mercy of men to gain access to land acquisition and use (Okereke, 2013). The nightmarish situations in cassava production does not exclude the deplorable state of road network connecting rural with urban, this is responsible for the colossal loss of cassava tubers, as the level of deterioration is always fast during the first 48 hours of harvest (Darsono 2016). Akinagbe, (2010) classified the enormous challenges facing cassava producers as: agronomic, institutional technical and financial constraints. However, women in Nigeria face enormous challenges in agricultural production. Gender inequality has been a well-rooted

issue in Nigeria and most of African countries. Women are mostly involved in post harvesting operations, notably in processing and in all activities geared towards the removal of cyanides. However, development experts focused more on men when it comes to agricultural production at the expense of the immense contributions of women (Tell 2016). Cassava possesses a number of specific attributes, such as a high efficiency in carbohydrate production, and tolerance to drought and different soil qualities make cassava a very attractive crop. (Beeching, *et al* 1998).

It is evident that, production, processing and marketing of wealth derivable from cassava is under serious threat if the aforementioned production hindrances remain unchecked, and peculiar socio-economic parameters of women are not put into consideration by development experts in providing intervention packages to ameliorate the hindrances to production (Onwumere, 2010). In the consideration of the forgoing, it is inevitable to critically dissipate energy on various issues affecting production capacity of women engaging in cassava production in Iwajowa Local Government area of Oyo state. Consequently, the study examines the peculiar challenges to production and processing of cassava in the study. In addition, the study Identify the sources of inputs available to women cassava farmers and sources of credit available to women cassava growers in the study area

Methodology

The study was conducted in Iwajowa Local Government Area with its Headquarters at Iwere-ile. This local government is known for their large production of cassava and processing in Oyo state (Onyenwoke & Simonyan 2014). Iwere ile lies on latitude 8^{O} north and longitude 3 $^{0}5^{'}$E. It shares boundaries with Ibarapa North Local Government in the north, west by the Benin Republic. The major towns in the local government area includes: Iwere Ile, Ilaji Ile, Iganna, Elekokan, Ayetoro-Ile, Ijio, Itasa, Ilaja-ile,, Ofeegun, Tudi, Jokolo and Ayegun Wasinmin. It has an area of 2,529 km² and a population of 102,980 at the 2006 census. Systematic random sampling technique was used to obtain 157 women cassava growers from the list obtained from farmers association in the study area. Data collected through interview schedule were subjected to both descriptive and inferential statistics. The respondents were asked questions on their socioeconomic characteristics, sources of labour for cassava production, sources of inputs available to women cassava farmers in the study area sources of credit available to women cassava growers in the study area and perceived constraints to cassava production by women in the study area.

Results and Discussion

Socio-economic characteristics of women cassava growers

Table 1 reveals that the mean age of respondents to ne 44 years. This, thus implies that women cassava growers were in their active ages, with good vigour that can withstand the stress and energy demanding cultural operations in cassava production, this is owing to the fact that most of the cultural operations are carried out manually.it could be inferred further that with necessary impetus, the women cassava growers could go a long way in expanding their scope of operation thereby helping in fighting hunger and poverty that are seriously ravaging the developing country. It was further corroborated by Alabi, and Oviasogie (2005). Tthe women are within the economically active age group which has positive relationship and correlation with acceptance and adoption of innovations. Also, from the table, Cassava farmers that had no formal education accounted for 21.0% of all the total farmers while the remaining majority (79.0%) had formal education ranging from primary to tertiary education. This implies that respondents are relatively educated, which might have positive consequences on their capacity to exploit latent opportunities in the cassava mixed farming and also support them in the adoption of improved technologies.

Alabi, and Oviasogie (2005) opined that high literacy rate is capable of impacting positively on cassava output. From the study, the mean years of farming experience was 12. years. This implies that the farmers are well experienced in growing cassava. Ironkwe et al (2009) accentuated the significance of farming experience especially in risk management and guiding against some production uncertainties. From his submission, higher

farming experience of the farmers reduces management risks and crop failures. The mean farmers' household size of 7 people implies that cassava farmers in the study area have large household size. It is inferred that the large household size provides needed farm labour which is of immense contribution to household food security; nevertheless, it imposes a high economic cost burden on the members of the household. Though a large family size may constitute a social burden, larger families use their labour input to an advantage in farming. The mean acreage of land cultivated by the respondents was 4.8 acres.

However, 40.8%, 36.3% and 15.3% of respondents cultivated 4 -6, 1- 3 and 7- 9 acreage of land respectively. The implication is that women cassava farmers in the study area were operating on a small-scale level. Apata (2007) classified the farm sizes of 0.01-1.0ha, 1.1-2.0ha and above 2.0ha as small, medium and large farms, respectively. The study also revealed that the respondent acquired land for growing cassava through inheritance (49.7%), by implication, the women in cassava production were natives of the study area where they have access to land formally owned by their parents. Therefore, land is not a problem for agricultural operation in the study area which is contrary to the general belief about land and agriculture. From the table, it was also revealed that majority (69.4%) of the respondents were members of farmers' cooperative societies, this could be responsible for their ability to hire labour and cultivate a reasonable farm size in the study area

Table 1 Socio-economic characteristic of respondents

Variables	Frequencies	Percentages
Age		
21 – 30	31	19.7
31 – 40	29	18.5
41 – 50	48	30.6 mean age is 44 years
51 –60	23	14.6
61 –70	21	13.4
71 and above	5	3.2
Religion		
Christianity	67	42.7
Islam	59	37.6
Traditional religion	31	20.0
Marital status		
Single	21	13.4
Married	116	73.9
Widowed	11	7.0
Divorced	9	5.7
Educational status		
Informal education	12	7.6
Adult education	21	13.4
Primary education	29	18.5
Secondary education	38	24.2
Tertiary education	57	36.3
Household size		
1 –3	4	2.5
4 –6	54	34.4
7 –9	80	50.9 mean = 7 people
10 and above	19	12.1
Major occupation		

Farming	75	47.7
Civil service	27	17.2
Artisan	10	6.4
Trading	45	28.7
Years of experience in farming		
1 – 5	27	17.2
6 – 10	39	24.8
11 – 15	43	37.4 mean = 12.1 years
16 – 20	32	20.4
21 and above	16	10.2
Membership of cooperative society	109	69.4
Member	48	30.6
Non- member		
Method of land acquisition		
Land purchase	10	6.4
Leasehold	21	13.4
Inheritance	78	49.7
Communal holding	33	21.0
Rent	15	9.5

Source: field survey, 2018

Sources of labour for cassava production

Table 2 shows that women cassava growers in the study area mostly (75.8%) hired labour for cassava production, while family labour constitutes 19.7% of the labour used. This implies that women usually employ labour to carry out their faming activities considering energy sapping nature of farming which to greater extent put women in a disadvantage compared to their men counterpart. However, it was not surprising that their production capacity is relatively low culminating in low output as the growers depend mostly on hired labour and family members providing helping hands.

Table 2 sources of labour for cassava production

Sources of labour	Frequency	Percentage
Hired	119	75.8
Family	31	19.7
Self	7	4.5

Source: Field survey, 2018

Sources of inputs in cassava production

From table 3, it is apparent that most (83.4%) of the respondent self- sourced cassava stems used in the production of cassava from personal farms and that of friends and family members, while research institute and agricultural extension agency were rarely approached having 1.3% and 7.6% respectively. Ditto for fertilizer and other chemicals used, the farmers usually source for fertilizers by themselves, the implication is low productivity as a result of non-availability of fertilizers and improved cassava stems that would have enhanced the output of the farmers which would have enhanced improved standard of living, thereby breaking the vicious cycle of poverty.

Table.3. Sources of inputs

Sources of input	Frequency	Percentages
Cassava		
Research institute	2	1.3
Agric extension agency	12	7.6
Friends/relatives/personal farms	131	83.4
Local input market		
	12	7.6
Fertilizers and chemicals		
Research institute		
Agric extension agency	0	6.4
Friends/relatives	10	16.6
Self-sourcing	26	39.5
Local input market	62	37.6
	59	

Source: Field survey, 2018

Credit sourcing among women cassava growers

Table 4 revealed that, 42.0% of the respondents sourced for the fund for investment in cassava production through personal savings, while 32.5% patronized cooperative societies for credit for their farm operations. Friends and family members had 17.8% has their contribution in sourcing credit. From the forgoing, it is apparent that the personal savings is not enough for operation on a large scale, hence the low acreage being cultivated by the women farmers. Credit facility is an impetus for agricultural operation in order to move from small scale operation to large scale enterprise.

Table 4 credit sourcing among women cassava growers

Credit sources	**Frequency**	**Percentages**
Personal savings	66	42.0
Cooperative societies	51	32.5
Commercial banks	6	3.8
Friends and family	28	17.8
Agric Banks	0	0.0
Non-governmental organisation	6	3.8

Source: field survey, 2018

Constraints to cassava production by women cassava growers

From table 4.5, it was revealed that capital inadequacy (70.7%) was a major constraint the respondents in the study area, closely followed by poor market (42.7%) where cassavas were sold at give- away prices. Likewise, poor yield was said to be the constraint by 28.0% of the growers, this was made possible owning to lack of access to extension personnel, inadequate capital and lack of access to improved cassava stem

Table 5: Constraints to cassava production

Constraints	Yes	No
Land inadequacy	12(7.6)	145(92.3)
Capital inadequacy	111(70.7)	46(29.3)
Poor technical- know- how	45(28.7)	112(71.3)
No access to improved cassava stems	55(35.0)	102(64.9)
Poor market	67(42.7)	90(57.3)
Poor yield	44(28.0)	113(71.9)

Source: field survey, 2018

Conclusion

Based on the findings of the study, it was discovered that women cassava growers were producing cassava at relatively small scale considering the size of land cultivated and other production variables. Also, it was affirmed that land was not a hindrance to cassava production in the study area and giving necessary support to the women, there is a very high tendency to increase the acreage of land cultivated.

Recommendation

Considering the findings of the study upon which the conclusion was drawn, the following recommendations were considered necessary:

1. Agricultural bank should be established in the study area to ease credit facilitation which is essential as a good intervention to break the vicious cycle of low productivity resulting from low investment
2. Extension activities should be allowed to have a place in the study area so as to help the women cassava growers to help themselves
3. There should be an intensive involvement of all stakeholders in agricultural production to design a special package for women farmers in order to take good care of their peculiarities

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PROXIMATE COMPOSITION AND PHYTOCHEMICAL PROPERTIES OF *PARKIA BIGLOBOSA* (JACQ.)*R. BR. EX DON* SEEDS IN DERIVED SAVANNA ECOSYSTEM OF SOUTH-WESTERN NIGERIA

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Abstract

This study investigates the proximate composition and phytochemical properties of P. biglobosa seeds collected from three States (Osun, Ondo and Ekiti) in the derived savanna ecosystem of South-Western part of Nigeria. P. biglobosa seed samples were collected from ten trees with sufficient fruits and without visible insect damage or disease symptoms on agroforestry farms in six communities within the study area. The seeds were removed manually and milled into flour for analyses (proximate composition, phytochemical and antioxidant properties) using standard methods. The results revealed that there were no significant differences (p >0.05) in the the protein contents (37.31%-39.84%) of the seeds from the three states. Tannin content of P. biglobosa seeds from Ondo State (5.00g/100g) was significantly higher than those from Osun and Ekiti States. Alkaloid contents from the seeds ranged from (4.44 g/100g-4.90 g/100g) and it was observed that the phytate content of seeds from the states were significantly different. P. biglobosa seeds from Ekiti State were found to possess highest value of total phenol (27.44 g/100g) and total flavonoid (4.27 g/100g) while the sample from Ondo State exhibited highest vitamin C content (62.41 g/100g). The ability of the samples to scavenge DPPH radical was highest in Ondo State sample (78.35%) which may be attributed to the vitamin C content. The result is an indication that further studies should be carried out to investigate the application of seeds of P. biglobosa as an ingredient in functional foods.

Keywords*:* AntioxidantProperties, *P. Biglobosa*, Proximate Composition, Phytochemical Properties

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Introduction

Tropical forests provide ample goods and services; these mainly include timber and non-timber forest products (NTFPs). The non-timber forest products (NTFPs) play important roles in rural community around the world (Onyekwelu *et al.*, 2015). Examples of NTFPs include; *Blighia sapida (*K.D Koenig), *Parkia biglobosa* (Jacq.) R. Br. ex Don, *Garcinia kola (*Heckel), *Cola nitida* (Vent.) Schott, *Irvingia gabonensis* (Aubrey-Lecomte ex O.Rorke) *Ricinodendron heudelotti* (Baill.) and *Chrysophyllum albidum* (Linn) have provided domestic importance to rural and urban dwellers, with great export potentials (Nwoboshi, 2000). These NTFPs are highly valued by rural people and form part of their daily diet. They could be essential sources of proteins, vitamins and minerals thus making them nutritionally important (Sacande and Clethero, 2007).

Parkia biglobosa, commonly known as African locust beans, is an important multipurpose tree and one of the most common species of the parkland agroforestry system (Onyekwelu *et al.*, 2015). The importance of *P.*

biglobosa to human livelihoods had been reviewed (Kalinganire, *et al.*, 2008; Teklehaimanot, 2007). The seeds are rich in protein and usually fermented to a

tasty food condiment called *'iru' or 'dawadawa'* which is used as a flavour intensifier for soups and stews and also adds protein to a protein-poor diet (Dike and Odunfa, 2003). However, the use of African locust bean seeds and other legumes as protein source is limited by the presence of anti-nutritional factors, which cause poor protein digestibility and are capable of precipitating other deleterious effects (Esenwah and Ikenebomeh, 2008).

Recent studies have shown that the leaf, seed and bark of *P. biglobosa* are possess some phytochemicals and exhibited antioxidant properties (Adaramola *et al*., 2013; Komolafe and Oyelade, 2015). *P. biglobosa* is an important woody plant used in traditional medicine (Olorunmaiye *et al*., 2011). The roots, barks, leaves, stems, flowers, fruits and seeds of *P. biglobosa* are used medicinally to treat a range of ailments, including diarrhoea, ulcers, pneumonia, burns, coughs and jaundice (Sacande and Clethero, 2007). In addition, Akoma *et al*., (2001) revealed that, the fruit pulp of *P. biglobosa* is sweet to taste, which indicates the presence of natural sugar and thus, a potential energy source. It also possesses an attractive yellow colour revealing the presence of carotenoid and sour taste which shows the presence of ascorbic acid (Gernah, *et al*., 2007).

However, little scientific information is available on proximate composition and phytochemical properties of *P. biglobosa* as influenced by seeds collected from different geographical locations within the derived savanna ecosystem of Southwest, Nigeria. Therefore, the determination of proximate composition, antioxidant and phytochemical properties of the seeds across geographical locations where there are abundance of the trees and fruits are essential in order to ascertain variation that may exist in their chemical constituents.

Materials and Methods

Sample collection

The samples were collected from three States (Osun, Ondo and Ekiti States) in the derived savanna ecosystem in Nigeria and purposively selected for abundance of the trees and availability of fruits. The sample trees used for this study were selected using multi-stage sampling technique. One local government area (LGA) was selected from each of the states and two towns were picked from the selected LGA. Samples were collected from ten *P. biglobosa* trees in each of the selected communities (making a total of 60 trees) with sufficient fruits and without visible insect damage or disease symptoms.

Sample preparation

The fruit pods were split open and the pulp washed with water to extract the seeds. The extracted seeds were washed with distilled water and sun-dried. The seed samples were finely milled into flour with the aid of a mechanical blender and sieved using 25 mm sieve prior to chemical analyses.

Determination of proximate composition of Parkia biglobosa seeds

The moisture, crude protein, crude fat, fibre and ash contents were determined according to the method of Association of Official Analytical Chemists (2005). Carbohydrate content was calculated by difference method described by Pearson (1976).

Determination of phytochemical properties of Parkia biglobosa seeds

Tannin content determination

0.2 g of finely ground sample was weighed into a 50 ml sample bottle. Ten milliliters of 70% aqueous acetone were added and properly covered. The bottles were put in an ice bath shaker and shaken for 2 h at 30^0C. Each solution was then centrifuge and the supernatant stored in ice. 0.2 ml of each solution was pipetted into the test tube and 0.8ml of distilled water was added. Standard tannic acid solutions were prepared from a 0.5 mg/ml of

the stock and the solution made up to 1 ml with distilled water. About 0.5 ml of Folin Ciocateau reagent was added to both samples and standard followed by 2.5 ml of 20% Na_2CO_3 the solution was then vortexed and allowed to incubate for 40 min at room temperature. Its absorbance was read at 725 nm against a reagent blank. Concentration of the same solution from a standard tannic acid curve prepared (Makkar and Goodchild, 1996).

Oxalate content determination

Oxalate was determined by soaking 1g of the sample in 75 ml of 1.5M H2SO4for 1h and then filtered through a No 1 Whatman filter paper. 25 ml was taken out of the filtrate and poured inside a conical flask and this was titrated hot about (80-90^{o}C) against 0.1M $KMnO_4$ until a pink colour that persist for 15 sec was attained (Day and Underwood, 1986).

Saponin content determination

The spectrophotometric method of Brunner (1994) was used for saponin determination. Two grams of the finely ground sample was weighed into a 250 ml beaker and 100 ml of Isobutyl alcohol was added. The mixture was shaken for 5 hours to ensure uniform mixing. The mixture was filter with No 1 Whatman filter paper into 100 ml beaker containing 20 ml of 40% saturated solution of magnesium carbonate ($MgCO_3$). The mixture obtained was again filtered though No 1 Whatman filter paper to obtain a clean colourless solution. 1 ml of the colourless solution was taken into 50 ml volumetric flask using pipette while 2 ml of 5% iron (III) chloride ($FeCl_3$) solution was added and made up to the mark with distill water. It was allowed to stand for 30 minutes for the colour to develop. The absorbance was read against the blank at 380 nm.

Phytate content determination

Phytates were determined according to the method used by Ramadan (2012). 4g of sample was soaked with 100 ml of 2% HCl for 3 hours and then filtered through a No 1 Whatman filter paper. 25 ml was taken out of the filtrate and poured inside a conical flask and 5 ml of 0.3% of ammonium thiocyanate solution was added as indicator, after which 53.5 ml 0f distilled water was added to give it the proper acidity and this was titrated against 0.00566 g per milliliter of standard iron (III) chloride solution that contained about 0.00195 g of iron per ml until a brownish yellow colouration persist for 5 minutes.

Determination of alkaloid content

The alkaloid content was determined gravimetrically using the methods of Harbone (1984). Five grams of each sample was weighed and dispersed into 50 ml of 10% acetic acid solution in ethanol. The mixture was then allowed to stand for about 4 h before it is filtered. This was filtered and extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide was added drop wise in order to precipitate the alkaloids. A pre-weighed filter paper was used to filter off the precipitate and washed with 1% ammonium hydroxide solution. The weight of the alkaloid was expressed as a percentage of the sample weight analyzed.

Determination of antioxidant properties of Parkia biglobosa seeds.

Vitamin C content determination

Vitamin C content of the aqueous extract of sample was determined using the method of Benderitter et al., (1998). Two gram of dinitrophenyl hydrazine (DNPH; 230 mg thiourea and 270 mg CuSO4.5H2O in 100ml of 5 M H2SO4) was prepared and 75 µl of it was added to 500 µl reaction mixtures [300µl of the aqueous extracts and 100 µl of 13.3 % trichloroacetic acid (TCA)]. The reaction mixture was subsequently incubated for 3 h at 37°C, then 0.5 ml of 65% H2SO4 (v/v) was added to the medium and the absorbance was measured at 520 nm.

Determination of total phenol content

The total phenol content of the methanol extracts of *P. biglobosa* was determined using the method reported by Singleton *et al*. (1999). Appropriate dilutions of the extracts were oxidized with 2.5 ml of 10% Folin Ciocalteau's reagent and neutralised by 2.0 ml of 7.5% sodium carbonate. The reaction mixture was incubated at 45°C for 40 mins, and the absorbance was measured at 765 nm with the JENWAY Model 6305 UV-Visible spectrophometer (Barlworld Scientific, Dunmow, United Kingdom). The total phenol content was calculated using Gallic acid as standard.

Determination of free radical scavenging capacity (DPPH TEST)

The free radical scavenging ability of the methanol extracts of *P. biglobosa* against DPPH (1, 1- diphenyl-2picryhydrazyl) free radical was evaluated as described by Hutadilok-Towatana *et al.,* (2006). An appropriate dilution of the extract (1 ml) was mixed with 1 ml of the 0.4 mM methanolic solution containing DPPH radicals. The mixture was left in the dark for 30 min before measuring the absorbance at 516 nm. The DPPH free radical scavenging ability was calculated with respect to the reference (which contains all the reagents without test sample). Free radicals scavenging ability was expressed as percentage (%) inhibition:

$$(AA\ \%) = \frac{\text{absorbance of control} - \text{absorbance of extract}}{\text{absorbance of control}} \times 100 \quad (2)$$

Determination of flavonoid

The ethyl acetate precipitation method was used by Bohm and Kocipai-Abyazan (1994). Five grams of sample was hydrolyzed by boiling in 100 ml of 2 ml of hydrochloric acid solution for about 35 min. The hydrolysate was filtered to recover the extract (filtrate). The filtrate was treated with ethyl acetate drop wise twice until in excess. The precipitated flavonoid was recovered by filtration using a weighed filter paper. After drying in the oven at 100°C for 30min, it was cooled in a desiccator and reweighed. The difference in weight gave the weight of flavonoid which was expressed as a percentage of the weight of sample analyzed.

Methods of data analysis

Data were subjected to analysis of variance (ANOVA). Comparison of means was carried out by Duncan's multiple range tests. Statistical analysis was performed using the Statistical Package for Social Sciences package (SPSS 16.0). All experiments were determined in triplicates and means ± SE were calculated from triplicate determination.

Results and Discussion

Proximate compositions of P. biglobosa seeds

The proximate compositions of *P. biglobosa* flour across the states are presented in Table 1. The protein contents were 41.88% for Ekiti State, 43.19% in Ondo State sample and 47.38% for seeds collected from Osun State. Appiah *et al*. (2012) reported values lower than 49.69% in condiments but higher than the values (33.64%) for raw seeds (Ijarotimi and Keshinro, 2012). The protein contents of the seed supported earlier submissions of Yusuf *et al*. (2007) that, *P. biglobosa* is a major source of plant protein and fat. It is a reliable source of nutrient used in combating protein deficiency among the rural poor in Nigeria. The fat content of seed samples differs significantly among the state, with 20.46% from Ondo State, (18.07 %) from Ekiti State and (16.60 %) from Osun State.

Table 1: Proximate composition (Mean ± SE) of *P. biglobosa* seeds (%dwb)

Sample	Osun	Ekiti	Ondo
Protein	47.38±0.54^{a}	41.88±1.14^{c}	43.19±0.56^{b}
Fat	16.60±0.50^{c}	18.07±0.15^{b}	20.46±0.29^{a}
Ash	6.04±0.16^{b}	6.77±0.08^{a}	5.62±0.35^{b}
Fibre	10.73±0.23^{b}	10.15±0.13^{b}	11.10±0.09^{a}
Carbohydrate	19.15±0.23^{b}	20.96±0.78^{a}	20.25±0.65^{ab}

Mean values with the same superscript in a row are not significantly different (P > 0.05). Each value is a mean of three replicate ±SE.

Similarly, the ash content of the Ekiti State sample (6.77%) was higher than those of Osun and Ondo States (6.04% and 5.62%), respectively. The ash content of *P. biglobosa* (5.62%-6.77%4 -) among the states was within the range of some legumes (2.00% in peas and 5.00% in *Glycine max* (Onyekwelu *et al.*, 2015). The fibre contents of samples from both Osun and Ekiti States (10.73%; 10.15%), respectively were lower and significantly different ($p < 0.05$) when compared with the sample from Ondo State (11.10 %). The crude fibre was found to be lower than the value (18.00%) reported by Gernah et al. (2007*)*. Crude fibre is a source of dietary fibre which is essential for good bowel movement and helps to prevent obesity, diabetes, cancer of the colon, reduce level of cholesterol in the body in order to minimize risks of cardiovascular diseases and another ailment of the gastrointestinal tract of human (Okaraonye and Ikewuchi, 2009; Onyekwelu *et al.*, 2015). The values obtained for protein, fat, moisture and ash contents from this study were similar to the values reported by Elemo *et al*. (2011).

Phytochemical properties of P. biglobosa seeds

Table 2 revealed the phytochemical properties of the *P. biglobosa* seed obtained from the trees across the study area. The result indicated that there were significant differences in the phytochemical properties of the seeds among the States except for alkaloid content. It was observed that the seeds possessed high level of phytate compared with other phytochemicals. The concentration of the phytate was lowest in the sample from Osun State (6.86 g/100g), followed by seeds from Ekiti State (8.24 g/100g) and highest in seeds from Ondo State (9.61 g/100g).

Table 2: Phytochemical properties (g/100g**) of *P. biglobosa* seeds (**g/100g**)**

Properties	Osun	Ekiti	Ondo
Tannin	2.71±0.02^{b}	2.91±0.01^{b}	5.00±0.02^{a}
Alkaloid	4.45±0.15^{a}	4.44±0.26^{a}	4.90±0.10^{a}
Oxalate	1.40±0.03^{b}	1.60±0.03^{a}	1.57±0.03^{b}
Phytate	6.86±0.27^{c}	8.24±0.48^{b}	9.61±0.27^{a}
Saponin	2.67±0.01^{a}	2.04±0.01^{b}	2.16±0.17^{c}

Mean values with the same superscript in a row are not significantly different (P > 0.05). Each value is a mean of three replicates ± standard error.

The presumed anti-nutrient effect of phytic acid may be more relevant to developing nations where diets are relatively deficient in micronutrients. On the contrary, in developed nations like the United States, where the diet is predominantly meat-based and relatively well balanced in terms of micronutrients, phytic acid consumption is considered beneficial to public health (Bohn *et al*., 2008). In addition, phytic acid (inositol hexakisphosphate) has been proposed as a novel protective treatment for Alzheimer's disease (Anekonda, *et al.*, 2011). Alkaloid content was between 4.44 g/100 g and 4.90 g/100 g. Some common alkaloids are caffeine, nicotine, quinine, cocaine, and morphine. Alkaloids have been demonstrated to have microbicidal and antidiarrheal effect, which is probably due to their effects on transit time in the small intestine (Nkwocha, *et al.*, 2014). Alkaloids are known for their toxicity but not all alkaloids are toxic. Alkaloids have been reported to inhibit certain mammalian enzymatic activities such as, phosphodiesterase, which prolongs the action of cyclic adenosine monophosphate (Nkwocha, *et al.*, 2014). The values recorded for tannin concentration in *P. biglobosa* seeds from Ondo State were found to be significantly higher than those from Osun State (2.71 g/100g) and Ekiti State (2.91 g/100g).

The tannin contents of the seeds from Osun and Ekiti States were within the range reported by Ijarotimi and Keshinro (2012) for the raw seeds (2.10 g/100g). Tannin relevant to grazing ruminants has been reported to contribute to prevention of bloat and the suppression of internal parasites (Hoste *et al.*, 2006). Also, tannin belongs to polyphenol group which has been reported to act as antioxidant by preventing oxidative stress that causes diseases such as coronary heart diseases, some types of cancers and inflammation (Tapiero *et al.*, 2002). The saponin content of the sample among the States was 2.67 g/100g for Osun, Ekiti (2.04 g/100g), and Ondo State (2.16 g/100g). This showed that the saponin content of *P. biglobosa* was not as high as that of soybean (2.20-5.83 g/100g) as reported by MacDonald *et al.*, (2005). Clinical studies have suggested that saponin affect the immune system in ways that help to protect the human body against cancers and also lower cholesterol levels. Saponin decrease blood lipids, lower cancer risks, blood glucose response.

In addition, a high saponin diet can be used in the inhibition of dental caries and platelet aggregation, in the treatment of hypercalciuria in humans, and as an antidote against acute lead poisoning (Shi *et al.*, 2004). Oxalate content of the seeds from Ekiti State (1.60 g/100g) was statistically different from those obtained from both Ondo (1.57 g/100g) and Osun (1.40 g/100g) States. The oxalate content in this study was lower (3.57g/100g) than that reported for raw *Parkia biglobosa* seeds (Ijarotimi and Keshinro, 2012) and *Synsepalum dulcificum* pulp (5.67 g/100g) by (Nkwocha, *et al.*, 2014). Variations may be due to differences in climate, soil quality, state of ripeness and may be caused by the different methods used for measuring oxalate in food (Ijarotimi and Keshinro, 2012).

Antioxidant properties of P. biglobosa seeds

The mean total phenol content of *P. biglobosa* seeds varied from 20.56 GAE/ml in Osun State to 27.44 GAE/ ml in Ekiti State and higher than flavonoid content of seeds (2.81% - 4.27%). A variety of phenolic compounds such as flavonoids, anthocyanins, flavan-3-ols and phenolic acids present in Australian fruits have been found to contribute to antioxidant activity (Netzel *et al.*, 2007). Results further showed that raw *P. biglobosa* seeds possessed very high vitamin C content of 62.41 mg/g in Ondo State sample, 42.66 mg/g in Osun State seeds and 41.02 mg/g from Ekiti State. Polyphenol antioxidants are abundant in the diet and have the potential to prevent diseases caused by oxidative stress, including neuro-degenerative and cardiovascular diseases, cancer, and stroke (Wang and Brumaghim, 2011). The ability of the seeds to scavenge free radicals of DPPH was highest (78.35%) in *P. biglobosa* seeds from Ondo State, followed by 67.91% in Osun State sample and least (57.03%) from Ekiti State seeds.The antioxidant properties exhibited by phytochemicals from plant is achieved by preventing the production of free radicals or by scavenging free radicals produced in the body (Oboh *et al*., 2007).

Table 3: Antioxidant properties of *P. biglobosa* seeds

Antioxidant properties	Osun	Ekiti	Ondo
Total phenol (GAE/ml)	20.56±0.07^{c}	27.44±0.15^{a}	22.04±0.01^{b}
Vitamin C (mg/g)	42.66±0.19^{b}	41.02±0.20^{c}	62.41±0.25a
DPPH (%)	67.91±0.25^{b}	57.03±0.15^{c}	78.35±0.41^{a}
Total flavonoid (%)	2.81±0.25$_{b}$	4.27±0.20^{a}	3.20±0.19^{b}

Mean values with the same superscript in a row are not significantly different (P > 0.05). Each value is a mean of three replicates ± standard error.

Conclusions

Research findings obtained from *P. biglobosa* seeds investigated in this study supported the earlier findings that the raw seed is rich in protein and phytochemicals. Considering the differences in the chemical constituents of the seeds from different geographical location investigated in this work, *P. biglobosa* seed from Ondo State was found to possess tannin, alkaloid, phytate and vitamin C at levels significantly higher than other samples. In addition, the seed from Ondo State demonstrated highest radical scavenging activity which may be attributed to variations in climate and soil quality.

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SOCIOECONOMIC EFFECTS OF DOMESTIC REMITTANCES ON EXPENDITURE PATTERN OF RURAL HOUSEHOLDS IN OSUN STATE, NIGERIA

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Abstract

Migration, which is defined as the movement of people over defined space and time, is an occurrence that has been part of humans from creation, with remittances as its reward. This study examined the channels, utilization and effect of domestic remittances on expenditure shares of rural households in Osun State Nigeria. Multistage sampling procedure was used to select 259 rural households using structured questionnaire to obtain data from the respondents. Data were analyzed using descriptive statistics and Heckman regression model. Findings revealed that 55% of the household heads were male, 76% were married, 41% had primary education and 55% were recipients of domestic remittances with a mean age and household size of 55 years and 5 persons respectively. Personal delivery (59%) was the main channel by which beneficiaries received their remittances. Remittance utilization was mainly on farm investments (28%), housing (19%), health (14%) and education (13%). Heckman model revealed that increase in the proportion of remittance would improve education ($p > 0.01$), health ($p > 0.05$) and farm investments ($p > 0.01$), but will probably reduce budget share to food in the households. In conclusion, remittances increased expenditure on education, health and farm investment of households in the study area. The study recommended that continuous flow of remittances into rural households should be enhanced in order to facilitate more productive utilization and investment of remittances.

Keywords: Budget Share, Domestic Remittance, Expenditure, Heckman Model and Rural Households

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Introduction

Humans have been on the move in the quest to exploit new resources and socio-economic opportunities for the wellbeing of humans. Also, humans have also been compelled to change place from their usual or initial place of residence in the face of environmental, social, economic and political shocks to another destination (EPInA, 2014). According to Ikwuyatum (2012) people migrate in search of 'safe heaven' where their safety is significantly assured. Migration as argued by past study as a process, involves the relocation of people from current place of residence and/or to a new destination (Castles, 2012). The extent of relocation must be between six months and one year before it can be classified or defined as a migration process. When the migration process occurs within national boundaries of country, it is referred as internal migration and when it occurs across national border and/or boundaries, it is referred to international migration (Castles, 2012).

Remittances, as a source of income are referred to as unrequited transfer sent by migrant workers back to relatives in their countries of origin (Ratha, 2007). Remittances (both international and internal often called domestic) are defined as person-to-person transfers of resources (both money and in-kind) sent by migrant workers to other members of the households. (Castles, 2012)). Remittances are well targeted to the needs of the recipients, who are often poor, and do not typically suffer from the government problems that are associated with official aid flows. As reported by Dilip and Sanket **(**2008), remittances are personal flows from migrants to their families and friends. Remittances can be in form of money, assets or informal or non-monetary forms. Non-monetary

forms include clothing, medicine, gifts, tools and equipment. Remittances can form a "family welfare system" that can help to smooth consumption, alleviate liquidity constraints and provide a form of mutual assistance (Orozco *et al*., 2005). There is evidence that remittances alleviate poverty at household level in some countries by helping to fund schooling, reduce child labour, increase family health and expand durable ownership (World Bank, 2006).

In the 2014 survey on Access to Financial Services in Nigeria, it was reported that 26.3 million adults (28.1percent of the 93.5 million adults) received money from family/friends within Nigeria, 17.5 million adults (18.7percent) sent money to family/friends within Nigeria and 10.4 million adults (11.1percent) both sent money to and received money from family/friends within Nigeria. (EFInA, 2014). The survey also revealed that 50.7percent (13.3 million) of the 26.3 million adults that reported having received money from within Nigeria were female while 49.3percent (13.0 million) were male. Furthermore, about 8.1 million (30.8percent) were between 18 and 25 years of age, 14.1 million (53.7percent) resided in rural areas compared to 12.2 million (46.3percent) that resided in urban areas (EFInA, 2014).

Remittances have been recognized as an important driver of the economy of most developing countries. It plays vital roles in poverty reduction, income redistribution and economic development, especially in rural areas. In Nigeria, as in most developing countries, remittances form a large part of the income of rural households (Akay *et al*, 2012; Olowa, et. al., 2013). Remittances are believed to have huge impact on the socio-economic conditions of families (Babatunde and Martinetti, 2010). Econometric analysis and household surveys suggest that unrecorded flows through informal channels may add 50percent or more to recorded flows. Including these unrecorded flows means that remittances are larger than foreign direct investment flows and more than twice as large as official aid received by developing countries (Ratha 2005).

Remittances are seen to be more significant in low-income countries and is one of the least volatile sources of foreign exchange earnings for developing countries during the 1990s (Ratha 2005, World Bank, 2008). Globally, remittances have been reported to have overtaken income from agriculture in sheer size and importance (Deshingkar and Anderson, 2004), as persistent socio-economic and structural problems continue to depress the level of rural wages and availability of work (Deshingkar and Anderson, 2004). Remittances are received under imperfect information, uncertainty and with different regularity (Seshan, 2012; Chami *et al*., 2005); therefore, households' remittance perception is not straightforward. Although poverty implications of remittances have been analyzed in different developing countries, relatively little is known about the its effect on household expenditure share among rural households.

Studies on impact of remittances on household expenditure in Nigeria have focused more on household housing investments in Eastern part of Nigeria (Osili, 2004) but did not address the other categories of expenditure and the peculiarities of the rural sector. It may be interesting to see as well whether households receiving remittances make unnecessary spending such as vices and luxuries or invest them in education, housing and health, however no recent studies in this area has included these expenditure categories in research. To bridge this gap, this study included an assessment of the impacts of remittances on expenditure pattern of rural households using micro-level household survey data. Consequently, this study attempted answering the following research questions: what are the channels and forms of domestic remittances received by the rural households and what is the influence of domestic remittance on rural household expenditure pattern in the study area? Specifically, the study aims to identify and describe the channels and utilization of domestic remittances received by the rural households, as well as, examines the impact of domestic remittances on expenditure pattern of the rural households.

Methodology

The study was carried out in Osun State which is landlocked and occupies 9,251 square kilometers. It shares borders with Kwara State to the North, Oyo State to the West, Ogun State to the South and Ondo and Ekiti States to the East. The coordinates of the State is located within latitudes $7^0$30'N $4^0$30'E and longitudes 7.500^{0}N

4.500^{0}E. It has a land area of 8,882 square kilometer, with a total population of 4,137,627, consisting of 1,740,619 males and 1,682,916 females (NPC, 2006). The climate is entirely tropical with two district seasons; the rainy and dry season. The State ecological features provide opportunity for various crops and cropping patterns. Tree crops such as cocoa, kola, citrus and oil palm are cultivated while arable crops such as maize, yam, rice, cassava, tomato and pepper are also cultivated. The primary occupation of the people in the state include farming, handcraft, and trading, hunting and paid employment.

Method of Data Collection, Sampling procedure and Sample size

Primary data were collected from selected households was used for this study. Multistage sampling procedure was adopted in this study, firstly, simple random sampling technique was used to select Ife-Ijesha and Iwo ADP zones each from the three OSADEP zones in Osun State, secondly three blocks were randomly to capture 50 percent of each zone, thirdly a simple random selection of four cells from the randomly selected blocks was carried out and the final stage involved a simple random sampling of fifteen households from each of the selected to give a total of 360 respondents but responses from only two hundred and fifty nine (259) respondents were valid for the data analysis for this study. The response rates

Method of Data Analysis

The analytical tools employed for this study include Descriptive Statistics and Heckman Regression Model. The Heckman (1976) two-step estimator, also known simply as the Heckman was adopted for this study. In the first step, a Probit expressed in equation 1 is estimated for participation in each expenditure category as follows:

$$P^*_{hi} = f(\delta' X_h) + u_{hi} \quad (1)$$

where:

$P_{hi}= 0$ if $P_{hi}* \frac{e_{hi}}{E_h} \leq 0$

$P_{hi}= 1$ if $P_{hi}* \frac{e_{hi}}{E_h} > 0$

In equation 1, P_{hi} is the latent variable governing the decision of a household participating in expenditure on good i. That is the dependent variable in each Probit is equal to 1 if $e_{hi}>0$ and zero otherwise; $X_h$is a vector containing E_h, $Z_h$and R_h;δ is a vector of parameters to be estimated.

The Probit model is then used to calculate a set of Inverse-Mills ratios as Stated for equation 2:

$$IMR_{hi} = \phi(\delta' X_h) / \Phi(\delta' X_h) \quad (2)$$

where:

IMR_{hi} denotes inverse mills ratio

$\phi(\delta' X_h)$ denotes the standard normal density function

$\Phi(\delta' X_h)$ represents the cumulative normal distribution function.

In the second step, the Inverse-Mills ratios are included as right-hand-side variables in the corresponding expenditure equations to correct for self-selection bias. In this second stage, the key dummies (such as remittance-receiving) in vector R_h is replaced with the key variables (such as remittance) included as shares in total income. Thus, this system of equations has the form:

Equation 3

$$\frac{e_{hi}}{E_h} = \alpha_i + \beta_{1i} X_h + \beta_2 R_{hr} + \beta_{4i} IMR_{3i} + u_{hi} \quad (3)$$

where:

$\frac{e_{hi}}{E_h}$= the share of household's expenditure on good i,(h_{i1}- h_{i7})

h_1 = Expenditure share on Education (ratio)

h_2 = Expenditure share on Health (ratio)

h_3 = Expenditure share on Food (ratio)
h_4 = Expenditure share on Farm investment (ratio)
h_5 = Expenditure share on Housing (ratio)
h_6 = Expenditure share on Clothing (ratio)
h_7 = Expenditure share on others (ratio)
X_h = Independent variables (Socio-economic variables i.e. X_1, X_2, X_3 …X_n):-
X_1 = Age of the household head (years).
X_2 = Age Squared of the household head (years).
X_3 = Marital status of the household head (X_3 = 1 If married, 0 if otherwise).
X_4 = Sex of household heads (X_4 = 1 if Male, 0 if otherwise).
X_5 = Household size (number of persons).
X_6 = Education level of household head (years).
X_7 = Farm size (hectares).
X_8 = Remittance access (X_9 = 1 if yes, 0 if otherwise)
X_9 = Distance to nearest food market (Km)
X_{10} = Distance to modern clinic (Km)
X_{11} = Access to motorable road (X_{12} = 1 if yes, 0 if otherwise)
X_{12} = Off-farm participation (X_{13} = 1 if yes, 0 if otherwise)
X_{13} = Rearing of small livestock asset (X_{14} = 1 if yes, 0 if otherwise)
R_{hr} = Remittance Income (₦).
$\frac{e^*hi}{E_h}$ = as previously defined.
i = 1, 2, 3, ……., 7.
In this second stage, the remittance-receiving dummies in vector R_h, is replaced with the remittance variables included as shares in total income.

Results and Discussions
Table 1 shows the distribution of the respondents according to their remittance categories, which revealed that 54.8percent of the total households were remittance receiving households (RRHHS), while 45.2 percent were not receiving any form of domestic remittances (NRHHS).

Table 1: Distribution of Respondents by Remittance Receipt

Category	Frequency	Percentage
RRHHS	142	54.8
NRHHS	117	45.2
TOTAL	259	100.0

Note:RRHHS = Remittance Receiving HouseholdsNRHHS = Non-Remittance Receiving Households

Further findings from the study area revealed that over half (55.2percent) of the respondents were male, within the age range of 51- 60 years (57.9percent), 41.0percent had completed primary school, 75.7percent were married, with average household size 5.0 persons (Table 2).

Table 2: Distribution of Respondents by Household Structure

Household structure	Frequency	Percentage
Age (years) (Mean = 55)		
30 – 40	7	2.7
41 – 50	47	18.1
51 - 60	150	57.9
61 – 70	52	20.1
71 and above	3	1.2
Educational level (years)		
No Formal education	35	13.7
Primary school (uncompleted)	17	6.6
Primary school (completed)	105	41.0
Secondary school	48	18.8
Vocational training	54	19.9
Sex of household head		
Male	143	55.2
Female	116	44.8
Marital Status		
Married	196	75.7
Separated/Divorced	59	22.8
Widowed	4	1.5
Farm size (Ha)		
<1.0	209	81.0
1.0 – 2.0	40	15.0
2.1 – 3.0	10	4.0
Household size		
1-4 persons	105	40.5
5-8 persons	145	56
Above 8 persons	9	3.5
Mean	5.01	-
Total	**259**	**100.0**

Source: Results of Data Analysis, 2017

Channels through Which Remittances Are Received by the Rural Households.

Remittances were sent to the households through various channels to the study area. Most (58.4percent) of the respondents received their remittances during visitation of the member living in another location to the household and 9.86percent through friends or relatives. (Table 3)

Table 3: Distribution of Households by Channels of Receipt of Remittances.

Channels	Frequency	Percentage
Brought Back Home during visits	98	58.45
Through Friends or Relatives	14	9.86
Transfer to personal bank account	11	7.75
Others	19	13.38
TOTAL	**142**	**100.0**

Source: Results of Data Analysis, 2017

Findings also revealed that domestic remittances received are put into diverse uses by the recipients. 28.2percent of remittances were used on farm investment, 19.0percent on housing, 13.0percent on education, 12.6percent on other uses and as low as 9.2percent and 7.2percent on clothing and food respectively. This implies that the major

cash remittances received by the households were usually spent on their farm holdings to boost their farming enterprises. (Table 4)

Table 4: Distribution of Respondents According to Utilization of Remittances.

Uses	Frequency	Percentage
Food	9	6.34
Education	18	12.68
Health	20	14.08
Farm Investment	40	28.17
Housing	27	19.01
Clothing	10	7.04
Others	18	12.68
TOTAL	142	100.0

Source: Results of Data Analysis, 2017

Determinants of Rural Household Expenditure Pattern

The first stage of the Probit result is shown on Table 5a & 5b while the second stage; Heckman result for rural household expenditure shares for Osun State is presented on Table 6a & 6b.The first stage as shown on Table 5, which informed the participation stage revealed that receipt of remittance by rural households in Osun State, has the probability to improve education ($p > 0.01$), health ($p > 0.05$) and farm investments ($p > 0.01$), but will probably reduce budget share to food in the households. The result of the second stage (Table 6) revealed that, age squared had negative relationship on food, farm investment and clothing budget of households in Osun State. This means that as age of household head increases by one year, the budget share on food, farm investment and clothing reduce by the households, while marital status showed a negative influence on education (-.0150), and positive influences on food category (0.146), housing share (0.153), clothing (0.117) and other forms of expenditure share (0.214).

Sex had a positive significance on education share and food share which were significant at 10 and 1 percent respectively, meaning that the more the household heads that are females the more they will increase their budget allocation towards education and food within the households. In terms of household size, the result showed that an increase in the household size reduces budget share on education (-5.132) and farm investment (3.125), while there is a positive increase in health category (3.125), food share, (3.042), housing (1.018) and others forms of budget expenditure (2.264).

Education showed significant influence on the expenditure shares. As years of education increases, budget share on education (1.013), food (0.018) and others (2.017) increases, whereas it showed an inverse relationship with the budget share on clothing. This suggests a tradeoff between what is spent on education and food compared to that of clothing. All things being as more is spent on education and food, this reduces the share that goes into clothing (-0.051).

Increase in farm size showed an inverse relationship with the expenditure share on food (-1.530) and a positive relationship on share on farm investment (0.156). This implies that as farm size increases more is spent on farm investment and less on food share. This suggests that Osun State rural households pay more attention on their farm investments as their farm size increases. Furthermore, the results show that the budget share on education (0.049) health (0.070), farm investment and others responded positively to increases in remittance income significant at least at 1 percent level, while remittance income also had a negative relationship with the budget share on food (-0.018). This implies a tradeoff between what is spent on education, health, farm investment and other forms of expenditure compared to that of food, that is, that all things being equal as more is spent on education, health, farm investment and other categories, the share that goes to food reduces with respect to increase in remittance income (Table 6 -10).

Table 6: Stage One Result for Determinants of Expenditure Pattern

Variables	Education		Health		Food		Farm Investment	
	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	T
Age	0.129	1.10	1.542	1.65	0.201	1.00	1.038	1.45
Age Squared	0.011	1.23	0.005	1.19	-0.015**	-2.29	-0.102**	-2.01
Marital status	-0.100*	-1.97	0.093	-1.36	0.140**	2.05	0.351	1.51
Sex	0.800*	1.68	0.110	0.34	1.210***	3.03	0.019	0.10
Household size	-3.187**	-2.25	2.120**	2.08	2.105***	2.57	-3.023***	-3.21
Education	1.017**	2.01	-0.090	-1.21	1.020**	2.31	-0.256	1.66
Farm size	0.109	0.28	-1.245	-0.38	-1.239***	-3.01	0.168**	2.14
Remittance Access	0.052***	2.61	0.95**	2.31	-0.015**	-2.39	0.565***	3.05
Distance to modern clinic	0.067	1.18	1.029*	1.83	1.019	1.12	0.657	0.69
Distance to market	-0.245	-0.47	0.319	1.19	1.340**	2.44	0.029	1.09
Access to motor able road	0.134*	1.98	0.122	0.41	-0.075	-0.30	0.291	1.59
Off-farm participation	1.300**	2.17	1.017	1.62	0.545*	1.86	0.085	0.17
Rearing of small livestock	1.325**	2.06	1.04	0.50	0.375**	2.10	1.169***	2.80
Constant	19.42***	9.03	12.17***	5.95	15.81***	9.21	13.10***	4.59
Pseudo R^2	0.458		0.439		0.462		0.470	
Obsv.	259		259		259		259	

Source: Results of Data Analysis, 2017

***, **, * coefficients are significant at 10percent, 5percent and 1percent respectively

Table 7: Stage One Result For Determinants Of Expenditure Pattern (Continued)

Variables	Housing		Clothing		Others	
	Coeff.	t	Coeff.	t	Coeff.	t
Age	1.053	1.37	0.127	1.17	1.024	0.23
Age Squared	0.204	1.62	-0.112**	-2.41	0.010	0.03
Marital status	0.145*	1.99	0.210	1.63	0.228*	1.98
Sex	0.568	1.53	0.039	1.45	1.021	1.51
Household size	1.102**	2.01	1.065	1.28	1.322**	2.45
Education	0.315	1.51	0.069	0.97	1.104*	1.96
Farm size	0.016	1.17	0.073	1.35	0.167	1.10
Remittance Access	0.096	1.42	1.034	1.64	1.100**	2.13
Distance to modern clinic	0.176	1.49	0.100	1.35	0.118	1.32
Distance to market	0.120**	2.19	0.034	1.59	0.028*	1.99
Access to motorable road	0.081	1.15	0.439	1.01	0.065	1.54
Off-farm participation	0.047	1.02	0.010	0.08	0.124**	2.00
Rearing of small livestock	0.072	1.39	1.012	1.67	1.003*	1.90
Constant	28.19***	6.72	18.56***	9.21***	15.03***	7.03
Pseudo R^2	0.543		0.409		0.502	
Obvs.	259		259		259	

Source: Results of Data Analysis, 2017
***, **, * coefficients are significant at 10percent, 5percent and 1percent respectively

Table 8: Stage Two Result of the Heckman model for Osun State.

Variables	Education		Health		Food		Farm Investment	
	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t
Age	0.430	1.02	1.043	1.69	0.165	1.02	1.023	0.91
Age Squared	0.002	1.07	0.003	1.17	-0.001**	-2.39	-0.025***	-2.72
Marital status	-0.150**	-2.01	-0.099	-1.45	0.146**	2.22	0.275	1.51
Sex	0.804*	1.66	0.105	0.23	1.169***	3.12	0.015	0.09
Household size	-5.132***	-2.30	3.123**	2.25	3.042***	2.69	-3.125***	-3.34
Education	1.013**	2.05	0.089	1.16	0.018**	2.39	-2.138	-1.63
Farm size	0.110	0.29	-1.236	-0.35	-1.530***	-3.02	0.156**	2.01
Prop.Remt.Tot.Incm	0.049***	3.21	0.070	2.73	-0.018**	-2.30	0.021***	3.23
Distance to modern clinic	-0.052	-0.10	1.391	1.70	-1.152	0.76	0.563	0.37
Distance to market	-0.243	-0.17	0.317	1.16	1.253**	2.43	0.017	0.08
Access to motorable road	-0.124	-0.17	-0.102	-0.35	-0.073	-0.08	0.342	1.57
Off-farm participation	1.253**	2.12	1.123	1.64	0.433	1.70	0.076	0.12
Rearing of small livestock	1.312**	1.102	1.102	0.47	0.352**	2.17	1.155***	2.82
Inverse Mills Ratio	-1.298 *	-2.32	-1.998**	-2.14	-0.057**	-2.00	-1.254***	-2.96
Constant	-36.55	24.32	19.47	10.457	58.457	25.19	-29.14	-10.43
R^2	0.476		0.311		0.350		0.551	
Obsv.	259		259		259		259	

Source: Results of Data Analysis, 2017
***, **, * coefficients are significant at 10percent, 5percent and 1percent respectively

Table 10: Stage Two Result of the Heckman model for Osun State (continued).

Variables	Housing		Clothing		Others	
	Coeff.	t	Coeff.	t	Coeff.	t
Age	0.054	0.97	0.087	0.37	1.034	0.23
Age Squared	-0.013	-0.72	-0.104**	-2.55	0.003	0.001
Marital status	0.153*	1.90	0.117*	1.89	0.214*	1.97
Sex	0.356	1.49	0.040	0.39	1.221	1.43
Household size	1.018**	2.04	1.054	0.25	2.264***	2.52
Education	0.376	1.47	-0.051**	-2.07	2.017*	1.89
Farm size	0.021	0.14	0.065	1.27	0.149	0.90
Prop.Remt.Tot.Incm	0.042	0.39	0.377	1.52	1.263***	2.94
Distance to modern clinic	0.056	1.49	0.097	1.43	0.115	1.28
Distance to market	1.010**	2.11	0.028	1.60	0.023*	1.97
Access to motorable road	-0.002	-0.00	0.501	0.57	0.053	1.52
Off-farm participation	0.033	0.28	0.007	0.08	0.038**	2.02
Rearing of small livestock	0.067	0.34	0.047	0.89	0.075	0.79
Inverse Mills Ratio	-0.783 ***	-3.33	-2.856 **	2.31	-0.167	-0.20
Constant	23.59	10.52	-11.36	8.95	-31.04	-9.52
Pseudo R^2	0.6728		0.5602		0.3431	
Obvs.	259		259		259	

Source: Results of Data Analysis, 2017

***, **, * coefficients are significant at 10percent, 5percent and 1percent respectively

Conclusion and Recommendation

From this study it can be concluded that utilization of domestic remittances was mainly to improve farm investment. Also increase the flow of domestic remittances significantly increased the standard of living of the rural households. In terms of allocating more to education, health, housing and clothing which are the basic essentials of life. Hence the following recommendations are suggested; with a large number of internal remittances in this study which are mostly dependent on hand carriage to remit, there is need to ensure and enhance more formal flow of remittances in order to improve the security for this mode of transfer and since remittances have become important sources of income for the rural households, there is the need to put in place policies that will encourage uninterrupted flow and more productive utilization and investment of domestic remittances.

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ECONOMETRICS OF INCOME DISTRIBUTION AMONG FARMING HOUSEHOLDS IN KWARA STATE, NIGERIA

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Abstract:
Incidence of poverty among Nigerians kept on growing in spite of all the laudable programmes and interventions that have been put in place by the governmental and non-governmental agencies to alleviate poverty in the country. It was against this background that this study examines the initiative of analyzing poverty status and income distribution among farm households in Kwara State. Data were collected through the use of questionnaire from respondents. Data were analyzed by descriptive statistics, Gini coefficient and poverty decomposable index. Findings revealed that the mean households' size is 7 persons which are large enough to attract high dependency burden, the mean age of the respondents is 58 years, most (91.70%) of the respondents had formal education. The result further showed Gini coefficient of 0.19, indicating a low level of inequality in income distribution which suggested homogenous population of the farm households. Theil T (26.7%) of the total inequality is contributed by the overall income while Theil L which measures the mean log deviation indicated 30% of total inequality was contributed by total income. In essence, other factors apart from income contribute more to total income inequality. Decomposing the Gini coefficient, the contribution of agriculture to total inequality was highest (3.271) while secondary economic activities contributed the least in negative effect. It is good to note that agricultural income is highly unequally distributed. Therefore, secondary economic activities which have greater potential impact on income distribution should be encouraged.

Keywords: Incidence of poverty, income distribution, income decomposition, primary income, primary occupation.
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Introduction

The pattern of income distribution has been a concern to economist (Clarke et al, 2003). Measures of poverty focus on the situation of individuals or households who find themselves at the bottom of the income distribution, typically this requires information about the mean level of (say) income as well as its distribution (Gottschalk and Smeeding, 2000). Measuring and the understanding of the level, causes and development of income inequality have received increasing attention (Fuentes-Nieva 2014). Researches in the 1990's witness a significant shift from the most focused research area of economic growth and convergence in Gross Domestic Product (GDP) per capita across countries to identify factors influencing the distribution of income, and analyzing income distribution and its development over a period of time (Heshmati, 2004). This shift in focus is specifically from the divergence of per capita to the long-term equalization or polarization of incomes across regions or countries, (Quah, 2002). This shift does not only affect the section of technological change but also raised human capacity in order to create growth and wealth. Also, as a matter of intense awareness of growing disparity, there is series of calls for analyzing different aspects of income inequality such as its measurement, decomposition and factors influencing income inequality (Heshmati, 2004).

In Nigeria, off and non-farm incomes represent an important element in the livelihood of few poor (World Bank, 1999). In several areas, increasing population density and the rapid rate of natural resources depletion have made it difficult for agriculture to remain the only or even the main source of income of rural households in many areas of the country. Following this, it safely said that under development of rural non- farm sector may, in part explain the increase in the level of poverty in rural Nigeria (Awoyemi, 2004). Income inequality can be harmful to economic growth and development of a country. In one of the macroeconomic objectives, equity in distribution of income and wealth among the citizens is a priority to the government. This act shows the importance and necessity of income inequality or decomposition.

According to Addison and Cornia (2001) in their study, they prove an existing relationship between income inequality and poverty. Therefore, a careful study of decomposition of income distribution among farm households gives insight

into the incidence of poverty and its reduction. Ogbeide (2015) indicated that economic crisis has widened the gap between the rich and poor largely on the fact that economic growth has not been fairly shared. The work examines the different causes linked to growing inequalities, such as changes in redistribution and policy fashion, globalisation and technological change. It also assesses the effectiveness of social and labour market policies in tackling poverty and high inequalities. OECD makes use of dedicated statistical database to benchmark and monitor income inequality and poverty across countries.

This database is usually updated from time to time as a matter of the importance and increasing debate on income inequality and poverty in policy discussion. The term income is known as disposable income of a household in a particular year. This income is in form of earnings, capital income, self-employment and public cash transfers less the income taxes and social security contributions paid by households. In measuring income inequality, five indicators are involved, which include Gini coefficient and S90/S10, among others. The poverty rate is measured as the ratio of the population (in a given age group) that the income falls below the poverty line; taken as half the median household income of the total population (FGT, 1984). In 2007, the official poverty rate was about 12.5 percent and this has increase to about 15.0 percent in 2012. Child poverty rate witness an upsurge from 18.0 percent in 2007 to about 21.8 percent in 2012. In ranking, this current poverty rates for the entire population and for the children was among the poorest over the period of 13 years (i.e., both are ranked 11th).

Nigeria Economic Report, documented by the World Bank shows that poverty in the country has been reduce contrary to the 2010 estimate of the National bureau of statistics (NBS), which shows that the proportion of people living in extreme poverty increases from 51.6% in 2004 to about 62% in 2010. This comprehensive national household survey was argued to have underestimated the consumption level of the people. In more recent household survey conducted by the NBS in 2011 and 2013, the world bank posited that poverty in Nigeria has lowered to 33.1% in 2013 from 35.2% in 2011, compared with 61.2% calculated using the questionable survey. This new poverty estimates are lower than the average for Sub-Saharan Africa. About half of the wealth in the world is owned by few among the population, specifically just about one per cent. In the countries where economic inequality has been on the increase in the last 30 years is where we found out several people lives.

The World Economic Forum has recognized economic inequality as one of the most important risk to human progress which impacts social stability within countries and poses threat on security in a global scale (Fuentes-Nieva, 2014). The accumulation and control of economic resources by small population escalate the problem in political and economic system and even add to other form of inequalities especially the one between men and women. In the study of Ogbeide and Agu (2015) indicated the cordial existence of an economy like Nigeria is under a threat due to prevalence of poverty and issues surrounding inequality. These issues have continually received attention of researcher and policy makers in different economies of the world. However, literatures have made clear the existing gap between poverty and inequality and the causal relationship between them. Few studies have established causal relationship between poverty and inequality in Nigeria. This study will add to literature on causality between poverty and inequality in Nigeria. There is an unswerving line of causality between poverty and inequality indicated by unemployment and low life expectancy. The objectives of the study are to: determine key earning capacity and livelihood diversity of the farm households and level of income inequality among respondents.
Moreover, given that annual income is required for a satisfactory measure of living standards, as income-based measure requires multiple visits or the use of recall data, whereas as consumption expenditure measure can rely on expenditure over the previous few weeks (Deaton, 1997). In view of the foregoing, an attempt was made to collect data on both household income and expenditure.

Methodology

This study was carried out in Kwara State, Nigeria. The state is located in the North Central zone of the country. It lies between latitudes 7045'N and 9030'N and longitudes 2030'E and 6035'E. With a population of about 2.37 million (NPC, 2006), the state is made up of four zones – A, B, C and D, with sixteen Local Government Areas (LGAs). The people of the state comprise the Yoruba, Fulani, Nupe and Baruba. Agriculture is the mainstay of the people of the state with over 80 per cent of the population living in rural areas [National Bureau of Statistics (NBS), 2005].

Data Collection and Sampling Procedure

Primary data were used for this study. This involves multistage sampling technique. The Multi-stage random sampling technique was adopted in data collection. The first stage involves purposive selection of Kwara Agricultural Development Zone because of the existence of arable crop farming among the smallholder farmers in the area. The second stage involves random selection of Six out of the sixteen LGAs (Local Government Areas) The third stage involved random selection of two communities from each of the chosen six LGAs making a total of twelve villages. Finally, a proportionate sampling of about 1.23% of smallholder farmers was drawn from each village making a total of one hundred and fifty-two (152) respondents used for the study.

These farmers were selected from the list of households who were into smallholder arable crop production provided by the Agricultural Development Programme (ADP). Incomes earned are both in cash and in-kind data are used in the study. So therefore, household consumption of crops and livestock produced are given monetary value based on prevailing market prices. There is an increasing need to focus on expenditure rather than income as an indicator of poverty status in poverty studies in Nigeria. This is because; measuring consumption expenditure, especially in rural households whose incomes came largely from self-employment in Agriculture. (Aigbokhan, 2000, Awoyemi, 2004).

Analytical techniques

Descriptive statistics were employed to illustrate the socio-economic characteristics, demographic patterns of the farm households and to show the importance of both non-farm employment and broad pattern of participation in non- farm opportunities across different groups of the population. Other analytical techniques used included FGT poverty indices, coefficient of variation and Gini coefficients of income inequality.

Income Inequality Measures.

The most widely used single measure of inequality is the Gini Coefficient which is based on Lorenz curve, a cumulative frequency that compares that distribution of a specific variable (e.g., income) with the uniform distribution that represents equality.

The formula below was used to construct the Gini Coefficient, cumulative percentage of expenditure (or income on the vertical axis. Gini Coefficient was measured following Morduch and Sicular (2002), where incomes are ordered so that $Y_1 < Y_2 < \ldots < Y_n$. Gini coefficient was computed as;

$$\text{Login}(y) = 2 \sum_{n2\,\mu}^{i=1}{}^{n} \binom{-n+1}{2} y_1 \qquad (1)$$

Where n is the number of observations, μ is the mean of the distribution, is the income of the ith household. This measure of income inequality conforms to the Pigou- Dalton transfer principle, principle of population, income scale independence and anonymity or symmetry but in the area of decomposability axiom, it fails especially if the sub-vectors of income overlap. However, several authors and researchers have recorded the success of decomposition of Gini Coefficient.

(b) Generalised entropy measures of inequality agreed with all the six criteria that make a good measure of income inequality. Gini coefficient was used to measure income inequality. While Theil indexes which are the family of generalized entropy inequality measures were used and the general formula was computed as: -

$$\text{GE}(\alpha) = 1/\alpha(\alpha 1/= \ 1/\text{N} \sum_{i=1}^{n} \left(\frac{yi}{Y}\right) \alpha - 1 \qquad (2)$$

Where y is the mean income, the values of GE measures vary between 0 and ∞, with zero representing an equal distribution and higher value representing a higher level of inequality. The parameter a in the GE class represents the weight given to distances between incomes at different parts of the income distribution and can take any real value.

Theil's T index GE(1) was computed as GE(1) = $\text{GE}(1) = \ 1/\text{N} \sum_{i=1}^{n} lin \left(\frac{yi}{Y}\right)$ (3)

while Theils L index GE(0) was the mean log deviation computed as $\text{GE}(0) \ = 1/\text{N} \sum_{i=1}^{n} \left(\frac{yi}{Y}\right)$

GE is an index to captured income variation.

c. Decile dispersion ratio: - a simple and widely used measure of inequality which presents the ratio of the average consumption of income of the richest 10 percent of the population divided by the average consumption of income of the bottom 10 percent was used.

The Decomposition of Income Inequality by Sources of Income

(a) Coefficient of Variation (CV) indicated that total income(Y) consists of income from K sources (Shorrocks 1982b and Oyekale *et al.*, (2004). The variances of each of the sources of income σ^2i and the covariance between sources of income σ^2ij can be expressed as equal to variance of total income. CV was used to measure the strength and stability of the data.

$\sigma 2 = \Sigma\sigma_I + \Sigma\sigma_{ij}$. The contribution of the ith source of income to household's total income variance comprises of jth income variance and part of the covariances allocated to the ith source of income. This can be expressed as: $\sigma 2 = \Sigma\sigma iy$ Furthermore, the decomposition corresponding to the coefficient of variation can be further expressed as:

$$\sum W_1C_1=1 \quad (4)$$

$W_1 = \mu_1/\mu$

$C_{1=}$

Where: $w_1$ci= factor inequality weight of the ith source in overall inequality. = mean of income from ith source. = mean of total income from all sources. ci = relative concentration of the ith source in overall inequality. = correlation coefficient between the ith source and total income.

Decomposition Based on Gini Coefficient

Following Pyatt et al., (1980), the Gini -Coefficient can be decomposed as follows:

$$G = 2\frac{COV(Y,r)}{n\,\mu}$$

Where n is the number of observations, Y is the series of total income and r is the series of corresponding ranks. The Gini Coefficient of the ith source of income - can be expressed as

$$G_1 = 2\frac{COV(Y,r)}{n\,\mu 1})$$

Where Yt and ri refer to the series of income from the ith source and corresponding ranks respectively. Since total income is the addition of all source incomes, the covariance between the total income and its rank can be written as the aggregate of covariances between each source income and rank of total income. The total income Gini can then be expressed as a function of the source Ginis. $G_1 = 2\frac{COV(Y,r)}{n\,\mu} = R_1G_1$

= Where R_1 is the correlation ratio expressed as : $R_1 = \frac{COV(Y,r)}{Y,r}$ Where cov (Y,r) is the covariance of total income and corresponding rank respectively and cov (Y. ri) the covariance of income and corresponding tank

Multiple regression model.

Multiple regression model was used to measure the cause and effect (causality) of factors influencing income variation among respondents.

$Y = X\beta + e$

Where Y is the income variation

X are the independent variables

B are the coefficients

E = error terms

Suppose an income equation is defined as: Y = X+ Where Y is the per capita income in Naira and X is an n x m matrix of independent variables with the first column given by the n vector ei= (1,1,—1). More specifically, the following variable specifications were proposed.

X_1 = Age of respondents in years,

X_2 = Sex of household,

X_3 = Number of persons in the household,

X_4 = Marital status of house head,

X_5 = Years of education of household head in years,

X_6 = Total number of hours of household worked per week in hours,

X_7 = Wage employment dummy (1 for wage employment, 0 otherwise),

X_8 = Farm activities dummy (1 for farmers, 0 otherwise),
X_9 = Nonfarm activities (0 for farm activities, 1 otherwise),
X_{10} = Location dummy (urban 1, 0 otherwise),
X_{11} = Distance to the nearest city (km),
X_{12} = Distance to the nearest market (km),
X_{13} = Amount of credit obtained in naira,
X_{14} = Secondary occupation dummy (1 for yes,0 for no),
Ordinary Least Square Method (OLS) was used as estimation technique.

***Incidence of poverty by major occupations*.**
In an attempt to answer the question of whether the movement to nonfarm occupation is reducing or not, the link between occupation and poverty was examined. At another stage of analysis, the results will be drawn to show how and to what extent participation in secondary economic activities contributed to rural poor's income. Foster - Greer - Thorbecke (FGT) (1984) poverty indices was used for each of the major income - source categories.

FGT can be expressed as;

$$P\alpha = \frac{I}{N}\sum_{I=1}^{q}\left(\frac{Z-Yi}{Z}\right)^{\alpha} \quad (5)$$

Where n is the total population (households), q is the number of households with income below the poverty line; z is the poorest household and $\propto$ is a poverty aversion parameter to be chosen in line with a society's sensitivity to deprivation and where $\propto = 0, 1$ and 2. In this study, the absolute poverty line was adopted. Here, the poverty line was defined as one half of the median income. After all, all poverty lines retain an element of arbitrariness. (Lanjouw, 2000, Awoyemi, 2004).

Results and Discussion
Socioeconomic characteristics of the respondents
The size of household could provide important information on the income decomposition and poverty level. According to Awoyemi, (2004), evidence abound pointing to the fact that poor people tend to live in small size households while non poor tends to live in large size households. This in turn could be explained in terms of dependency burden and of number of mouths to feed, which are often associated with household size. The modal household size group is 4-7 persons, large enough to attract high dependency burden, the more a household gravitates towards poverty status and vice- versa. The age of farmer is an important factor influencing the level of output especially in the peasant economy, which is characterized by high labour requirement. Respondents whose age fell within 41 and 65years made up the bulk of the practicing farmers in the study area. They constituted 56.7% of the respondents. Those whose age fell between 41 and 50 were in modal age range of 34.2% followed by 51-65 years having 32.5%. This was quite understandable if one recollects that most people become rightful owners of farmland when their parents have died or transferred the land to them as a result of incapability to manage them due to old age. The uneven distribution had 24.2% of respondents with age bracket 15-40 years.

Table 1: Socioeconomic characteristics of the respondents

Variables	Frequency	Percentage
Household Head (Gender)		
Male	102	88%
Female	18	12%
Household Head(Age)		
15-30	2	1.7%
31-40	27	22.5%
41-50	41	34.2%
51-65	39	32.5%
Above 65	11	9.2%
Household Head Education		
No formal education	22	18.30%
Primary education	31	25.85%
Secondary education	36	25.85%
Tertiary education	31	25.85%
Household size		
1-3	9	7.5%
4-7	60	50%
8-10	30	28.3%
11-14	10	8.33%
Above 15	7	5.83%
Marital status		
Single	6	5%
Married	104	86.7%
Divorce	4	3.3%
Widow	6	5%
Total	120	100%

Source: Field Survey, 2018

It is a widely accepted fact that the gender relations largely determine household security, well-being of members, livelihood diversification and poverty level. For instance, for a long time, women in Africa have been placed under stress by the gap between their income responsibilities and their access to resources. This in turn is believed to have fee to the feminization of poverty. The study seeks to investigate how gender-based differences in access to resources influence how different members of households participate in secondary economic activities

It was found out that majority of farm household heads were male representing 82.5% of the total population, 16.7% were married, 3.3% were divorcee while the singles and widowed were both 5%. The benefits derivable from group action suggest that when man and woman work together, they stand a better chance of success than when each works as an individual. The underlying economics of it ensures spreading of risks among embers, pool of sources and other factors, which could bring about positive synergistic effects on the level of production and earning capacity. The Table also showed that 18.3% of the respondents had no formal education, 25.85% had only primary education, 30.0 % had secondary education only while 25.85% of the respondents had tertiary education.

Inequality Measures the Gini Coefficient

For overall income of household heads in Kwara State is computed as 0.19. This shows a low level of inequality in income distribution exists, which suggests that poor income category (homogenous population), dominates the farm households. The results of the Generalized Enthropy measures as in Table 2 show that when higher weight is given to distances between income distributions. It takes value of 0.3001 with weight of 2. This is 30% which was generated from the results of Gini - Coefficient of homogeneity in the farm household population. Using Theils T, 26.7% of total inequality is contributed by the overall income while in Theils L which measure the mean log deviation, 30.0% of

total inequality was contributed by the total income. In essence, other factors apart from income contribute more to total income inequality. Also, the Decile Dispersion Ratio of income of the rich to the poor is 41.81%.

Table 2 Inequality Measures

Variable	Value	Percentage
Gini (Total income	0.1895	18.95
Generalized entropy (α =0)	∞	∞
(α =1)	∞	∞
(α =2)	0.3001	30.01
GE(1)Theils	0.267	26.70
GE(0)Theils L	0.3001	30.00
Decile Dispersion Ratio	41.81	41.81

Source: Field Survey, 2018

This shows that the income gap between rich and poor has not widened in farm household despite the low returns to agricultural production and income generally.

Income function of respondents

This involves the use of regression - based methods of distribution by income source. The lead equation was selected based on magnitude of the coefficients of multiple determination, the significance /contribution of the explanatory variables to the distributional changes as adjudged by the F-value, the significance of the t-value and appropriateness of the signs and value of the regression coefficients in line with a-priori expectation. Based on the above-mentioned criteria applied in the regression analysis of income changes due to changes in the variables, the exponential functional form was chosen as the lead equation. The functions are expressed in Table 4 below. The result shows that seven coefficients of the explanatory variables are significant and that any change in any of the variables results in change in income. Positive effect is established by age of respondents, sex, years of education, farming activities and credit availability while non-farming activities and location of the farm are observed to have negative effect. It is evident from the income function results that there seems to be low productivity of labor in economic activities among the respondents.

Labor variable shows negative association with level of income decomposition. The effect of age on income function shows that as one gets older, there is a tendency to rationalize income among needs and wants. The result shows that distribution is more egalitarian among male household heads than female. Other variable that shows positive effect on income function are number of persons in the household, marital status of respondents, farming activities, location of the farm and distance to market have negative effect on income distribution. Income inequality by income source. The issue of income inequality is further discussed because the link between income inequality and poverty has been the focus of discussion on poverty (Awoyemi, 2004). This is widely believed that reducing income inequality could benefit the poor in the long run (Kimalu et al., 2001)

To this end, an attempt is made to decompose coefficient of variation and the Gini coefficient to identify the two ways in which income sources contribute to overall income inequality. First, it can be asked whether an income source serves to increase or decrease overall income inequality? Secondly, is it possible to identify how much of the overall inequality is due to any particular income source? Table 4 reports the results of the decomposition to identify income-inequality decreasing sources of income. An income source increases overall inequality when Gini coefficient is greater than one i.e. the higher the values of these estimates for a source, the higher will be its contribution to total income inequality. As expected, the contribution of agriculture to total inequality to the highest (3.271) while secondary economic activities contributed the least. It is good to note that agricultural income is highly unequally distributed, further, it is identified that secondary economic activities is inequality decreasing.

Table 3: Summary statistics of key variables used in the study.

Variable	Number	Unit	Mean	Std Deviations
Sex	120	M. F		
Distance to the city	120	Km	6.475	6.836
Distance to the market	120	Km	3.250	2.524
Education	120	Yrs	4.075	2.524
Estimated total income from enterprise/annum	120	N	314978.5	245044.55
Additional income received from secondary activities both cash and kind	120	N	87085.83	96636.81
Female average wage rate /day	21	N	623.14	619.67
Male average wage rate /day	99	N	100.85	928.88
Hours spent on primary occupation /week	120	Hours	38.95	13.69
Income from primary occupation /week	120	N	220502.66	194259.84
Hours spent on secondary occupation /week	11	Hours	21.81	15.61

Source: Field Survey, 2018

CV shows how focus is on the inequality of different income sources namely agricultural activities (primary occupation) and non- agricultural activities (secondary occupation). It was found that agricultural income represented the most important inequality-increasing source of income while non-agricultural income has greater inequality decreasing potential. Table 5 set out this decomposition and shows that while agricultural income only represents 70.01% of total income in Kwara State, it accounted for about 40% of the inequality.

Table 5 Decomposition of Gini Coefficient.

Income source	Gini Decomposition Coefficient
Primary income	3.271
Secondary income	-2401.58
Total income	1.428

Source: Field Survey, 2018

The study revealed that there is a high level of income inequality contribution from the agricultural sector in the area of study (Table 5). Past study that hypothesized that higher income inequality would lead to more redistributive public policy in democracies because the median voter increasingly prefers redistributionist public policies as inequality increased (Persson and Tabellini 1994). Hence, policy to reduce the gap of inequality between the rich and the poor stand a better chance of wide acceptance by populace.

Table 6 Foster-Greer Thorbecke Poverty Measures

Income sources	Poverty incidence (P_0)	Poverty depth (P_1)	Poverty severity (P_2)
Total Income	0.7167	0.363	0.237
Primary occupation	0.725	0.396	0.268
Secondary occupation	0.650	0.412	0.322

Source: Field Survey, 2018

Table4: Income Functions of Respondents

Independent variables	Linear Coefficients	Std.Err	tstat	Prob.	Exponential Coefficients	Std.Err	t-stat	Prob.
Age	7831.953	19419.23	0.40	0.69	0.019700	0.007922	2.48	0.01**
Sex	97755.65	57377.63	1.70	0.09*	0.473212	0.186691	2.53	0.01**
Household Size	7302.228	5217.962	1.39	0.16	0.014742	0.016976	0.86	0.38
Marital Status	-74833.76	99292.50	-0.75	0.45	0.282444	0.311403	0.91	0.37
Educational Level	8063.397	5827.52	1.38	0.17	0.042017	0.018852	2.23	0.02**
Labor hours	650.8707	1113.607	0.58	0.56	-0.000484	0.003615	-0.13	0.89
Wage labor	-57058.20	56870.95	-1.00	0.32	-0.300522	0.185267	-1.62	0.11
Farming	70751.69	56492.52	1.25	0.21	0.365314	0.183932	1.98	0.04**
Non-farm	-137434.6	66212.28	-2.07	0.04**	-0.361419	0.215707	-1.68	0.09*
Location	-165353.5	61415.31	-2.69	0.01***	-0.603526	0.200079	-3.02	0.00***
Dist. to city.	-611.7252	5288.599	-0.12	0.91	0.007347	0.017224	0.43	0.67
Dist. To Mkt.	10284.70	11156.16	.92	0.36	-0.023489	0.036178	-0.65	0.52
Credit Obtained	1.218532	0.413931	2.94	0.00***	0.0000035	0.0000013	2.62	0.01**
Constant	43388.40	441626.6	0.09	0.92	11.32017	0.5058	22.41	0.00***
R^2	0.35667	0.38						
Adjusted R^2	0.270889	0.30						
S.E. of Regression	209238.6	0.68						
F-Stat.	4.158033	4.95		Prob.	(F-Stat)	0.00010		

Table 6 presents the results of the Foster-Greer Thorbecke (FGT) measures of poverty. These measures quantify the three well-known dimensions of poverty, namely the level, the depth and the severity (also known, respectively as incidence, inequality and intensity) of poverty. The headcount ratio (P0) is the most popular FGT measure. It is the ratio of the number of poor individuals to the total population. The results reveal that 65% of those who are engaged in primary economic activities were living in absolute poverty in the study areas.

Conclusion

The analysis has shown that the study areas revealed an acute poverty status and needs to be urgently addressed before it becomes politically volatile. The study shows that poverty should not be viewed from income/consumption/expenditure alone but should be addressed from people's perspective as poverty is multidimensional and should be measured in many dimensions. Also, from the respondents' point of view, the preceding analysis has demonstrated that secondary occupation in complementary with agricultural activities in the area of study. Roughly, three quarters of the economically active population in Kwara State, Nigeria is employed in the secondary economic activities.

The range of activities in which the rural population engaged extends from trading to services. A considerable number of secondary activities are connected to agriculture, in that they fit into agricultural goods or they supply goods and services for agricultural households. Encouragement of secondary economic activities which has greater potential to impact on income distribution in that they are inequality decreasing should be practiced (Fields, 2000). An important challenge is to increase access of the poor to secondary activities that yield high incomes. Creating enabling environment for vigorous growth as well as investing in education and improvement in the asset endowments of the poor will alleviate poverty in the study area.

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DETERMINANTS OF COMMERCIALIZATION OF CASSAVA AMONG SMALL HOLDER FARMERS IN AKURE NORTH LOCAL GOVERNMENT, ONDO STATE.

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Abstract

The study examines the determinants of commercialization of cassava among small holder farmers in Akure North Local Government, Ondo State. Specifically, it ascertained the socio-economic characteristics of small holder cassava farmers, identified the sources of information available to small holder cassava farmers, determined the factors affecting commercialization of cassava production of small holder cassava farmers and identified the constraints of small holder cassava farmers. Thirty smallholder cassava farmers were purposively selected in each of the three communities identified, thus making a total of Ninety respondents. Primary data were used and were obtained through a well-structured questionnaire. Data were analyzed by descriptive statistics and multiple regression analysis. Findings revealed that 76.6% of the respondents are male, 48.9% of the respondents had secondary school education, 82.2% of the respondents are married and 66.7% of the respondents do not have access to any credit facilities. Regression result showed that none of the socio-economic characteristics were significant at 5% and 10% level of significant. Chi-Square result revealed the level of Cassava Production and Selected Socio-Economic Characteristics of cassava farmers. It was revealed that age (χ^2=1.533E2), gender (χ^2=3.842), level of education (χ^2=7.815) and household Size (χ^2=26.296) were all significant at 5% level of significance. The study concludes that inadequate funds and labour were the major constraints facing cassava farmers in the study area. The study recommended that farmers should organize themselves into functional cooperative groups so as to have access to funds and other vital information for their cassava production and that government should provide funds for peasant farmers that will enable them to expand their land and be able to produce more.

Keywords*:* Value chain commercialization, factors analysis; pro-poor; entrepreneurship; Nigeria.

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Introduction.

Agriculture is fundamental to the sustenance of life and it is the bedrock of economic development especially in the provision of adequate and nutritious food vital for human development and raw materials for industry (Onwuala, 2009). Food is one of the basic needs of man but its provision is not always adequate for all nations especially in developing countries like Nigeria (Ogunleye *et al*, 2008). The significance of cassava in agricultural sector in Nigeria has been recognized in the area of its growth potential, industrial uses, human and animal food, economics of production and processing (Okpara, 2015).

Cassava is a preferred staple food by many people in Nigeria because of its attributes. Cassava became popular with the introduction and implementation of Structural Adjustment Programme (SAP), since 1986 with increasing output. According to National Report (2006), this policy made those imported cereals to be more costly, making cassava a relatively cheap source

of energy. As a famine-reserve crop, it holds greater potentials for the transformation of Nigeria economy.Cassava (*Manihotesculenta*) production is vital to the economy of Nigeria as the country is the world's largest producer of the commodity (Wikipedia, 2016). The crop is produced in 24 of the country's 36 states. In 1999, Nigeria produced 33 million tonnes, while a decade later; it produced approximately 45 million tonnes, which is almost 19% of production in the world. The average yield per hectare is 10.6 tonnes. In Nigeria, cassava production is well-developed as an organized agricultural crop. It has well-established multiplication and processing techniques for food products and cattle feed. There are more than 40 cassava varieties in use. Cassava is processed in many processing centres and fabricating enterprises set up in the country (Wikipedia, 2016).

Cassava production in Nigeria stands out in the world as Nigeria is the highest cassava producing country. According to Worldatlas.com (2018), Cassava, an important food crop in many countries, is produced in the highest quantities in Nigeria, followed by Thailand and Indonesia. Food and Agriculture Organization (2013), argued that Nigeria is the world's leading cassava producer, with about 21 percent share in the global market. A small fraction of cassava output in the country is produced for commercial use in the livestock feed, ethanol, textile, confectionery, and food industries, while the majority is produced by smallholder farmers for subsistence or small-scale processing (Knipscheer*et al*. 2007)

Nigeria, a nation with 50% of its population in rural areas (CIA: 2011) with each area depending on their farm resource for their livelihoods, cannot claim any success in commercialization of cash crop production without referencing the contribution of small-scale farmers in rural areas. However, 'there is a fear that commercialization essentially means promoting change that is in the interests of larger, more powerful players, to the detriment of smallholder farmers' (Leavy and Poulton, 2007). Major source of employment for rural dwellers is still agriculture (Akande, 2003). The fact remains that rural people continue to rely on their farming activities and most of them combine subsistence with commercial methods to make ends meet (Afolabi, 2012).

Moreover, Nigerian agricultural commercialization still depends on small holder rural farmers in staple crops like cassava. Even though Nigeria is the highest producer of cassava in the world but they are not the highest exporters of cassava. This signals that about 0-95% of the cassava produced in Nigeria are consumed within the country without any industrial relevance. Today, none of the country's export crops, with the exception of cocoa, commands any significant world market share. With the increasing need to eradicate poverty and put an end to hunger and malnutrition as enshrined in the MDG targets, Nigeria and indeed many African countries are returning to the agricultural sector for possible solutions which could include commercialization of the production of staple crops like cassava (Aderibigbe, 2007).

Modernization and commercialization of the smallholder agricultural sector provides the stimulus and impetus to reducing food insecurity in developing countries. This has been a subject of considerable focus among policy-makers and development specialists not only at the level of farming households but also at the level of national and international policies (Omamo, 1998). Rural poor cassava farmers have been faced however with a lot of problems which has made it impossible for them to commercialize, these includes lack of training in Good Agricultural Practice (GAP), non-availability of sufficient farm land, inaccessible loan, unavailability of mechanization for farm operation among others. This research work is therefore initiated to this end to identify the determinants of commercialization of cassava production among small holder rural poor in Ondo State. Thus, objective of the study is to analyze the determinants of commercialization of cassava production among small holder rural poor in Ondo State.

Concept of Agricultural Commercialization

Agricultural commercialization can broadly be looked at from two perspectives: a rise in the share of marketed output; or of purchased inputs per unit of output (Jaleta*et al*, 2009). In essence, agricultural commercialization can occur on the output side of production with increased marketed surplus, or on the input side with increased

use of purchased inputs. On the output side, commercialization is a measured as a ratio of the value of agricultural sales to the value of agricultural production while it is measured as a ratio of the value of inputs acquired from market to the value of agricultural production on the input side [ibid]. Technically, agricultural commercialization entails a shift from subsistence production to a more complex market-based production and consumption system that leads to the strengthening of the linkages between input and output sides of a market (Jaleta*et al*, 2009).

Empirical Studies on the Determinants of Agricultural Commercialization

Afework and Endrias (2016) opined that there are a number of determinants in the commercializing smallholder agriculture. These determinants are broadly categorized as external and internal factors. The external ones are factors beyond the stallholder's control like population growth and demographic change, technological change and introduction of new commodities, development of new infrastructure and market institutions, development of the non-farm sector and the broader economy, rising labor opportunity costs, macroeconomic, trade and sectorial policies affecting prices and other driving factors (Von Braun *et al*., 1991; Pingali and Resogrant, 1995).

In addition, development of input and output markets, institutions like property rights and land tenure, market regulations, cultural and social factors affecting consumption preferences, production and market opportunities and constraints, agro-climatic conditions, and production and marketing related risks and are other external factors that could affect the commercialization process (Pender *et al*., 2006). Also, Ochieng*et al* (2015) presented the findings of Rios *et al*. (2009) investigated the linkages between commercialization and productivity farm households in Tanzania, Vietnam and Guatemala and showed a positive and significant correlation between commercialization and productivity in Vietnam and Guatemala but insignificant in Tanzania. Smallholder commercialization of either food crops or horticulture have been done mainly in Eastern, Southern and West Africa with very few studies in Central Africa especially in Rwanda and DRC thus the paper becomes a pioneer in this regard. Still, the implications of smallholder commercialization for household food security are not yet fully understood and the findings not always in consensus (Maertens *et al*., 2012), which is likely to be due to inability to empirically identify the causal relationship. We use propensity score matching (PSM) approach to evaluate the contribution of commercialization of staple crops on household food security of rural households.

The study addresses two research questions: (1) what are the factors influencing commercialization of banana and legumes and (2) what is the impact of commercialization of banana and legumes on household food security among smallholders in Great Lakes Region.

Methodology

Area of Study

The study was carried out in Akure North Local Government Area of Ondo State. Akure North is a one of the Local Government Area in Ondo State, Nigeria. Its headquarters are in the town of Iju/Itaogbolu. The Local Government is bounded by Akure South Local Government in the west, Owo Local Government Area in the East and Ifedore Local Government Area in the North. It has an area of 660 km² and a population of 131,587 at the 2006 census. The average annual temperature is 25.9 °C and the rainfall average is 1546 mm. The Local Government is characterized by two distinct seasonal variations which are the dry season (October to February) and raining season (March to September). Akure North Local Government Area is an agrarian area with high production in economic and cash crops such as cassava, cocoa, maize, yam among others. Cassava farming is a very popular enterprise among farmers in the Local Government especially in the rural area and they are majorly smallholder farmer. This makes the study area suitable for this study.

Sampling Procedure and Sample Size

Three communities were purposively selected from Akure North Local Government Area based on the intensity of cassava production in those communities. These communities are Eleyowo, Owode and Itaogbolu. Thirty smallholder cassava farmers were purposively selected in each of the communities, thus making a total of Ninety respondents for the study.

Method of Data Collection

Primary data were used for this study and were obtained through a well-structured questionnaire that was self-administered on smallholder cassava farmers with the assistance of trained enumerators in the study areas. The questionnaire elicited information on the respondent's socio-economic characteristics, sources of information and other constraints affecting smallholder cassava farmers.

Methods of Data Analysis

Both descriptive statistics and inferential statistics were used to analyze the data obtained from the respondents. Objectives i, ii, and iv were subjected to descriptive statistics which includes the use of frequency counts and percentages. Objective two (ii) was subjected to inferential statistics which is the linear regression model. This helped to determine the various factors that are affecting the output of smallholder cassava farmers.

The hypothesis set for this study was also subjected to Chi-Square which helped to determine if there is a relationship between respondents' socio-economic characteristics and their level of cassava production. Commercialization was measured by calculating commercialization index using the formula below:

$$\text{Commercialization Index} = \frac{\text{Value of Agricultural Sales in Markets}}{\text{Agricultural Production Value}}$$

The Regression model is shown below:

$$Y = X_1B_1+X_2B_2+X_3B_3+X_4B_4+X_5B_5+X_6B_6+X_7B_7\ldots\ldots\ldots\ldots\ldots\mu_1$$

Where:
Y=Commercialization Index
X_1= Age (Years)
X_2=Sex (Male or Female)
X_3=Educational level
X_4=Marital Status
X_5=Farming Experience (Years)
X_6=Family Size (No of People)
X_7= Farm Size (Hactares)
μ_1=Error Term

Chi-Square was used to test the hypothesis stated. Formula for chi square is stated below:

$$X^2 = \frac{\sum (fo-fe)^2}{fe}$$

Where $\sum$ = Summation
X^2 = Chi – square
Fo = Observed frequency
Fe = Expected frequency

Results and Discussion

Socio Economic Characteristic of Cassava Farmers

This chapter presents the results of the data analysis for the study. The data analyzed includes the socio-economic characteristic of cassava farmers, the source of information available to cassava farmers, the level of the production of cassava farmers and the constraints affecting cassava farmers in the study area. Tables 4 revealed that majority (76.7%) of the respondents are male while 23.3% are female. This implies that men are more involved in cassava farming than the women in the study area. This could be because cassava production involves a lot of strength and energy, which the men can provide. It was revealed that various level of education of cassava farmers in the study area. 48.9% of the respondents had secondary education and 40.0% had primary school (basic) education. This implies that 91.1% of the respondents are educated and this will aid adoption of new innovations and technologies.

Table 1 showed that 82.2% of the respondents are married while 10% are single. This implies that cassava producers in the study area have family responsibilities to cater for and also involving the members of the family in cassava production can generate income which can help to take care of the family. Table 1 shows that 27.8% of the respondents are within the age bracket of between 48 and 57 years while 26.7% are between 38-47 years. This implies that cassava farmers are getting older and because of this they may not have enough energy to expand their farm. Table 1 shows that 50.0% of the respondents had a household size of between 0 and 4 people while 34.4% of the respondents have a size of between 5and 8 people. The result implies that cassava farmers in the study have small household size. This may reduce the availability of family labour, thereby making the farmers to depend on hired labour and this may increase their cost of production. Table 1 revealed that 56.7% of the respondents have farm size of between 0.4-1.0 hectares and only 32.2% had farm size of between 1.1 and 2.0hectares. The result is an indication that cassava farmers in the study area are still small holder farmers and their level of commercialization is very low and this is due to small size of farm they use in cultivation.

Table 1: Socio Economic Characteristic of Cassava Farmers

Gender	**Frequency**	**Percentage (%)**
Male	69	80.0
Female	21	10.0
Total	**90**	**100.0**
No formal education	8	8.9
Primary education	36	40.0
Secondary education	44	48.9
Tertiary education	2	2.2
Total	**90**	**100.0**
Christianity	49	54.4
Islam	38	42.2
Traditional	3	3.3
Total	**90**	**100.0**
Marital Status		
Single	9	10.0
Married	74	82.2
Divorced	3	3.3
Widowed	4	4.4
Total	**90**	**100.0**
Age (years)		
18-27	7	7.8
28-37	17	18.9
38-47	24	26.7
48-57	25	27.8

Above 57	17	18.9
Total	**90**	**100.0**
Household Size	**Frequency**	**Percentage (%)**
0-4 persons	45	50.0
5-8persons	31	34.4
9-8 persons	9	10.0
Above 13persons	5	5.6
Total	**90**	**100.0**
Farm Size (Hectare)	**Frequency**	**Percentage (%)**
0.4-1.0	51	56.7
1.1-2.0	29	32.2
2.1-3.0	8	8.9
3.1-4.0	2	2.2
Total	**90**	**100.0**

Source: Field Survey 2018.

Table 2 showed that majorities (85.6%) of the respondents are into farming, 6.7% are traders and 3.3% are artisans. This implies that farming is the major means of livelihood of the people in the study area.

Table 2: Distribution of Respondents According to Major Occupation

Major Occupation	**Frequency**	**Percentage (%)**
Farming	77	85.6
Trading	6	6.7
Teaching	1	1.0
Artisan	3	3.3
Others	3	3.3
Total	**90**	**100.0**

Source: Field Survey 2018.

Table 3 revealed that majority 61.1% of the respondents were not involved in any off-farm activities, while 14.4% were into business or trading and artisans respectively. The result shows that 61.1% are mainly farmers who do not are not involved in any other income generating activities while the others engaged in other activities to generate income to sustain their family.

Table 3 Distribution of Respondents According to off- Farm Activities

Off-farm Activities	Frequency	Percentage (%)
Not Involved	55	61.1
Business/Trading	13	14.4
Artisan	13	14.4
Civil Service	6	6.7
Teaching	1	1.1
Others	2	2.2
Total	90	100.0

Source: Field Survey 2018.

Table 4 revealed that 66.7% of the respondents do not have access to any credit facilities so the farmers use their personal savings to carry out their farming activities and 21.1% had access to credit facilities through cooperative society. The implication is that the farmers will not have enough capital to expand their production which can lead to commercialization activities.

Table 4: Distribution of Respondents According to Source of Credit Facilities

Source of Credit Facilities	Frequency	Percentage (%)
No Access	60	66.7
Micro finance Banks	2	2.2
Cooperative Group	19	21.1
Thrift and credit	7	7.8
Others	2	2.2
Total	**90**	**100.0**

Source: Field Survey 2018.

Table 5 revealed that 35.6% of the respondents got their information from extension agents, 30% got their information from farmers association and 24.4%got information through television or radio. The result shows that farmers in the study area have access to timely information through the extension agents and farmers association which will help improve their production.

Table 5: Distribution of Respondents According to Source of Information

Source of Information	Frequency	Percentage (%)
Farmers	8	8.9
Television/Radio	22	24.4
Extension Agents	32	35.6
Farmers Association	27	30.0
Academic/research Institution	1	1.1
Total	**90**	**100.0**

Source: Field Survey 2018.

Table 6 revealed that 45.6% of the respondents had access to training and capacity building as a result of being involved in cooperative groups. This implies that cassava farmers will enjoy personal development and be able to practice agriculture better than others who did not join any cooperative group.

Table 6: Distribution of Respondents According to Benefits Derived from Cooperative Groups.

Benefits Derived	Frequency	Percentage (%)
Do not belong	13	14.4
Source of timely Information	13	14.4
Access to soft loan	22	24.4
Access to training and Capacity building	41	45.6
Others	1	1.1
Total	**90**	**100.0**

Source: Field Survey, 2018.

Table 7 showed that 47.8% of the respondents use the combination of both family and hired labour for cassava production and 40.0% employed only hired labour. The result imply that the production of cassava requires

energy in which family members alone may not be able to provide but can be supplemented by combining both hired labour and the family members.

Table 7: Types of Labour

Types of Labour	Frequency	Percentage (%)
Family labour	9	10.0
Hired labour	36	40.0
Family and hired labour	43	47.8
Contract labour	2	2.2
Total	**90**	**100.0**

Source: Field Survey, 2018.

Table 8 showed that 53.3% of the respondents were affected by inadequate funds to improve on their level of production. The results imply that the cassava farmers in the study area found it difficult to commercialize their production due to inadequate funds. Also, 18.9% experienced labour shortage which reduces output.

Table 8: Distribution of Respondents According to Constraints affecting Cassava Production

Constraints	Frequency	Percentage (%)
Pest and Disease	13	14.4
Labour Shortage	17	18.9
Inadequate Fund	48	53.3
Lack of Quality Planting Materials	3	3.3
Pest &Disease and Inadequate Funds	9	10.0
Total	**90**	**100.0**

Source: Field Survey 2018.

Result of the Multiple Regression Analysis

In order to determine the socio-economic factors affecting commercialization of cassava farmers, the regression model was used as follows;

$Y= B_o+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7$……..$u_e$

Where Y = commercialization index (dependent variable).

X_1= Age (years)

X_2= Gender

X_3= Level of Education

X_4= Marital Status.

X_5= Household Size (Person)

X_6= Farm Size (Hectare)

X_7= Years of Involvement in Cooperative Group

U_e= Error term

The result of the regression is shown below;

$Y=0.432-0.108X_1^*-0.088X_2+0.025X_3+0.005X_4+0.021X_5+0.185X_6^*-0.036X_7^*$

(0.488) (0.007) (0.157) (0.106) (0.129) (0.034) (0.082) (0.011)

$R^2= 0.058$

F=0.719

R^{2-}=-0.023
* Significant at 5%

From the regression result, it is seen that the coefficient of variability is 0.058. This implies that 5.8% of the variability in the dependent variables (Y) is being accounted for by the independent variables in the specified model. The result showed that age (X_1), farm size (X_6) and years of involvement in cooperative group (X_7) were significant at 5% level of significance but gender (X_2), level of education (X_3), marital status (X_4) and household size (X_5) were not significant at 5%. With respect to age, the result implies that the older the farmers becomes the lesser the opportunity to commercialize because their strength reduces with their age, also for the farm size, due to small size of farms used in cultivation, the cassava farmers finds it difficult to commercialize. The years of involvement in cooperative group were also significant because most of the farmers are still new in the cooperative group and has reduced their access to credit facilities which reduces commercialization. However, gender(X_2), level of education (X_3), marital status(X_4) and household size(X_5) do not significantly contribute to commercialization of cassava production.

However, the positive sign associated with the level of education (X_3), marital status (X_4), Household size (X_5) and farm size (X_6) indicates that there is a direct relationship with commercialization index. Also, the negative sign attributed to age(X_1), gender(X_2), and years in cooperative group(X_7) indicates that they have inverse relationship to commercialization index.

Chi-Square Result
The chi-square was used to determine the relationship between output of cassava production and selected socio-economic characteristics of the respondents. The result of the relationship is showed in table 9.

Table 9: Chi-Square Result of Level of Cassava Output and Selected Socio-Economic Characteristics

Relationship	χ^2 Cal	χ^2 Tab	df	Decision
Age	1.533E2	43.773	33	NS
Gender	25.600	3.842	1	S
Level of Education	56.667	7.815	3	S
Household Size	79.244	26.296	16	S

Source: Computer data analysis results
*Significant at 0.05
S-Significant
NS- Not Significant

Table 9 showed the chi-square result of level of cassava output and selected socio-economic characteristics of cassava farmers. It was revealed that gender (χ^2=3.842), level of education (χ^2=7.815) and household Size (χ^2=26.296) were significant at 5% level of significance because chi square calculated value is greater than chi square tabulated value, hence we reject the H_0 and accept the H_A which says that there is a significance relationship between level of cassava output and selected socio-economic characteristics (Gender, level of education and household size). However, age (χ^2=1.533E2) was not significant because chi square calculated value is less than chi square tabulated value which implies that we accept the H_0 and reject the H_A, that is there is no significant relationship between age and level of cassava output. This implies that age does not affect the level of cassava output meaning that whether you are young or old, you can still produce higher cassava output in the study area. Also the significance of gender is an indication that more males might have joined in cassava production. In case of level of education, more educated people could have joined cassava production or probably cassava farmers could have gone for more education. This will increase the level of cassava output.

Household size was also significant with the level of cassava output. This could imply that the household size of cassava farmers could have improved in the previous years, more people joining the household could add to the labour supply on the farm and this could bring about increase in the level of cassava output.

Conclusion and Recommendations

The study analyzed the determinants of commercialization of cassava production among small holder rural farmers in Akure North Local Government Area of Ondo State. Specifically, the study ascertained the socio-economic characteristics of small holder cassava farmers, identified the sources of information available to farmers, determined the factors affecting commercialization of cassava production and identified the constraints of small holder cassava farmers in the study area. Three communities were purposively selected from Akure North Local Government Area based on the intensity of cassava production in those communities. These communities are Eleyowo, Owode and Itaogbolu. Thirty smallholder cassava farmers were purposively selected in each of the communities, thus making a total of Ninety respondents for the study. Primary data were used for this study and were obtained through a well-structured questionnaire.

Descriptive statistics and inferential statistics were used to analyze the data obtained from the respondents. Descriptive statistics includes the use of frequency counts, percentages, while inferential statistics used is the linear regression model and Chi-Square Commercialization was measured by calculating commercialization index. Findings revealed that 76.6% of the respondents are male, 48.9% of the respondents had secondary school education, 54.4% practiced Christianity, 82.2% of the respondents are married, 27.8% of the respondents are within the age range of between 48 and 57 years, 50 % of the respondents had an household size of between 0 and 4 people, 56.7% of the respondents had farm size of between 0.4 and 1.0 hectares and 85.6% of the respondents are into farming and 61.1% of the respondents were not involved in any off-farm activities.

Findings also revealed that 66.7% of the respondents do not have access to any credit facilities, 35.6% of the respondents got their information from extension agents, 45.6% of the respondents had access to training and capacity building as a result of being involved in cooperative groups, 47.8% of the respondents used the combination of both family and hired labour, 53.3% of the respondents were affected by inadequate funds to improve on their level of production. Regression result showed that age (X_1), farm size (X_6) and years of involvement in cooperative group (X_7) were significant at 5% level of significance but gender (X_2), level of education (X_3), marital status (X_4) and household size (X_5) were not significant at 5% level of significance.

The chi-square result revealed that gender (χ^2=3.842), level of education (χ^2=7.815) and household Size (χ^2=26.296) were all significant at 5% level of significance because chi square calculated value is greater than chi square tabulated value, hence we reject the H_0 and accept the H_A which says that there is a significance relationship between level of cassava output and selected socio-economic characteristics (Gender, level of education and household size). However, age (χ^2=1.533E2) was not significant because chi square calculated value is less than chi square tabulated value which implies that we accept the H_0 and reject the H_A, that is there is no significant relationship between age and level of cassava output.

Conclusion

Cassava farmers find it difficult to commercialize their production due to some identified constrains such as inadequate labour and inadequate funds. The study concludes that if farmers are able to commercialize their production, it will enhance food production in Akure North Local Government and in Ondo State.

Recommendations

In view of the findings of the study, the following are recommended:

i. The farmers should join cooperative groups where they can have access to funds in order to commercialize their production;

ii. The farmers should come together to assist one another by adopting communal labour so as to reduce the cost of labour; and

iii. Government should provide an avenue for farmers to sell their products easily so as to encourage more production.

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DETERMINANTS OF TECHNICAL EFFICIENCIES IN THE WHITE SHRIMP (*NEMATOPALAEMON HASTATUS*) VALUE CHAIN IN COASTAL FISHERIES OF NIGERIA

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Abstract

The study assessed the determinants of technical efficiencies in the Nematopalaemon fishery of Nigeria using evidence from coastal areas of Ondo State. Multistage sampling technique was used to select one hundred and sixty (160) participants in the white shrimp fishery of Ondo State, Nigeria. Socioeconomic data were collected using a well-structured questionnaire between January 2015 and December 2016. Determinants of technical efficiencies of participants at each segment of the value chain were then assessed using the stochastic frontier analysis. Results indicated that age, family size, shrimping experience, the horsepower of the outboard engine, number of fishing hours and number of fishing days/month were the significant factors that determined the inefficiency of a typical shrimper in the study area. Also, factors such as age, processing experience and the number of processing days/month determined the processing inefficiency while age and experience were the significant factors in the inefficiency model for shrimp marketers. All the estimates of production function at the shrimping (cost of gear, repair and maintenance, fuel and feeding), processing (fresh shrimp, firewood, smoking tray, packaging materials and additives) and marketing (dried shrimp, rents and market levy and transportation) segments of the value had positive coefficients. However, only the cost of fuel and feeding in the shrimping segment; cost of fresh shrimp in the processing stage and cost dried shrimp in the marketing segment were the significant production factors for the peak and off-peak month. Furthermore, shrimpers were more technically efficient

(79% and 76%) than theprocessors (71% and 66) and marketers (72% and 71%) in a typical peak and offpeak month respectively. Transformation of the entire Nematopalaemon value chain and increased contribution of the fishery to coastal livelihood in Nigeria requires the Federal Department of Fisheries to develop policies that would promote access of participants in the value chain to education and extension services.

Keyword: Technical efficiency, inefficiency, white shrimp, value chain, coastal areas, Ondo State

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Introduction

Shrimp is highly relished and priced delicacy on the world food menu (Food and Agricultural organization, 2018). Nigeria contributes significantly to wild caught shrimps from the tropics (Ajayi, 2016). The country is endowed with rich shrimp resources predominantly in the Niger-Delta States (Udoh and Ukpatu, 2017). Bayode *et al.* (2011) reported that major shrimping areas in Nigeria are Escravos, Forcados, Ramos, Pennington, Brass, Bartholomew, Calabar and Ondo coastline along the Nigerian continental shelf. Shrimping grounds in the country covering an area of 2,500 km^2 with the white shrimp

(*N. hastatus*) being the major component species in the fishery (Bayode *et al.*, 2011). Most of the shrimps sold in Nigeria are hauled from the wild by artisanal fisherfolks and is dominated by the *Penaeidae* shrimps (Okayi

et al., 2013). Inshore production of Shrimp in 2002 and 2014 ranged between 8,056 MT and 17,654 MT with the highest recorded in 2012 (Akintola *et al.*, 2013). Nigerian shrimp and prawn export shrunk from ₦ 6 billion ($ 19.7 million) in the 3rd Quarter of 2016 to ₦ 4.4 billion ($14.4 million) representing a 27% decrease (National Bureau of Statistics, 2016).

The shrimp industry in Nigeria is characterized by a value chain system that involves the small-scale shrimping, processing and marketing of *N. hastatus*. The value chain provides policymakers, shrimpers, processors and marketers with a systematic tool which allows them to understand the processes in the industry, and especially to know the costs related to the various steps in the chain. It equally allows fisheries administrators and fishing industry personnel to address value chain issues, so as to maximize value within their commercial operations (Macfadyen *et al.*, 2011).

The efficiencies of participants in a fisheries value chain could be hampered by a litany of problems amongst which include: relative high cost of gears, boats, outboard engines, trawling operations, low processing technology, seasonality of catch, lack of infrastructure, lack of finance, lack of storage facilities and marketing problems (Anene *et al*., 2010). These structural problems with other inefficiency and cost factors may reduce the performance of participants in the value chain. Therefore, assessing the level of efficiencies of participants and their determinant factors provides valuable information for understanding the problems at each segment of the value chain.

Generally, the knowledge of efficiency of artisanal fisheries is of significant importance for policymakers as it provides a missing link especially onthe concept of technical efficiency. It equally creates awareness concerning inefficiencies in artisanal fisheries, and an insight into possible improvement in the determinants of theseinefficiencies (Kareem et al., 2013). Technical efficiency can be measured by different techniques but due to the stochastic nature of fishing, the stochastic frontier approach has widely be used in literature (Kareem *et al*., 2013). The economic tool helps to know the inefficiency among the shrimp fishery participants in any study area and has the possibility of diagnosing factors that could aid increased shrimp and policy formulation (Kareem *et al.*, 2013). It can also be used to predict when there will be fishery operating inefficiency; therefore, strategies can be developed to reduce inefficiency in the shrimp value chain (Hoyo *et al.*, 2017).

Such techniques have been used globally to determine efficiencies in aquaculture and fisheries enterprises (Hoyo *et al.*, 2017). In Nigeria, different authors have reported the utilisation of SFA in efficiency analysis (Amos, 2007, Kareem *et al.* 2012, Ogunbameru *et al.* 2012, Wategire and Ike, 2015, Frank and Umoh, 2016). Specifically, Amos (2007) and Wategire and Ike (2015) provided empirical information on the utilization of SFA in the shrimp fishery and found out that the type of boat, the horsepower of the outboard engine, fuel, and labour were the factors that determine the efficiency of a shrimping enterprise. The authors further stated that the technical inefficiency is defined by factors such as age, education, access to credit, cost of inputs membership of local cooperative groups and years of experience (Wategire and Ike, 2015).

Despite the global use of stochastic frontier approaches in measuring the efficiency of many firms, there is little or no information on its utilization for assessing the efficiencies of major participants in a shrimp value chain in Nigeria. Though, Amos (2007) and Wategire and Ike, (2015) provided empirical data on the subject of this research; however, the information provided was limited to the shrimping segment of the value chain. Therefore, this study aims at providing information on the technical efficiencies and estimates of the production function of major participants (shrimper, processor and marketer) in the *Nematopalaemon* fishery of Nigeria using the coastal areas of Ondo State a case study. This would assist in determining factors that could limit/improve the performance and contribution of the *N. hastatus* fishery to coastal livelihood Nigeria.

Theory of Technical Efficiency Measurement: Stochastic Frontier Production Function Approach

Two basic methods are used in measuring technical efficiency and they are the classical approach and the frontier approach. The classical approaches based on the ratio of output to a particular input. It is termed partial productivity measure, in the sense that output is compared with input at a time. The principal limitation of this approach is that changes in output per input ratios are affected by changes in the combination of different inputs vis-à-vis changes in productive efficiency. The variation in these partial productivity indexes can be interpreted as variations in the efficiency of particular input but not as changes in the use of all the inputs per unit of output (Ajibefun, 1999 and Ehinmowo, 2014).

However, Frontier approach measures the productivity of all the input factors at once. The frontier approach emerged as a result of the inadequacy of the classical approach. It involves the use of econometrics, statistical and linear programming methods for analyzing the productivity and efficiency of firms. The Frontier approach can be a non-parametric method which is mathematical programming to frontier estimation or parametric method which can be a deterministic approach and stochastic frontier approach (Aigner*et al.*1977, Fatuase, 2016). The relative merit of the parametric method is that it can account for noise and as well allows conventional hypothesis to be conducted. The parametric method involves the specification of a particular functional form, while non-parametric methods do not have this requirement. Also, the stochastic frontier function is estimated through the use of statistical modelling approaches, that is, econometric analysis such as stochastic frontier analysis (SFA) while deterministic frontier functions can be estimated using two alternative approaches; programming models such s linear programming (LP) and statistical models (econometric analysis is of the Ordinary Least Square Method (OLS).

Deterministic methods assume that all deviations from the frontier function result from inefficiency. While stochastic methods in addition to the inefficiency as sources of deviation from production frontier allow for some deviation to be attributed to statistical noise, that is, noise problem outside the farmer's control (Apezteguia and Garate 1997). Also, Stochastic Frontier Analysis is preferred over Ordinary Least Square of deterministic approach because it estimates a true frontier which represents the maximal properties of production function rather than an average frontier of Ordinary Least Square. Therefore, this study used this technique to estimate the productivity of variables of the production function and predict the technical efficiencies of the shrimper, processor and marketer in the *Nematopalaemon* fishery of Nigeria using the coastal areas of Ondo State a case study.

Methodology

The study was conducted in the coastal area of Ondo State, Nigeria (Figure 1). The study area was chosen because it has the longest coastline in Nigeria which provides a source of livelihood for the human population in the area and the supply of marine food products to neighbouring inland communities and landlocked areas.

Sampling Technique

Multistage sampling technique was used to select the number of respondents. Six (6) communities that were predominant in shrimping, processing and marketing of *N. hastatus* were randomly selected from Ilaje LGA. Ayetoro, Bijimi, Idi-Ogba and Olotu were selected for shrimping enterprise, Ayetoro and Bijimi for processing while Igbokoda and Obi were purposively selected to assess shrimp marketing information. Snowball sampling technique (chain referral) was then used to identify twenty (20) shrimpers, twenty (20) shrimp processors and twenty (20) shrimp marketers from each community. Primary data was c ollected using a wellstructured questionnaire. A total of one hundred and sixty (160) participants in the value c hain provided information on socioeconomic characteristics (age, gender, family size, and years of experience) aswell cost items and sales at each segment of the *N. hastatus* value chain between January 2015 and December 2016.

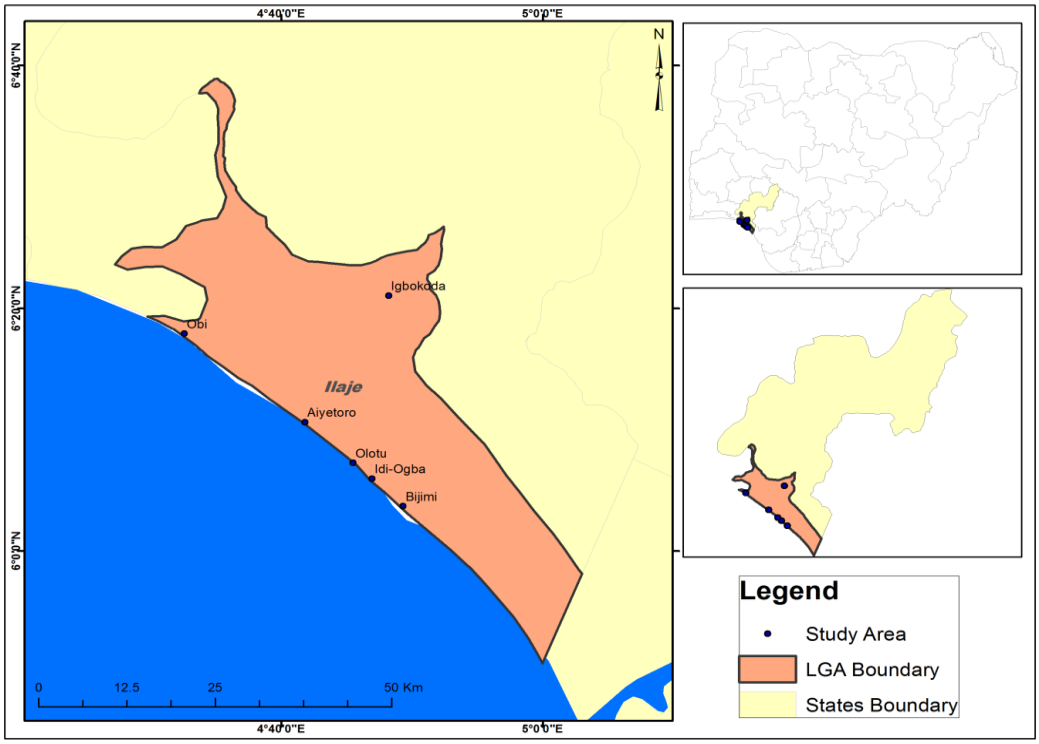

Figure 1: Map of Study Area

Efficiency Analysis

Technical efficiencies, estimates of inefficiencies and production functions were analysed stochastic production frontier model using Frontier 4.1 software at 5% significant level. The influence of socio-economic factors of shrimpers, processors and marketers on their technical inefficiencies (TI) models is outlined by equation 1, 2, 3.

$$TI_S = \delta_0 + \delta_1 AgE + \delta_2 EdU + \delta_3 FmZ + \delta_4 SeX + \delta_5 EhP + \delta_6 ToT + \delta_7 RtL + \delta_8 NfH + \delta_9 BoW + \delta_{10} CrS + \delta_{11} NfD + \delta_{12} NoB + \delta_{13} NoN + e_i \quad 1$$

$$TI_P = \delta_0 + \delta_1 AgE + \delta_2 PrE + \delta_3 EdU + \delta_4 HoS + \delta_5 MaS + \delta_6 DlP + \delta_7 SoW + \delta_8 NkB + \delta_9 ByC + \delta_{10} NpM + \delta_{11} TrA + e_i \quad 2$$

$$TI_M = \delta_0 + \delta_1 AgE + \delta_3 EdU + \delta_2 MaE + \delta_4 HoS + \delta_5 NoE + \delta_6 SoS + e_i \quad 3$$

Where:

TI_S= Technical inefficiencies of shrimpers; AgE = Age of shrimpers (years); EdU = educational level; FmZ = family size; SeX = years of shrimping experience; EhP = engine horse power; ToT = take of time; RtL = return time to landing; NfH = Number of fishing hours; BoW = ownership of boat; CrS = crew size; NfD = number of fishing days/month; NoB = number of boats; NoN = number of nets; δ_0-δ_{11}:parameters estimated; e = error term,TI_P= Technical inefficiency of processors; AgE= age of processors (years); PrE = processing experience; EdU = educational level (i.e number of years of schooling); HoS = household size; MaS = marital status; DlP = distance between the processing unit and landing site; SoW = strands of wood; NkB = Number of years kitchen (processing unit) has been in-use; ByC = By-catch; NpM = Number of processing days per month; TrA = smoking tray area, e_i = error term; TI_M= Technical inefficiency of marketers; AgE= age of marketers (years); EdU = educational level (i.e number of years of schooling); MaE = marketing experience; HoS = household size; NoE =nature of enterprise; SoS = source of shrimp; δ_0-δ_6:parameters estimated; e = error term.

Equally**,** estimates of the technical efficiencies of shrimpers, processors and marketers were determined by technical inefficiency models specified in equation 4, 5 *and* 6:

$LnY_S = b_0 + b_1 lnCfG + b_2 lnCrM + b_3 lnCfU + b_4 lnCfE + e_i$ 4

$LnY_P = b_0 + b_1 lnCfS + b_2 lnCoF + b_3 lnCoK + b_4 lnCoT + b_5 lnCpM + b_6 lnCoA + e_i$ 5

$LnY_M = b_0 + b_1 lnCpS + b_2 lnRmL + b_3 lnCoP + b_4 lnCoT + b_5 lnOcM + e_i$ 6

Where: Y_S = total value of fresh shrimp sold (₦), CfG = cost of fishing gear i.e. depreciated cost of net, boats and outboard engine (₦), CrM =cost of repair and maintenance (₦), CfU =cost of fuel (₦), CfE=costs of feeding(₦),b_o -b_6 = parameters estimated, e_i = error term,Y_P = total value of processed shrimp sold (₦), CfS = cost of fresh shrimp (₦), CoF =cost of firewood (₦), CoK =cost of kerosene (₦), CsM = costs of smoking tray (₦), CpM = cost of packaging materials, CoA =cost of additives b_o_b_6 = parameters estimated, e = error term, Y_M = total value of processed shrimp sold (₦), CpS = cost of processed shrimp (₦), RmL = cost of rents and market level (₦), CoP =cost of packaging (₦), CoT = costs of transportation (₦), OcM = other costs of marketing, $b_o b_5$ = parameters estimated

Results and Discussion

Stochastic Estimates of Shrimping Functions

Results of the estimates of the stochastic frontier production function of participants at the three segments of the value chain are presented in Table 1, 2 and 3. At the shrimping stage (Table 1), the coefficients of shrimpers' household size, experience, the horsepower of the outboard engine, take off time, return time to landing, number of fishing hours and number of fishing days were all negative and statistically significant at 5% level. However, coefficients of age, take-off time and the number of the shrimping net were positive but only the former was significant at 5% level.

Variables with negative coefficients imply that they reduce the technical efficiency an increase in those variables will increase the efficiency of shrimpers while variables with positive coefficients are expected to reduce shrimpers' technical efficiency. This explanation is supported by Kareem *et al.* (2012) and Amos (2007) who reported that the signs of the coefficients in the inefficiency model are interpreted in the opposite way.

Since the coefficient of age was positive, it implies that an increase in the age will decrease the technical efficiency of shrimpers. Though, it is *a prior* expectation that shrimpers increase in experience and fishing methods as they grow in age. However, the strength to handle equipment (carrying of outboard engines) pulling-in and pulling-out of boats and carrying shrimping net decreases with increase in age. Similar studies among shrimpers who utilized non-motorized boats on the coast of Delta State, Nigeria had positive and significant coefficients for age (Wategire and Ike, 2015). Amos (2007) equally got a positively significant and not-significant age for crustacean shrimpers on the coast of Ondo State, Nigeria. Nlerum and Bagshaw (2015), Akankali and Chindah (2011), Dawang *et al.* (2011) on the contrary estimated a negatively non-significant, significant and non-significant coefficient for age among shrimpers in River State, Delta State and Natural Lakes of Plateau State, Nigeria. Despite the fact that shrimpers are expected to become more skilful in the art and craft of shrimping, such experience is reduced at middle age as their physical strength obeys the law of diminishing returns which results in decreased technical efficiency and productivity. This assertion is equally supported by Nlerum and Bagshaw (2015) who submitted that as shrimpers age increases, their roles in fishing reduces. Equally, the youth are more receptive to innovative and technological drive towards improved easy of shrimping compared with older ones (Wategire and Ike, 2015).

Educationally, the shrimpers were more educated than the processors and marketers. A negative coefficient in the peak and off-peak season suggests that an increase in the years of schooling of a typical shrimper will increase their technical efficiency. Since the majority of shrimpers had formal education, it is expected that this will leverage on their shrimping methods and economic diversification. Similar research by Wategire and Ike (2015), Akankali and Chindah (2011) established a negative and significant coefficient for education in the coast of Delta State, Rivers State and Epe Lagoon, Nigeria respectively. However, Frank and Umoh (2016), Nlerum and

Bagshaw (2015), Kareem *et al.* (2013) and Ogunbameru (2012) reported a positive coefficient for education among shrimpers in Akwa-Ibom State, River State and Ijebu Water-Side, Nigeria respectively. Maddox (2007) suggested that the link between peoples' education, literacy and their ability to engage in processes such as co-management of fish stocks, livelihood diversification, and income and asset management is valid for a productive sector. Thus, reduced literacy level, widespread educational disadvantaged coastal communities are a barrier to achieving proactive management and productive fishing enterprise. Wategire and Ike (2015) believed that the use of education for managerial input showed that shrimpers with better education are technically more efficient than their counterparts with less education. The author further stated that education helps to seek, interpret and make good use of information and production inputs. Odebiyi *et al.* (2013) believed that education is an important factor which can influence production and determine the level of awareness on the rate of return on the enterprise. Olaoye *et al.* (2013) cited an economic development theory which suggests that technical efficiency is influenced by technical knowledge acquired and understanding in addition to other socio-economic factors.

Furthermore, the negative coefficient of family size suggests that an increase in the household size of a shrimper will increase their technical efficiencies. Since crew members are most times the immediate family of the lead shrimper, it is expected that more hands will be provided *in N. hastatus* shrimping operation which will ultimately reduce labour cost. Frank and Umoh (2016), Nlerum and Bagshaw (2015) and Kareem *et al.* (2013) recorded negatively significant and non-significant coefficients for family size in Akwa Ibom State, Rivers State and Ogun Water-Side, Nigeria respectively. However, Dawang *et al.* (2011) and Unongo (2010) estimated a positively non-significant family size among shrimpers in Natural Lakes of Plateau State and Guma Local Government Area of Benue State, Nigeria respectively.

Also, an increase in the years of shrimping experience in the present study will provide increased capacity for shrimpers to know how to fish in tides, weather forecast and ensuring economic efficiency of the shrimping enterprise. Result for shrimpers under study was not different from the negative coefficient estimated for years of experience in Natural Lakes of Plateau State, Delta and River States (Akankali and Chindah 2011 and Dawang *et al.*, 2011). However, the present study differs from the findings of Wategire and Ike (2015) who estimated a non-significant shrimping experience among small scale shrimpers in the coast of Delta State (Wategire, 2015) and Akwa Ibom State (Frank and Umoh, 2016). Young shrimpers as opined by Akankali and Chindah (2011) are ignorant of not adopting conservation measures and their desire to increase catch as a step to increasing income. It is presumed that having more years of shrimping experience in the study area will enable shrimpers to have more information and understanding of the industry.

The implication of an increase in the horsepower of outboard engines is that it would increase the speed of the boat. Choosing the right type of boat and engines for a vessel is very important. Boat weight and horsepower of engines have an impact on the performance of the boat. Increased horsepower will reduce the fishing effort (hours) thereby increasing fishing area and catch volume. Kareem *et al.* (2013) and Ogunbameru (2011) estimated a positively significant coefficient for the horsepower of boat engines in Ijebu Water-Side, Nigeria respectively. Also, a reduction in the take-off time of shrimpers will favour an increased number of fishing hours which may increase shrimp catch significantly particularly in the off-peak season. Coefficients of crew size were negative for the two seasons and this implies that increasing the crew size will increase the technical efficiency of shrimpers but reduce their inefficiencies. Kareem *et al.* (2013) reported a positive and non-significant crew size in Ijebu Water Side.

Results from the stochastic analysis further reveal that as more shrimpers personally own a boat, the more the benefit that could be derived. Shrimpers in this category will not be spending resources to rent boats which can reduce their profit. Thus, any addition to the numbers of boats, outboard engines and nets will make shrimpers to be more efficient in their production than those with lesser numbers. The numbers of the net were significant in the peak season probably because of the frequency of shrimping which requires increased numbers of nets. Shrimpers with more outboard engines, boats and nets can earn more income from renting/leasing out of these

materials. The gamma coefficient of 0.656, implies that about 65.6% variations in fishermen output were as a result of the presence of technical inefficiency effects in the fishery and this was significant at 5% probability level.

Results of shrimping functions indicated that only cost of fuel and feeding had significant positive coefficients while of cost of fishing gear was negative and not significant at 5% level. The reason for this might be attributed to the fact that the shrimping enterprise was analyzed on a short run basis while fixed costs were depreciated monthly. Factors such as cost of fuel, repair and maintenance and feeding with positive coefficients will increase the technical efficiencies of the shrimping enterprise while those with the negative coefficients will reduce it. The negative coefficient of the cost of gear implies that as more resources are expended on gear and nets, such will reduce the efficiency of the enterprise. It is expected that nets, outboard engines and wooden boats become more efficiently utilized when they are adequately maintained. The efficiency of shrimpers may be reduced if outboard engines or boat breaks down on the high sea during shrimping, causing time wastage, reduced catches and income. Thus, fishing equipment and materials must be adequately maintained for increased, continuous productivity and high fishing efficiency. The significance of the cost of fuel and feeding was expected as these were the two daily variables that drive shrimping operations.

A similar study by Frank and Umoh (2016) estimated a positively significant cost of PMS for shrimpers in Akwa Ibom State, Nigeria. Kareem *et al.* (2013) reported that the coefficients of cost of gear, outboard engines and feeding were positive and significant coefficients among shrimpers in Ogun Water-Side, Nigeria. The author, however, reported a negative and non-significant fuel cost in the study area. Equally, Ogunbameru (2012) reported that the cost of outboard engines was a positively significant factor in the fishing enterprise of Ogun Water-Side, Nigeria. On the other hand, Unongo (2010) described the operating cost of fishing in Guma Local Government Area of Benue State, Nigeria as positive and significant. Cost of maintenance and labour were the significant factors in the fishing enterprise in Natural Lakes of Plateau State, Nigeria which were different from the shrimping enterprise under study (Dawang *et al.*, 2011).

Table 1: Stochastic Estimates of Inefficiency and Production Models of Shrimpers

	Peak Month		Off-Peak Month	
Variables	**Coefficient**	**T-ratio**	**Coefficient**	**T-ratio**
Estimates of Inefficiency Model				
Constant	-2.39	-7.69	-1.79	-5.72
AgE	0.73	3.75*	0.69	3.65*
EdU	-0.04	-0.77	-0.03	-0.57
FmZ	-0.03	-0.53	-0.03	-0.51
YeX	-0.46	-2.54*	-0.45	-2.34*
EhP	-0.87	-3.70*	-0.86	-3.57*
ToT	0.86	3.65*	0.76	3.61*
RtL	-0.71	-3.71*	-0.75	-3.84*
NfL	-0.69	-2.44*	-0.54	-2.26*
BoW	-0.28	-1.39	-0.12	-1.52
CrS	-0.03	-0.56	-0.03	-0.51
NfD	-0.91	-4.00*	-0.87	-3.69*
NoB	-0.02	-0.43	-0.03	-0.56
NbE	-0.03	-0.58	-0.02	-0.47
NoN	0.24	1.54	0.17	1.41
Estimates of Production Function				
Constant	-0.28	-2.86	-0.23	2.89
Ln CfG	0.15	1.48	0.14	1.23
Ln CrM	0.16	1.45	0.12	1.41
Ln CfU	0.57	3.95*	0.48	3.22*
Ln CfE	0.27	2.66*	0.28	2.48*
Diagnosis Statistics				
Sigma-Squared	0.84	5.61	0.73	5.38
Gamma	0.67	2.68	0.56	2.05
Log likelihood	406.67		306.48	

Source: Computed from Field Survey (2017).**Note:** * Means significant at 5% level

Stochastic Estimates of Shrimp Processing Functions

Results equally show that age of processors, processing experience, household size, strands of wood, number of processing days/month and smoking tray area were the parameters with negative coefficients while age of processors, processing experience and number of processing days/month were significant at a 5% probability level for both periods at the processing segment of the value chain (Table 2). The coefficients of educational level, marital status, the distance between the landing and processing site, numbers of years kitchen have been in-use, by-catch and tray area were positive. Increasing parameters such as age, experience, household size, strands of wood, numbers of processing days per week, tray area with negative coefficients will increase the

technical efficiency of processors. On the other hand, positive coefficients of parameters such as educational level, marital status, the distance between the landing site and kitchen, number of years kitchen have been in-use and by-catch increases the technical inefficiencies while they reduce the technical efficiency. Non-significant factors such as marital status, educational level, household size, distance between landing site and kitchen, strands of wood, year kitchen was built had no significant influence on the shrimp processing while factors such as age, processing experience, by-catch and numbers of processing days/per month had significant influence on processing efficiency.

The negative coefficient associated with age indicates that as a processor grows in age, she becomes more adaptable to the shrimp processing enterprise. However, adaptability such as the ability to withstand fire and smoke during processing which can result in coughing or catarrh reduces with increase in age. Hence, to increase the participation of higher age group in the processing of white shrimp, there is a need to developed improved and cheap processing methods that will reduce processing hazards enumerated above. The significance of processing experiencing is expected. This is because as processors grow in age in the enterprise, they learn more on how to reduce the hazard associated with processing, understand price fluctuation, product shelf life, and seasonal availability and how to derive maximum economic benefit from the industry.

Furthermore, a positively but non-significant educational level estimated indicates that education was not a significant factor in determining the efficiency of white shrimp processors in the value chain but the positive sign shows that this will only increase their inefficiency and reduce their technical efficiency. Olaoye *et al.* (2015) reported that fish processing highly involves very strict controls and measurements in order to ensure that all processing stages have been carried out hygienically. Hence, improved education among processors could increase their knowledge of kitchen hygiene. Increasing the household size is expected to increase the availability of cheap labour for the processing enterprise. Most times, the children of processors help in carrying fresh shrimp from landing sites to the kitchen, sort by-catch, prepare smoking tray, firewood and regulate the amount of fire produced during processing. An increase in the numbers of married women in the processing stage of *N. hastatus* is expected to increase the efficiency of the enterprise. Reducing the distance between the landing site and the kitchen is expected to increase the technical efficiency of processors. Distance involves the concept of time and place of residence of processors. In this case, the distance was measured in the number of walking minutes between the kitchen (processing unit) and the landing site. Walking long distance with loads of fresh shrimp can weaken muscles and joints. They can also strain and damage the joints and knees. A negative coefficient for strands of wood signifies that more strands of wood will increase the efficiency of processors. The numbers of woods needed to dry shrimps to a moisture level that could guarantee long shelf life must be provided.

The kitchen (processing unit) housing materials for this stage of the value chain is an integral part of the fishery. Therefore, a recently constructed kitchen will ensure strong infrastructure for processing than the one constructed a long time ago. Dilapidated kitchen is attributed to structures that are long-time constructed. They are the entrance for rodents, flies and water during rainfall. This could affect the sensory properties, hygiene and economic returns of processed shrimps. The level of by-catch in shrimp was estimated as a significant factor that could reduce the amount of shrimp available for sale. Reducing the level of by-catch in shrimp bought by processors will increase their technical efficiency as more dried shrimp would be available for marketing compared with shrimp catches with a high level of by-catch. Seafood Watch (2017) documented that for every pound of shrimp caught in the fishery, up to six pounds of other species are discarded. Increased by-catch wastes time and damage gear. Thus, reducing by-catch in the shrimp fishery could be achieved using more selective shrimping gear, gear modification and more selective fishing methods. Shrimping activities and seasonal variation affects the quantity of shrimp that is available for processing, i.e. the volume of catches and the number of days shrimp will be processed per month is determined by the numbers of days shrimps were extracted. As the number of fishing days increases, more shrimps are processed per day and processors earn more returns on their investment. Increasing the size (area) of the smoking tray will allow more shrimp to be processed per time.

This would reduce the processing frequency per day, reduce time, increase income per day and improve the technical efficiency of the processing enterprise.

Results further show all the cost factors in the processing model had a positive coefficient. However, only the cost of fresh shrimp was significant at 5% level for both peak and off-peak period respectively. Thus, an increase in those variables will increase the technical efficiency of shrimp processing in the study area. Though one would have expected the cost of packaging and additives to be significant, however, the non-significance of the variables is an indication of low-value addition in the enterprise. This according to Odebiyi *et al.* (2013) opined is the biggest challenges faced by the seafood sector in the coastal fishing community. Therefore, to increase the income generated at this stage of the value chain, in addition to the cost of packaging materials and additives will shift the cost of production, produce competitive products for different classes of the society which will earn processors more income.

Table 2: Stochastic Estimates of Inefficiency and Production Models of Shrimp Processors

	Peak Month		**Off-Peak Month**	
Variables	**Coefficient**	**T-ratio**	**Coefficient**	**T-ratio**
Estimates of Inefficiency Model				
Constant	-1.79	-5.01	-1.21	-3.01
AgE	-0.65	-4.03*	-0.28	-4.01*
PrX	-0.42	-2.05*	-0.42	-2.01*
EdU	0.02	0.47	0.02	0.46
HoS	-0.05	-0.87	-0.04	-0.76
MaS	0.03	0.58	0.02	0.52
DlP	0.07	0.86	0.08	0.85
SoW	-0.04	-0.67	-0.04	-0.65
NkB	0.03	0.56	0.04	0.57
ByC	0.21	1.28	0.18	0.91
NpM	-0.55	-2.95*	-0.41	-2.00*
TrA	-0.01	-0.31	-0.02	-0.52
Estimates of Production Function				
Constant	-0.24	2.38*	-0.22	2.15*
Ln CfS	0.54	3.41*	0.48	3.14*
Ln CoF	0.05	0.59	0.03	0.48
Ln CoK	0.03	0.56	0.02	0.55
Ln CsT	0.08	0.96	0.07	0.92
Ln CpM	0.07	0.83	0.06	0.76
Ln CoA	0.02	0.42	0.02	0.43
Diagnosis of Statistics				
Sigma-Squared	0.75	2.42	0.78	3.89
Gamma	0.72	2.60	0.69	1.70
Log likelihood	-270.86		-333.94	

Source: Computed from Field Survey (2017).**Note:** * Means significant at 5% level

Stochastic Estimates of Shrimp Marketing Functions

Table 3 provides information on stochastic estimates of the shrimp marketing function. All the parameters had negative coefficients except the nature of the enterprise. Only the age of marketers and marketing experience were the significant factors in the inefficiency model of shrimp marketers. Increasing the age of marketers will increase the experience of marketers. This will leverage on understand traditional marketing functions, marketing systems, products and price fluctuations in the study area. This according to Iheke (2010) is an indication of practical knowledge acquired which can be used to overcome certain problems associated with the shrimp marketing enterprise. A similar study by Umoinyang (2014) reported a negatively significant coefficient for age, positive and significant coefficient for education and household size for fish marketers in Akwa Ibom State, Nigeria. Ume and Okoronkwo (2013) equally estimated a similar negative coefficient for the experience of fish marketers in Anambra State, Nigeria. A negative coefficient for the source of shrimp indicated that addition to more locations where processed shrimp could be sourced would increase the availability of the product in the market places while the marketers will earn more income.

In addition, the cost of dried shrimp and cost of packaging were positive but only the cost of dried shrimp was significant at 5% level for both periods. The coefficients of rents and market levy, transportation cost and costs incurred on other miscellaneous variables were negative but not significant at 5% level for both periods respectively. Results from this study imply that an increase in the cost of processed shrimp and cost of packaging with positive coefficients in the efficiency model for marketers will increase the efficiency of shrimp marketers. This is because as marketers have more capital to buy processed shrimp and packaged in attractive materials, the more the income that would be generated as consumers purchase the products. Increasing the cost of other factors with negative coefficients such as transportation, rents, market level and other costs will reduce the efficiency of shrimp marketing in the study area. The significance of the cost of processed shrimp implies that only the factor is significant in shrimp marketing in the study area. Significant factors in the inefficiency model for marketers were age and marketing experience while other parameters such as educational level, household size, source of shrimp, type of shrimp marketed, nature of enterprise were not significant. This implies that the age and marketing experience were the two critical factors that affect the inefficiency of shrimp marketers in the study area.

Table 3: Stochastic Estimates of Inefficiency and Production Models of Shrimp Marketers

	Peak Month		**Off-Peak Month**	
Variables	**Coefficient**	**T-ratio**	**Coefficient**	**T-ratio**
Estimates of Inefficiency Model				
Constant	-1.64	-4.33	-1.43	2.13
AgE	-0.74	-3.17*	-0.72	-3.16*
MaE	-0.15	-2.42*	-0.18	-2.45*
EdU	-0.1	-1.22	-0.08	-1.06
HoS	-0.02	-0.44	-0.02	-0.47
NoE	0.03	0.57	0.04	0.62
SoS	-0.12	-1.47	-0.19	-1.66
Estimates of Production Function				
Constant	-0.45	3.51*	-0.48	-3.28
Ln CpS	0.57	2.42*	0.52	2.16*
Ln RmL	0.07	0.95	0.05	0.86
Ln CoP	0.16	0.85	0.12	0.56

Ln CoT	0.02	0.86	0.05	0.94
Ln OcM	0.05	0.47	0.03	0.45
Diagnosis of Statistics				
Sigma- Squared	0.64	1.8	0.92	2.02
Gamma	0.67	2.8	0.69	2.45
Log-likelihood	-529.87		-515.97	

Source: Computed from Field Survey (2017).
Note: * Means significant at 5% level

Elasticity and Return-To-Scale of Value Chain Segments

Return to the scale of the three enterprises evaluated in the value chain is presented in Table 4. RTS was 1.25 and 1.06, 0.79 and 0.68, 0.87 and 0.77 for the shrimping, processing and marketing segments of the shrimp value chain in a typical peak and off-peak month respectively. These parameters provide information on the change in output relative to a unit change in input (Mbanasor and Obioha, 2003). From the result, the production elasticity for each of inputs at each segment was less than unity indicating that therelationship between the input factors and the value of output at each stage of the value chain is inelastic (Anene *et al.*, 2010). Results further indicated that the estimated elasticity of the production v ariables at each segment of the *N. hastatus* value chain had positive increasing functions of the variables in the shrimping stage and positive decreasing function at the processing and marketing segments respectively.

Hence, participants in the shrimping segment were in stage III while shrimp processors and marketers were in stage II of production level respectively. It can be further explained that the shrimpers had increasing return to scale while the processing and marketing segments indicate decreasing return to scale. It thus implies that shrimpers were operating at the region of maximum production;
an irrational region of production while processor and marketers operated at the stage of economic relevance in the production process (Amos, 2007). The implication of these results to shrimpers is that higher outputs are possible with an increase in the levels of aggregate input at the current level of technology (Anene *et al.*, 2010). To increase productivity at the processing and marketing segments, there is a need to increased inves tment most especially increasing the cost component of value addition (additives, packaging).

Similar studies by Amos (2007) recorded a lower elasticity of production (0.80) for crustacean farmers in coastal areas of Ondo State, Nigeria compared with the values recorded at shrimping segment and peak period in the marketing segment of the present study. However, the value reported by Amos (2007) was higher than the elasticities estimated in the processing segment and in the off-peak of shrimp marketing. Elasticities values recorded in the present study for all the segments were however lower than the inelastic value (1.28) reported among fisherfolks in Oguta, Nigeria (Anene *et al.*, 2010).

Table 4: Elasticity and Return-To-Scale of White Shrimp Value Chain Segments

Variables	**Peak Month**	**Off Peak Month**
Shrimping		
CfG	0.15	0.14
CrM	0.16	0.12
CfU	0.57	0.48
CfE	0.37	0.32
RTS	**1.25**	**1.06**
Processing		
CfS	0.54	0.48
CoF	0.05	0.03
CoK	0.03	0.02
CsT	0.08	0.07
CpM	0.07	0.06
CoA	0.02	0.02
RTS	**0.79**	**0.68**
Marketing		
CpS	0.57	0.52
RmL	0.07	0.05
CoP	0.16	0.12
CoT	0.02	0.05
OcM	0.05	0.03
RTS	**0.87**	**0.77**

Source: Computed from Field Survey (2017).

Technical Efficiencies of Value Chain Participants

The predicted technical efficiencies of shrimpers, shrimp processors and marketers are presented in Table 5. TE for shrimpers ranged between 31% and 100% with a mean efficiency of 79% and a standard deviation of 13% during the peak period. The results further revealed that 60% of the sampled shrimpers had the efficiency range between 80% and 89% while those that operated below the efficiency level of 50% formed about 7.50% of the shrimpers. For the off-peak period, the predicted efficiency of the shrimpers ranged between 23% and 96% with a mean efficiency of 76% and a standard deviation of 17%. The results also revealed that only 8.75% of the shrimpers operated at an efficiency level that was less than 50% while about 86.25% of shrimpers operated at an efficiency level that was not less than 60%.

Respondents at the shrimping segments who operated at efficiency level of at least 80% constituted 60% and 76.25% of the shrimpers. The mean efficiency score obtained for the shrimping enterprise during the peak period was greater than the 77% and 73% recorded by Kareem *et al*. (2013) and Wategire (2015) respectively for artisanal fisheries in Ijebu waterside of Ogun State, Nigeria and non-motorized small scale shrimp shrimpers in the coastal areas of Delta State, Nigeria. The value is, however, less than the 83% obtained by Dawang *et al*. (2011) for artisanal fisheries in five natural lakes in Plateau State, central Nigeria. This suggests that shrimpers were more technically efficient during the peak period than the off-peak period. It can also be deduced that shrimpers have a chance of about 21% and 24% to improve on their technical efficiency levels during the peak and off-peak seasons respectively. In addition, it can be said that the shrimpers in the study area displayed wide variations in terms of efficiency level.

Efficiency score for shrimp processors ranged from 27% to 98% with a mean efficiency of 71% and a standard deviation of 23% during the peak period. The result further revealed that about 24.4% of the processors operated below efficiency level of 50%, 29.27% operated at an efficiency level of at least 90%, 46.34% operated at an efficiency level of at least 80% and 58.54% operated at an efficiency level of at least 70%. During the off-peak period, the efficiency score of the processors ranged from 22% to 100% with a mean score of 66% and a standard deviation of 22%. The result also revealed that 34.14% of the processors operated at efficiency level below 50% while 17.08% operated at efficiency level between 50% and 69%, 48.78% operated at efficiency level, not below 70%. Processors displayed a higher level of technical efficiency during the peak period than the off-peak period. It can be deduced that the fish processors have the chance of about 29% and 34% to improve on their technical efficiency levels during the peak and off-peak seasons respectively.

Results further indicated that the predicted technical efficiency of a shrimp marketer ranged from 24% to 99% with the mean efficiency of 72% and a standard deviation of 24% during the peak period. The result further showed that 25% of the marketers operated below the efficiency level of 50% while about 55% of them operated at an efficiency level of at least 70% and 37.50% of marketers operated at an efficiency level of at least 90%. During the off-peak period, the efficiency scores of the marketers ranged from 15% to 99% with a mean efficiency score of 71% and a standard deviation of 25%. While about 20% of the marketers operated at an efficiency level that is less than 50%, 10% of them operated at an efficiency level that ranged between 50% and 69%, and 65% of marketers operated at an efficiency level of at least 70%. Marketers had a fair level of technical efficiency during the peak and off-peak periods. However, there was a wide variation in the technical efficiency of the marketers. It can also be deduced that the marketers in the study area have a chance of about 28% and 29% to improve on their technical efficiency levels during the peak and off-peak seasons respectively.

Table 5: Technical Efficiencies of Value Chain Participants

	Peak Period		**Off-Peak Period**	
Shrimper				
Range	**Frequency**	**Percentage**	**Frequency**	**Percentage**
0.20 - 0.29	0	0.00	3	3.75
0.30 - 0.39	3	3.75	2	2.50
0.40 - 0.49	1	1.25	2	2.50
0.50 - 0.59	2	2.50	4	5.00
0.60 - 0.69	6	7.50	8	10.00
0.70 - 0.79	15	18.75	13	16.25
0.80 - 0.89	48	60.00	29	36.25
0.90 and above	5	6.25	19	23.75
Total	80	100.00	80	100.00

Mean	0.79		0.76	
S Dev	0.13		0.17	
Shrimp processors				
Range				
0.20 - 0.29	2	4.88	1	2.44
0.30 - 0.39	5	12.20	6	14.63
0.40 - 0.49	3	7.32	7	17.07
0.50 - 0.59	1	2.44	3	7.32
0.60 - 0.69	6	14.62	4	9.76
0.70 - 0.79	5	12.20	5	12.20
0.80 - 0.89	7	17.07	8	19.51
0.90 and above	11	29.27	6	17.07
Total	40	100.00	40	100.00
Mean	0.71		0.66	
S Dev	0.23		0.22	
Shrimp Marketers				
Range				
0.10 - 0.29	1	2.50	4	10.00
0.30 -0.49	9	22.50	4	10.00
0.50 - 0.69	8	20.00	6	15.00
0.79 – 0.89	7	17.50	15	38.50
Total	40	100.00	40	100.00
Mean	0.72			0.71
S Dev	0.24			0.25

Source: Computed from Field Survey (2017).

Conclusion

The study assessed the determinants of technical efficiencies and estimates of production functions of participants in the white shrimp value chain in coastal areas of Ondo State, Nigeria. It reveals that policy variables such as age, family size, experience, horsepower of outboard, take off time, return time to landing, number of fishing hours and number of fishing days of shrimpers; age, experience and number of processing days/month of processors, as well as age and experience of shrimp marketers, were the significant factors in the inefficiency models of participants at the shrimping, processing and marketing segments of the value chain respectively. All the estimates of the production functions for all the segments had positive coefficients. However, only the cost of fuel and feeding in the shrimping segment; the cost of fresh shrimp in the processing stage and cost dried shrimp in the marketing segment were the significant factors for a typical peak and off-peak month respectively? The results imply that productivity at each segment of the value chain can be increased in the nearest future by 21% and 24%, 29% and 34%, 28% and 29% in the shrimping, processing and marketing segments by increasing inefficiency and production function estimate with negative and positive coefficients respectively. This would enhance output at each segment of the value chain as well as improve the performance and contribution of the *N. hastatus* fishery to coastal livelihood Nigeria.

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SMALLHOLDER CROP FARMERS' PERCEPTIONS OF CLIMATE CHANGE AND EFFECTS ON LIVELIHOODS IN EHLANZENI DISTIRCT OF MPUMALANGA PROVINCE, SOUTH AFRICA

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Abstract
Climate change is perhaps the most serious and noticeable environmental challenge facing the whole world today but will have different effects on human livelihood based on different regions. It has been acknowledged that the phenomenon has a negative impact on rural farmers' livelihood that is why the study seek to examine smallholder crop farmers' perceptions of climate change and its effects on livelihood in Ehlanzeni district of Mpumalanga province, South Africa. A total number of 351 rural farming households were interviewed. The perceptions of climate change were compared with empirical evidence from climatic trends of the study area, and impacts on rural livelihoods. The results showed that climate data failed to show the evidence perceived by farmers over a long-term period. The study recommends that farmers' perceptions on climate change should be considered when programs on agricultural production are planned and implemented.

Keywords: Climate change, Livelihood, Perception, Smallholder farmers, South Africa

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Introduction

The impacts of increased climate variability are pronounced, especially in developing and least developed countries, where most agricultural production systems are rain-fed; and where people have few resources to cope with and adapt to these changes (Traerup and Mertz, 2011; Easterling *et al.,* 2000). Furthermore, the effects of climate change imply that the local climate variability which people have previously experienced and adapted to is changing and this is happening in a relatively great speed. This will have a great adverse impact on the already vulnerable and poor communities that rely on climate sensitive livelihood sources like agriculture (Nhemachena *et al*. 2014).

Climate change affects agricultural production, as agricultural sector is inherently sensitive to climate conditions and is one of the most vulnerable sectors to the risks and impacts of global climate change (Maponya and Mpandeli, 2012). The climate change has already affected crop yields in many countries (Oduniyi 2013; Maponya and Mpandeli 2012; Ayinde et al. 2010; IPCC 2007). This is predominantly possible in low-income countries, where climate is the determining factor for agricultural productivity (Apata et al. 2009) and with unproductive adaptive measures (Ayinde et al. 2010). It was concluded that Africa's agricultural production is vulnerable and negatively affected by climate change. This is due to the consequence of unpredictable and inconsistent weather which calls on farmers to take understanding of the effects that this weather composition might have on agriculture in the immediate period or long term of production (Deressa et al. 2009; Apata *et al*. 2009).

Climate change models for Southern Africa indicate that the region will face increased challenges due to projected changes in climate (Hulme et al. 2005); likewise, (Tadross et al. 2009; IPCC, 2007; Tadross, Hewston and Usman, 2005) predicted reductions and increased rainfall variability for most parts of Southern Africa. This corroborates the findings of Moyo et al.

(2012) that Southern Africa has been experiencing recurrent droughts and these experiences together with other extreme weather events are expected to continue. It was envisaged that the region will face additional warming,

drying and extreme climatic conditions but these will vary spatially across the regions (Nhemachena et al. 2014). Climate change projections in Southern Africa are supported by recent trends in climate of the region (Brown et al. 2012). Nhemachena et al. (2014) claimed that failure to confront climate change will jeopardize developmental gains across various sectors and worsen vulnerability of local systems and the national economy. Therefore, climate change adaptation/mitigation is of utmost importance.

Climate change phenomenon has been alarming in South Africa and there are discussions to determine a way to forestall the challenges from climate change but this cannot be achieved if people's perceptions and opinion did not count. Rural household perception of climate change is important to make knowledgeable decisions on adaptation alternatives (Maddison, 2007). The views are usually informed by the farmers and rural communities' personal experiences of how climate change affects their livelihood (Nhemachena, 2014). Climate change observation is not enough to make farmers adopt a coping strategy to climate change. Maddison (2007) based on evidence from 11 African countries, revealed that even if farmers accurately identify climate change; some may still fail to adjust because of limited access to information, adaptation technology options, markets and budgetary resources amongst other factors. This indicates the significance of ensuring that rural communities have the means and resources to implement the various potential best adaptation strategies at their disposal to address current and expected climate change impacts on agricultural production and livelihood.

Maddison (2007) enunciated that battling climate change is of two-stage process: (1) the initial stage is perceiving that changes in climate have occurred and (2) making decisions to adopt a particular measure or not. Based on the above point of view, identifying how farmers perceive climate change is critical in helping to inform policy decisions on adaptation grounded on local perspectives and current autonomous adaptation strategies (Nhemachena, 2014). This article investigated smallholder crop farmers' perceptions of climate change and its impact on livelihoods in Ehlanzeni District of Mpumalanga Province. The perceptions were compared with empirical evidence from climatic trends on precipitation and temperature and impacts on livelihoods in the study area. The remainder of the paper is structured as follows. The methodology is the following, while results and discussion are presented in preceded in the next section and conclusions and policy recommendations accomplish the paper.

Methodology

Study Area

The study was carried out in Ehlanzeni district of Mpumalanga province, South Africa. The following five local municipalities within the Ehlanzeni district were visited, namely Thaba Chweu, Mbombela, Umjindi, Nkomazi and Bushbuckridge. Mpumalanga province is geographically located in the eastern part of South Africa and situated at longitude 30.6167 and latitude -29.8167 which covers a total land area of 76 495 square kilometers (Stat SA, 2011) with an average of 494 meters in elevation. The province is located mainly on the high plateau grasslands of the Middleveld, which roll eastwards for hundreds of kilometers. It rises towards mountain peaks and terminates in an immense escarpment in the northeast and this escarpment plunges hundreds of meters down to the low-lying area known as the Lowveld (South Africa. Info, 2015) which make the province to fall within the grassland biome.

The escarpment and the Lowveld form a transitional zone between this grassland area and the savanna biome. Ehlanzeni district shares land border with Mopani district to the North, the Republic of Mozambique to the east, the kingdom of Swaziland and GertSibande to the south, Nkangala to the south-west and Sekhukhune to the north-west (Wikipedia, 2016). The choice of Ehlanzeni district for this study comes because of its climatic contrasts with the other drier districts that is situated in the HIGHVELD REGION of the province. Ehlanzeni district is situated in the LOWVELD REGION of the province and has a cold winter and hot, humid weather which allow for a variety of agricultural activities.

Figure 1: Map of the study area
Source: Mpumalanga Municipality map (2016)

Sampling procedure

The specific study areas included Bushbuckridge, Mbombela, Nkomazi, Thaba Chweu and Umjindi local municipalities and the smallholder farmers practicing crop production in these local municipalities. The criteria for participation were that farmers must be farming for at least one farming season and willing to participate. A multistage sampling technique was utilized for the study. There was a purposive random sampling in the study area. Firstly, there was a purposive selection of places with the highest crop production in the study area. Secondly, a purposive selection of villages in each local municipality (Thaba Chweu, Mbombela, Umjindi, Nkomazi and Bushbuckridge) was done and lastly 351 farming household that are mainly into crop production were randomly selected from the list of farmers that was obtained from the extension officer of each local municipalities in a proportionate method.

The primary data was gathered systematically with the aid of a structured questionnaire which targeted only smallholder crop farmers and their demographic and socio-economic characteristics as well as perceptions on climate change and impacts on their livelihood. The nature of the study and the contents of the questionnaire were explained to the farmers that were interviewed. Descriptive statistics, mainly frequency distribution, means and percentages were used for empirical analysis. The study also used empirical climatic studies and qualitative data gathered from South African weather services to validate farmers' perceptions and its consequences on livelihoods.

Results and Discussion

Smallholders crop farmers` perceptions of changes in climatic variables was investigated and the impacts of such changes. The findings are reported and discussed in this section. The descriptive statistics on the socio-economic characteristics of the farmers is first reported and discussed then followed by the findings on farmers` perceptions of climate change and the impact on livelihoods.

Descriptive socio-economic characteristics of respondents

The socio-economic characteristics of the respondents analyzed were age, gender, educational level, household size, major occupation and farmers' farming experience.

Age of the respondents

The distribution of the respondents according to age was presented in (Table 1). As reflected in the Table, 10.3% of the respondents were between age ranges of 19 – 35 years. Respondents of the age range of 36 – 45 years of age constituted 25.1%, while those in 46-55 years of age accounted for 30.8% and the remaining 33.9% were found to be 56 years of age and above while farmers below 18 years of age were not considered to be part of the research. Therefore, the results of the study showed that older farmers are believed to be more experienced thus impacting positively on their productivity.

Gender

According to the results in Table 1, 72.1% of the respondents were males while the proportion of female respondents was 27.9%. The reason for having higher number of male farmers may be due to the drudgery nature of agricultural activities. This agreed to Coster and Adeoti (2015) that stated that male authority was attributed to the strenuous farming due to high dependency on physical labour. Generally, women unlike men have limited access to critical agricultural inputs and consequently disadvantage their participation in farming.

Education level

Table 1 below showed respondents with secondary education and post-secondary education to be 29.6% and 24.5% respectively. However, 27.9% of the respondent had a primary education. It was further revealed that 5.1% of the respondents had vocational training while another 5.1% went for adult education and participants with no formal education constituted 7.7%. This showed a reasonable level of literacy in formal education among the farmers. Maddison (2007), Mugula and Mkuna (2016) and Deressa *et al.* (2008) found that experienced and educated farmers have more skills and knowledge regarding change of climate and coping measures. Thus, the literacy level of participants significantly affected climate change perception in the current study area. Based on these results, there is an assumption that farmers' literacy level might affect level of cognizance regarding change of climate and the development of practices for adaptation. Educated farmers respond to climate change risks by making at least few options towards adaptation (Maddison, 2007).

Household size

The table below revealed that 59% of the respondent's household size falls under the range of 3-5, 31.3% had a household size range of 6-8, while household size range of 9-11 amounted to 8.5% and 1.1% represents household size of 12 and above. The finding indicated that there might be improvement in agricultural production especially if family members are fully involved in farming activities. This was similar to the finding of Mugula and Mkuna (2016) who revealed that household with large farm size were more likely to engage in agricultural production, take advantage of high production and are more likely to adapt to climate change.

Major occupation

The study revealed that farming (63.5%) was the major occupation of the respondents in the study area, 21.9% of the respondents were formally employed, 0.9% participants were traders, 8.2% were self-employed and 5.4% of the respondents were pensioners. The reason why majority of the respondents were engaged in farming might be as a result that they were smallholder farmers with no job other than farming. This was supported by Connolly-Boutin and Smit (2016), and Calzadilla *et al.* (2013) who estimated that farming provided the main livelihood

and employment for majority of the population of most developing countries and contributes considerably to national GDP.

Farming Experience

Majority of the farmers (47.0%) had farming experience of 21 years and above while 26.2% had farming experience range of 6 – 10 years and 19.7% of the respondents had a farming experience ranging between 11 and 15 years. The farmers with less than two years of farming experience constituted 7.1%. The implication of this is that the farmers had knowledge about the farming sector. Ibrahim *et al.* (2015) and Madisson (2007) found that experience impacted positively on farmers' productivity and could perceive climate change earlier.

Table 1: Frequency distribution of respondents by socio-economic characteristics

Variables	Frequency	Percentage
Age group		
19 – 35	36	10.3
36 – 45	88	25.1
46 – 55	108	30.8
≥56	119	33.9
Total	351	100.0
Gender		
Male	253	72.1
Female	98	27.9
Total	351	100.0
Educational Status		
Post-secondary Education	86	24.5
Secondary Education	104	29.6
Primary Education	98	27.9
Vocational Training	18	5.1
Adult Education	18	5.1
No Formal Education	27	7.7
Total	351	100.0
Household size		
3 – 5	207	59.0
6 – 8	110	31.3
9 – 11	30	8.5
≥12	4	1.1
Total	351	100.0
Major Occupation		
Farming	223	63.5
Employed formally	77	21.9
Trading	3	0.9
Self Employed	29	8.2
Pensioners	19	5.4
Total	351	100.0
Year of farming		
<2 years	81	23.1
6 – 10 years	65	18.5
11 – 15 years	242	68.9
≥21 years	136	26.8
Total	351	100.0

Source: Field Survey (2016)

Perceptions on Climate Change

Distribution based on changing climatic variables

Table 2 revealed multiple responses of the farmers on different climatic variables that is changing in the study area. About 63.8% of the farmers indicated that rainfall is changing intensity while 93.2% of the farmers identified that there has been a significant increase in the level of drought intensity, 85.2% of the farmers disclosed that the temperature level of the area is increasing while 42.7% of the respondents claimed that the study area has been experiencing strong winds; similarly 8.3% stated that they have been experiencing no wind situation and 12.8% identified flood as other type of climatic variable that is changing.

The implication of this result is that when there is low density of rainfall combined with increased temperature and strong wind, it will increase the rate of evaporation and this will lead to drought; this is an implication that makes the farmer identified drought as the most climatic change variable in the study area and this justifies the studies of Nhemachena *et al.* (2014) which says Southern Africa has recently been experiencing recurrent droughts which South Africa is part of the region. In addition, South African government and South African weather services had declare Mpumalanga province as an area affected by drought in the country.

Table 2: Frequency distribution according to changing climatic variables

Changing climatic variables	*Frequency	Percentage
Rainfall	224	63.8
Drought	327	93.2
Increased temperature	299	85.2
Strong wind	150	42.7
No wind	29	8.3
Others (flood)	45	12.8

Source: Field Survey (2016)

*Multiple responses

Distribution based on perception on long term rainfall

Table 3 shows that majority of the farmers (84.6%) identified that rainfall will decrease in the study area in the long run while 15.4% indicated that there will be an increase in rainfall in the long run.

Table 3: Frequency distribution according to perceptions on long term rainfall changes

Long term rainfall perceptions	Frequency	Percentage
Increase in rainfall	54	15.4
Decrease in rainfall	297	84.6
Total	351	100.0

Source: Field Survey (2016)

Distribution based on perception on temperature

Table 4 revealed that 79.5% of the farmers pinpointed increase in temperature in the study area in the long run while 20.5% maintained that there will be a decrease in temperature in the long run.

Table 4: Frequency distribution according to perceptions on long term temperature changes

Long term temperature perceptions	Frequency	Percentage
Increase in temperature	279	79.5
Decrease in temperature	72	20.5
Total	351	100.0

Source: Field Survey (2016)

Distribution based on how climate change is affecting crop production

It was revealed in Table 5 that climate change has been affecting crop production in the study area. None of the farmers indicated that climate change has been increasing the production output; while majority of the respondents 80.1% affirmed that climate change in the study area has been causing decrease in their production level; 19.9% confirmed that they have been experiencing no production since climate is affecting the farming activities.

This finding corroborates the assertion of United State Department of Agriculture (USDA) (2007) which expressed that climate change has both positive and negative effects on agriculture; but there could be a more negative influence in the long run, which may lead to food scarcity if no immediate efforts are to challenge these problems. Akinnagbe et al. (2014) also stated that crop yields are affected by many factors associated with climate change which include: temperature, rainfall, extreme weather events, climate variability and even CO_2 concentration in the atmosphere which is predicted to cause global warming that will have a significant impact on crop production.

Table 5: Frequency distribution according to how climate change is affecting crop production

How climate change affect crop	Frequency	Percentage
Decreased Production	281	80.1
No production	70	19.9
Total	351	100.0

Source: Field Survey (2016)

Distribution based on impacts of climate change on livelihood

Table 6 indicates a multiple response on how climate change affects the livelihood of the respondents in the study area. About 81.8% of the farmers indicated that climate change increased their socio-economic problems; while a reasonable percentage of 75.8% expressed that reduction in income is another way climate change has been affecting their livelihood; 71.2% stated that changes in climatic variables increased unemployment rate in the study area and 50.4% says that climate change reduces cultivated lands; 49.9% identified reduced cultivated practices as one of the impacts of climate change on livelihood in the study area but 8.5% stated that climate change increased their cultivated practices.

Table 6: Frequency distribution according to climate change impacts on livelihood

Climate change impact on livelihood	*Frequency	Percentage
Increased socio-economic problems	287	81.8
Reduced income	266	75.8
Increased unemployment	250	71.2
Reduced cultivated lands	177	50.4
Reduced cultivated practices	175	49.9
Increased cultivated practices	30	8.5
Total	351	100.0

Source: Field Survey (2016)

*Multiple responses

Distribution based on impacts of climate change on agricultural production

Table 7 reflected a multiple response of the respondents on the impact of climate change on agricultural production. Majority of the farmers (86.3%) enunciated that climate change reduce crop yields while only 6.8% indicated that crop yield increases with the impact of climate change. Furthermore, about 87.2% affirmed that climate change has increased disease affecting crop production in the area in addition to the 61.3% that claimed changes in climatic variables lead to reduction in land fertility.

This validate Benhin (2006) that climate change impacts on agricultural production may be different from different farming systems in the country-irrigated, dryland, large scale and small-scale farms; but small-scale farmers will be the most severely affected and crop net revenues are expected to fall by as much as 90% by 2100. Therefore, in general climate change is expected to be harmful to agriculture in the study area.

Table 7: Frequency distribution according to climate change impacts on agricultural production

Climate change impact on agricultural production	*Frequency	Percentage
Reduce land fertility	215	61.3
Increase crop yield	24	6.8
Reduce crop yield	303	86.3
Increase crop disease	306	87.2
Total	351	100.0

Source: Field Survey (2016)
*Multiple responses

Distribution based on impacts of climate change on food security

Table 8 displayed a multiple response of the respondents on the impact of climate change on food security. All the farmers stated that climate change has increased the price of food. About 72.4% indicated that climate change is reducing the household income as 58.7% stated that food scarcity is part of the impact of climate change in the study area as well as 62.7% of the respondents revealed that climate change has caused lack of local food crops markets. This substantiate the research outcome of Parry *et al.* (2004) who stated that developed countries mostly benefits from climate change compensating for declines projected, for the most part of the developing nations, while global production might appear stable, regional differences in crop production are likely to grow stronger through time, leading to a significant polarization of effects with substantial increases in prices and risk of hunger amongst the poorer nations, especially scenarios of greater inequality.

Table 8: Frequency distribution according to climate change impacts on agricultural production

Climate change impact on food security	*Frequency	Percentage
Reduce income	254	72.4
Food scarcity	206	58.7
Increase food price	351	100.0
Lack of local market	220	62.7
Total	351	100.0

Source: Field Survey (2016)
*Multiple responses

Comparing farmers' perceptions and empirical climate change evidence

The trend line of mean rainfall for the study area projected an upward movement which indicated that rainfall in the study area has been increasing all over the years between the periods of 1996 – 2015 which is a contrasting evidence to farmers` perception of decrease in rainfall. However, the trend on the graph below for the past three years shows that there has been a significant decline in rainfall in the study area which justifies the empirical models for Southern Africa region that there will be reductions in rainfall (IPCC, 2007; Nhemachena, 2014). It implies that over a long-term period, climate data fail to show the evidence perceived by farmers. Therefore, this result shows that farmers can accurately perceive change and climate variability and impacts on agriculture and livelihoods for short-term period.

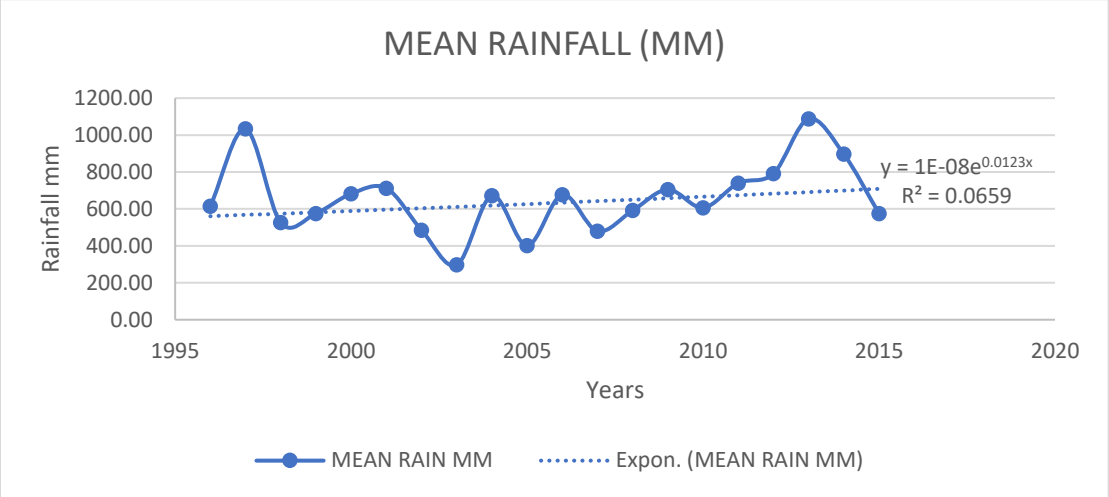

Figure 4.5: Mean Rainfall of Ehlanzeni district
Source: South African Weather Services, 2016

Furthermore, farmers' perceptions on temperature in the study area was found to be generally comparable to the temperature data provided by the South African weather services for the study area which the trend line shows a rising movement, it indicates that temperature has been increasing in the study area between the periods of 1996 – 2015. This implies that the results for perceptions on temperature was in agreement with actual trends in observed temperatures indicating a clear increase in temperature but temperature increase in the last three years has moved to an extreme which has caused drought in the study area which is in agreement in the projection for the Southern Africa region that has recently been experiencing recurrent droughts (Moyo et al, 2012; Nhemachena, 2014) which is being caused by decreasing rainfall and increase in temperature.

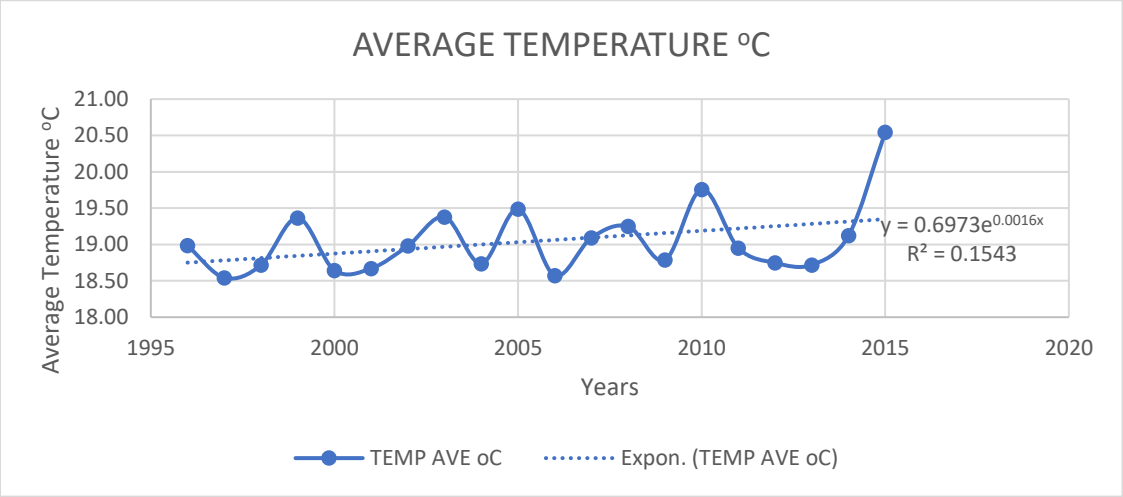

Figure 4.6: Mean Rainfall of Ehlanzeni district
Source: South African Weather Services, 2016

Conclusions and recommendations

This study investigated smallholders' crop farmers' perceptions on climate change and its impacts on livelihood. The study was conducted in Ehlanzeni district of Mpumalanga province, South Africa. The findings show that farmers were able to observe changes in climatic variable and the impact on livelihood is negative. When perceptions were compared with empirical evidence of climate change (temperature and rainfall), it was discovered that farmers perception agrees to temperature while the trend line on precipitation differs from farmers perception on rainfall. It was revealed that over a long-term period climate data fail to show the evidence perceived by farmers. Therefore, this result shows that farmers can accurately perceive change and climate variability and impacts on agriculture and livelihoods for short-term period.

The following recommendations could go a long way in informing policies to deal with the effects of climate change on agricultural production and farmers' livelihood in the study area based on the farmers' perceptions: (1) Farmers' perceptions on climate change should be considered when programmes on agricultural production are planned and implemented. Programs should be positioned with the way in which farmers perceive climate change. This will probably help in getting co-operation from the farmers when adaptation measures have to be implemented. Farmers in the study area perceived climate change in form of declining rainfall and increasing temperature and low humidity which implies that programs must consider perceived changes in climatic variables. (2) Rural communities in Ehlanzeni district should actively invest in strategies to adapt to climate change in order to reduce expected climate change impacts on their livelihoods and there is a need to collectively support rural communities to enhance their adaptive capacity. However, further research is required to address the impacts of changes in climate on farmers' livelihoods.

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ECONOMIC ANALYSIS OF COWPEA PRODUCTION IN OYO STATE, NIGERIA.

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Abstract
The study examined the economic analysis of cowpea production in Oyo State of Nigeria. 120 respondents were interviewed. Data collected were analysed empirically. Percentage and frequency tables were used to analyse the socio-economic characteristics of the producers. Gross margin was used to estimate the profitability of the cowpea production in the study area. Result shows that the economic efficiency for cowpea production in the study area was 0.3 (or 30%), which implies that the farmers operate below economic efficiency level and capacity. The estimated benefit cost ratio of 1.38 and the gross margin of ₦106, 016.07, which was close to half of the total revenue (₦ 203, 016.67) both indicates that cowpea production is a profitable business in the study area. The regression analysis also indicates that age, sex, household size and educational level of farmers have positive coefficient and thus, they are variables that influence cowpea production in Oyo State. The study however, recommends improved extension services delivery by public and private agricultural support agencies to enhance the adoption of modern production techniques by farmers to boost their efficiency.

Keywords: *Cowpea Production, Economic Analysis, Efficiency, Profitability.*

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Introduction

Cowpea (*Vigna unguiculata*) is one of the major staple crops in the dry Savannah region of West Africa. The seeds serve a good source of protein to humans and their animals, income for farmers and farm commodity traders, and its juvenile leaves and pods are widely consumed as vegetables (Dugje *et al.*, 2009). The importance of this crop to the livelihood of millions of the people, especially the poor, in this region cannot be overemphasized.

Nigeria is no exception to the wide cultivation and uses of cowpea. In fact, the larger hunk of the world cowpea supply is from Nigeria, which produces not less than 3 million metric tonnes of cowpea from 4.4 million hectares of land annually (FAO, 2006). The crop is predominantly grown in the drier locations of the Guinea Savannah, Sudan Savannah and Sahel Savannah zones of Nigeria. In the recent, enhancements in scientific researches have made it possible to extend its cultivation successfully onto the wetter regions of the country. Despite the huge contribution of Nigeria to the total world's cowpea production, it is reported (Abubakar and Olukosi, 2008) that the average production yield within the country is low; thereby leaving a huge gap between the currently realized yield and the potential realizable yield.

Despite the poor yield condition experienced of cowpea production in Nigeria, the demand for it is on a steady increase, both locally and internationally (Coulibaly and DeBoer, 2000). In fact, the country's supply of cowpea, at the present, is not meeting up with the national demand alone; a situation which is indicated as likely to be lingering on through to the year 2015 'under most plausible yield assumptions' (Abubakar and Olukosi, 2008: 243). The underlying factors identified as causing such a discrepancy between the national supply and demand of cowpea include; increasing population growth, soaring poverty condition and the consequent resort of the general public to predominantly live on relatively cheap food. Kormawa *et al*. (2000) emphasized possible further widening in gap between the supply and demand if cowpea production is not better adapted to prevailing weather conditions and the high incidences of diseases and pests in cowpea production are not abated.

In the light of the foregoing, this study seeks to investigate, on a general note, the profitability of cowpea production among cowpea farmers in Oyo State, Nigeria. To unravel this, the study specifically aims at: examining the socio-economic characteristics of cowpea farmers in the state; identifying the factors influencing cowpea production in the study area; determining the cost and return of cowpea production in the locality; and lastly, identifying the problems of cowpea production in the study area and suggesting possible solutions.

Methodology

The study was carried out in Oyo State in South Western Nigeria. It is a predominantly agrarian state with many of the inhabitants practicing farming, while others are involved in various disciplines such as civil service, hunting, fishing, marketing and local art works, among others. Oyo state is located between latitudes $7^0 3^1$ and $9^0 12^1$ north of the equator and longitudes $2^0 47^1$ and $4^0 23^1$ east of the Greenwich meridian with a total land area of about 28,454 square kilometers. It has a total population of 5,591,589 (NPC Census, 2006). The state has three agro-ecological zones, namely: rainforest, savannah and derived savannah (Agboola, 1979), which make the production of cowpea and other crops like maize, rice, cassava, yam, pepper, plantain, tomatoes, cocoa and oil palm important in the study area. Multiple stage random sampling technique was adopted in the study to select the representative farmers.

Three (3) local government areas were randomly selected. They comprise, Oyo East, Ogbomosho South and Saki East. Two communities were selected from each of the local government areas, while 20 respondents were randomly selected from each community. Therefore, a total of 120 respondents were selected in all. Primary data on socio-economic and farming status of the respondents were collected with the aid of a pre-tested structured survey questionnaire, while the secondary data were obtained from journals, internet, libraries and others. Descriptive statistical tools such as frequency counts and percentages were used to analyze the socio-economic characteristics of the respondents. Farm budgetary techniques were employed to analyze the costs and returns on cowpea production in the area. The gross margin analysis was used to determine the profitability of cowpea production. The hypothesis of the study was tested with the regression analytical tools.

The Gross Margin Model

The gross margin is the difference between gross farm income and the total variable cost of production. It was used to estimate the profitability level of cowpea production in the study area. Gross margin analysis is used to evaluate the efficiency of an individual business (Olukosi and Erhabor, 2005) while the net farm income is the difference between the gross margins and the total cost of production less the sum of fixed variable cost.

Mathematically, the gross margin model states as follows:

GM = TR - TVC ……..(i)

NFI = GM - TFC ……..(ii)

Where

GM = Gross margin per hectare (N)

TR = Total Revenue per hectare (N)

TVC = Total variable cost per hectare (N)

NFI = Net farm income per hectare (N)

TFC = Total fixed cost per hectare (N)

The variable cost involved purchasing cost, transportation, storage, labour and contingencies, while the fixed costs include cost on land lease and utilities.

Economic Efficiency

To determine the economic efficiency of resources used, the following ratio was used to estimate the relative efficiency of resource use according to Rahman and Lawal (2003)

$$E.E = \frac{MVP}{MFC} = r$$

Where:
r = efficiency ratio of resource used
MFC = Marginal Factor Cost i.e. Cost of a unit of a particular resource
MVP = Marginal Value Product i.e value added to cowpea out put

The Multiple Regression Model
The ordinary least square multiple regression analytical method was used to determine the level of relationship between variables that determine the size of returns to the business. This involves the use of production function models. The model stipulates the technical relationship between inputs and output in any production process. It is used to examine the degree of effects of changes in inputs on the output in Agricultural production.

Production Function
Model Specification
The Implicit Production function is given as:

$Q = f(x) \ldots\ldots X_n, ut)$
Where Q = returns (₦)
$Xi \ldots\ldots X_n$ = Explanatory variables
U_t = Error term

The above was utilized explicitly through experimentation with four functional forms.
Linear Function $Q = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9InX_9 + U_t$
Exponential function $InQ = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9InX_9 + U_t$
Semi-log function $Q = Inb_0 + b_1InX_1 + b_2InX_2 + b_3InX_3 + b_4InX_4 + b_5InX_5 + b_6InX_6 + b_7InX_7 + b_8InX_8 + b_9InX_9 + U_t$
Double-log function $LnQ = Inb_0 + b_1InX_1 + b_2InX_2 + b_3InX_3 + b_4InX_4 + b_5InX_5 + b_6InX_6 + b_7InX_7 + b_8InX_8 + b_9InX_9 + U_t$

Where

X_1	=	Marital Status
X_2	=	Age of Farmers (Years)
X_3	=	Sex (Male/Female)
X_4	=	Household Size
X_5	=	Educational Qualification
X_6	=	Farm Size
X_7	=	Cropping Pattern
X_8	=	Time of Planting
X_9	=	Method of Cultivation

Results and Discussions
The socio-economic characteristics of cowpea producer in the study area are presented in the Table 1 below. The socio economics characteristics examined are age, gender, marital status, household size, source of land and educational qualification.

Table 1: Analysis of Socio-economic Characteristics of respondents

Characteristics	Frequency	Percentage %
Age		
22-30	49	40.8
31-45	47	39.2
46-55	17	14.2
56 and above	7	5.8
Gender		
Male	100	83.3
Female	20	16.7
Marital Status		
Single	49	40.8
Married	62	51.7
Widow	6	5.0
Divorce	3	2.5
Household		
1-5	12	10.0
6-10	52	43.3
11 and above	56	46.7
Source of Land		
Leased	9	7.5
Rent	15	12.5
Inheritance	69	57.5
Outright purchase	19	15.8
Gift	8	6.7
Qualification		
Non-formal Education	3	2.5
Primary Education	40	33.3
Secondary Education	67	55.8
Tertiary Education	10	8.3

Source: *Survey data, 2010*

From the table 1 above showed that majority of the cowpea farmers in the study area are still young, it can be observed from the table above that 80 percent of the population are still between the range of 22-45 years of age and 46-55 years of age are 14 percent while 56 and above years of age are 5.8 percent.

It was revealed that majority cowpea producers are men. Table 1 indicated that 83.3 percent of cowpea producers in the study area are men while only 16.7 percent are women. The high percentages of males involved in cowpea production might be connected with the fact that relatively high amount of energy and capital are required for the business since it involves a lot of rigors.

It was also revealed that 40.8 percent of cowpea producers are single, 51.7 percent of the sampled population is married and 2.5 percent are divorced and 5.0 percent are widow. It was observed that most of the producers usually have more than one wife with a large family for the purpose of having more access to family labour, it is only the younger farmers who keeps lesser number of wives or just one and the few young men who are single but with individual farms lands. Therefore, a lot of money will be needed to pay for hired labour by the middle-aged farmers. These younger farmers are also observed to be the one within the population who are enlightened enough to send wards to school. Respondents that fall between the range of 1-5 household size had a percentage of 10.0 percent while 6-10 household size is 43.3 percent and household size from range 11 and above is 46.7 percent these showed that cowpea farmers in the study area makes use of family labour and this reduces their expenses on hired labour.

From Table 1, it was revealed 7.5 percent of the respondents acquired land by leasehold while 12.5 percent of the farmers rented their farm. The majority of the respondents, 57.5 percent got their land by inheritance whereas 15.8 percent and 6.7 percent sourced their farmland from outright purchase and gift respectively. It is obvious therefore, that cost of cowpea production is minimized through acquisition of land by inheritance. Although, it explains why small-scale farming is prevalent in the study area as land are held in fragment.

Table 1 above showed that 2.5 percentages of the respondents has non-formal education, and it is observed that the bulk of the population of the cowpea producers interviewed received secondary education. This could be accounted for the reasons they could handle modern inputs and adopt model technologies to enhance their cowpea and make profit. The more educated a farmer or producer is, the more enlightened he becomes and chance are that he readily accepts and adopts new innovations than the one with little or no qualifications.

Gross Margin Analysis

The gross margin is the difference between total revenue and total variable cost.

Table 2; Gross margin analysis

	Naira
Total revenue per yr (TR)	₦ 203, 016.67
Variable cost per year	
Cost of labour	₦ 80, 000. 00
Cost of Transportation	₦ 10, 000. 00
Cost of Seeds	₦ 2,000. 00
Cost of fertilizer	₦ 5, 000. 00
Fixed cost	
Tools and machinery	₦ 20,000.00
Others farm implements	₦ 50,000.00
Total Fixed Cost	₦ 167,000.00
Net Farm Income	₦56,016.67
Gross Margin	₦106,016.07
Economic Efficiency	0.34
Benefit Cost Ratio (BCR)	1.22
Gross Ratio	0.82

Source: *Survey data, 2010*

Table 2 revealed that the average total cost of cowpea producers is ₦167, 000 and the total revenue is ₦ 203,016.67 and the Net farm income is ₦56, 016.67 the gross margin is ₦ 106,016.67 in the study area.
It also showed that the Economic Efficiency for cowpea producer is 0.34 which implies that the cowpea farmers operate below economic efficiency level since E. E and ROR is less than one, which implied that for every ₦1.00 invested, 34kobo is being gained. The gross ratio for cowpea producer is 0.82 which implies that for every ₦1.00 returns, 82k is being spent. The BCR for cowpea farmer is 1.22 which is one of the concepts of discount method of project evaluation. The rate of thumb project with BCR greater than one indicates profit. This implied that cowpea production is profitable in the study area.

Table 3: Normalized Multiple Regression Analysis

Variables	Coefficient	Standard error
Marital Status	-.2650832	.1719969
Age	.0023861	.0129163
Sex	.0667462	.2443033
Household size	.012726	.0336223
Educational Qualification	.2763751**	.1346598
Farm size	-.1180197*	.0634759
Pattern cropping	-.0378514	.1274638
Time of planting	-.1170227***	0.396693
Method of cultivation	-432758**	.2202976
-Cons	2.056476	.9446207

Source: *Survey data, 2010*

Functional form:

$Q = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + U_t$

(0.26) (0.002) (0.06)

Marital status, size of farm, cropping pattern, time of planting has negative coefficient which implies that this has no effect on cowpea production in Oyo State. The decrease in marital status can leads to increase in cowpea production i.e. single or youths can be adequately involve in cowpea production than married people in the study

area. Farm size is also significant at 10%, time is significant at 1% while marital status and planting pattern are not significant to cowpea production. While age, sex, household size, educational qualification, method has positive coefficient which implies that these has an effect on productivity of cowpea producers in the study area.

Conclusion

The research reveals that majority of the cowpea farmers in the study area are actively young with an average age of 35, while the minimum age is 22 and the maximum is 65 years. It was also deduced that the majority of the male respondents are married. Majority of the farmers have formal education, which would definitely promote the adoption of new technologies in the production and processing of cowpea in the study area. The gross margin of ₦106, 016.07, close to half of the total revenue (₦ 203, 016.67), indicates that cowpea production is profitable in the study area. If productivity must increase, small scale farmers must improve their use of modern inputs, practice better soil conversation techniques in order to boost production. In addition, developing input markets, especially for fertilizer, and improved seeds are crucial and government should encourage full participation of private investors in cowpea production through the supply and distribution of inputs.

An appraisal of the extension service in the state is suggested so as to discover and improve on weak points, or modifies their plans of operation to bring about better outreach to farmers. From the findings in this study, it is recommended that farmers in the study area should be encouraged to come together and pull resources together so that they can attain the most profitable scale of production. Public and private agricultural support agencies should assist the farmers in the provision of inputs like fertilizers and tractor rent age services at affordable prices. Updating their knowledge of improved cowpea production techniques through standard extension services delivery system would definitely boost their efficiency.

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BENEFITS OF AGRICULTURAL TRANSFORMATION AGENDA ON CASSAVA FARMERS IN IJEBU-ODE LOCAL GOVERNMENT, OGUN STATE.

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Abstract

This paper examines benefits of agricultural transformation agenda on cassava farmers in Ijebu-Ode Local Government areas of Ogun state, Nigeria. Multistage sampling technique was employed to sample 208 registered cassava farmers. Data were obtained using structured questionnaire. Majority of the respondents are married (86.5%), male (64.9%), at the range of 40-49 years (30.8%) with secondary education (49.0%). About 99.5% are aware of ATA goals, and ATA has helped cassava farmers (98.1), hence, 93.8% have derived benefits from ATA. There was significant relationship between the information source and benefits derived by the respondents from agricultural transformation agenda ($p<0.05$). There was no significant relationship ($p>0.05$) between the constraints and benefits derived by the respondents from agricultural transformation agenda. The result of this work reveals that there is lack of start-up capital for the farmers to engage in farming: therefore, farmers should be encouraged with the disbursement of adequate credit facilities by the government.

Key Words: Benefits, Agricultural transformation, agenda, cassava farmers, Ijebu-Ode, Ogun State

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Introduction

Cassava (*manihot esculenta*) production is vital to the economy of Nigeria as the country is the world's largest producer of the commodity in the world (Nweke *et al.,* 1994). The crop is produced in 24 of the country's 36 states. In 1999, Nigeria produces 33 million tons, while a decade later, it produced approximately 45 million tons, which is almost 19% of production in the world (Central Bank of Nigeria, 2003). Originally a crop of South America, it was introduced to Nigeria's southern part during the period of slave trade proliferated by Portuguese explorers and colonizers in the sixteenth century.

Cassava is the chief source of dietary food energy for the majority of the people living in the lowland tropics, and much of the sub-humid tropics of West and Central Africa (Tsegia *et al,* 2002). Therefore, its production and utilization must be given prime attention in food policy. Even though farmers have not yet attained the desired technical efficiency in cassava production as a result of weak access to external inputs such as fertilizers and herbicides (Ezedinma *et al*, 2006), the wide scale adoption of high yielding varieties and the resulting increase in yield have shifted the problem of the cassava sector from supply (production) to demand issues, such as finding new uses and markets for cassava. The government of Nigeria considers a transition from the present status of usage to the level of industrial raw material and livestock feed as a development goal that can spur growth with increase in employment. This consideration underscores the various research and policy initiatives in cassava improvement, production, and processing. Estimates of industrial cassava use in Nigeria suggest that approximately 16 percent of cassava root production was utilized as chips in animal feed, 5 percent was processed into a syrup concentrate for soft drinks and less than 1 percent was processed into high quality cassava flour used in biscuits and confectionery, dextrin, adhesives, starch, and hydrolysates for pharmaceuticals and seasonings (Ene, 1992). At present, a wide range of traditional cassava forms (such as *gari, fufu,* starch, *lafun, amala,* etc.) are produced for human consumption (Kormawa *et al*, 2003).

As an effort of the previous government, it has thriven to ensure that agriculture is a major source of income into the national economy by creating Agricultural Transformation Agenda program, scheduled to reduce the level of poverty, ensure that the nation stop importation of agricultural/crop produce and also start exporting agricultural/crop produce by the year 2020 (Federal Ministry of Agriculture 2011). Currently, the ATA program has started paying attention to some major crop produce such as Sorghum, Cassava, Rice, Groundnut, Oil palm, and cotton. This program also designs to provide job for the country's unemployed youths. Cassava targets to Create job worth about 1.2 Million by 2015. As part of its aim, ATA has ensured the processing of cassava flour into making of cassava bread and making use of its peal as bio-fuel, which in turn tends to reduce the level of poverty and hunger among the rural and local farmers in Nigeria (Odeyemi 2013).

Agricultural transformation agenda is defined as the process by which the agricultural produce of a country is being restored to its formal glory. It's an act by which farmers are being empowered with several agricultural facilities to booster their agricultural produce (Agboola 2015). The Agricultural Transformation Agenda is designed to make the Agricultural Sector a business project as against development project and to promote Private Sector investment in agriculture, thereby execute integrated projects via value chain processes; generate employment, and transform Nigeria into a net exporter of agricultural commodities. Also, the transformation action plan is focused on key aspects of Agricultural Value Chain processes. They include the provision and availability of improved inputs (seed and fertilizer), increased productivity and production, as well as the establishment of staple crop processing zones (Felix 2013). The ATA is aimed at establishing a sustainable agriculture and agribusiness in Nigeria to raise the income of rural farmers. UNDP through its project, Facility for Inclusive Markets (FIM) has offered to support the government of Nigeria in key demand areas that include developing and implementing key value chains in agriculture and agro-industry and enhancing inclusiveness (UNDP 2012). It is estimated that smallholder farmers produce not less than 95% of the agricultural output and cultivate about 85% of the total agricultural land.

Today, the amount of food available per person on a global basis is 18 percent higher than 30 years ago. Most developing countries benefited from this development with the result that their nutrition has witnessed very tremendous improvement. As impressive as this improvement is, about 800 million people worldwide still suffer from chronic hunger; and one quarter of this population resides in Africa. The situation gets worse every year and can lead to a catastrophe if it is not possible to increase food supply at a rate faster than that at which the world population increases (Knirsch, 1996). The major challenges of Nigeria's Agriculture have been identified to include: lack of a legislated agricultural extension policy, grossly inadequate and untimely funding; poor leadership and coordination and low private sector participator. Nigeria has experience decline in cassava farming with so many factors nailed as being responsible for this declining among which are low soil fertility, high incidence of pest and pathogens, high cost of pesticides, lack of access to improved planting material, poor farmer education and most importantly unavailability of government implements being the basic in catastrophe. Hence, the study examines benefits of Agricultural Transformation Agenda on cassava farmers in Ijebu-ode local government.

Methodology

Study Area

The study was carried out in Ijebu-ode, Ogun state nickname "Gateway to Nigeria". According to 2006 census, Ogun State has a population of 3,751,140 residents, with a total land mass of 16, 980.55 km^2 (6, 556.23sq mi). It consists of 20 local governments of which Ijebu-ode is one. The state is characterized by heavy rainfall with climate following usual tropical pattern. The state is predominantly an agricultural area and most of its inhabitants are farmers. Ijebu-Ode local government has an area of about 192 km^2 and a population of 154,032 (2006 census). It is within 100 km of the Atlantic Ocean in the eastern part of Ogun State and possesses a warm tropical climate. The inhabitants are Yoruba speaking with people from northern and eastern part of the country in the rural villages and communities. The major occupation of people in the area is cultivation of cash crops with cassava being the main crop, but often intercropped with yam, grain, tobacco and cotton. There are three wards in Ijebu-Ode which include; Iwade-Oke, Iwade-Isale, and Porogun

Data Collection and Analysis

Multistage sampling procedure was carried out in this research. In the first stage, Ijebu-ode was divided into three wards purposively selected for this study due to location of ATA farm institute (Thai Farms) in Ososa, Ijebu-ode. The second stage was randomly selected using 3 cells from each of the 3 wards due to availability of cassava farmers in the area. (According to ADP 2015, the total number of registered cassava farmers in Ijebu-Ode is; 2,080). While in the third Stage was sampled proportionately using 10% of cassava farmers in each block.

Table 1: Showing Names and Population of each cell

Cells	Population	Percentage (%)	Total
IJASI	178	10	18
ITANTEDO	175	10	18
ITA-AFIN	169	10	17
IYANRO	266	10	26
IDELE	274	10	27
OSOSA	358	10	35
MOBAYEGUN	197	10	20
ITALAPO	205	10	21
ISASA	258	10	26
	2,080		**208**

Source: Agricultural Development Program (ADP) Ijebu-ode Local Government, Ogun State

The data for this study was collected through interview with the aid of a well structure questionnaire. All data collected were analysed using statistical analysis and interpretations of the results were done by descriptive statistics and correlation analysis.

Table 2: Personal Characteristics of Respondents in the Study Area

Characteristics	Frequency	Percentage
Age		
< 20	1	0.5
20 - 29	30	14.4
30 - 39	53	25.5
40 – 49	64	30.8
50 – 59	32	15.4
> 60	28	13.5
Total	208	100.0
Marriage status		
Single	25	12.0
Married	180	86.5
Divorced	1	0.5
Widowed	2	1.0
Total	208	100.0
Educational status		
No formal education	6	2.9
Primary education	5	2.4
Secondary education	102	49.0
Tertiary education	62	29.8
Adult education	33	15.9
Total	208	100.0
Religion		
Christian	128	61.5

Islamic	80	38.5
Total	208	100.0
Year of experience		
1 – 5	115	55.3
5 – 10	58	27.9
10 – 15	18	8.7
Above 15	17	8.2
Total	208	100.0
Household		
1 – 5	138	66.3
6 – 10	66	31.7
Above 10	4	1.9
Total	208	100.0
Tribe		
Yoruba	161	77.4
Igbo	32	15.4
Hausa	15	7.2
Total	208	100
Primary occupation		
Farming	118	56.7
Artisan	89	42.8
Clergy	1	0
Total	208	100

Source: Field Survey

The table 2 below shows the socio-economic characteristics of cassava farmers. The tables above, 0.5% of the respondents were < 20 years, 14.4% of the respondents were within the age of 20-29, and 25.5% were within the age range of 30-39, more-so 30.8% were within the range of 40-49, and 15.4% were within the range of 50-59 years, while 13.5% were > 60 years. The data showed that the respondents in the range of 30-49 years (56.3%) were in their productive age. The significance of this information is that the respondent's age range is ideal and that this will enable them to cope with the rigors of cassava production. This result is in line with the findings of Wuranti (2004) who noted in his study that farmers in their active years are productive and can easily adopt agricultural innovations.

The table further reveals in terms of education that 29.8% of the respondents attended tertiary institution, 49.0% were with secondary school certificate, 2.4% were with primary school leaving certificate, and 15.9% has adult education while 2.9% had no formal education. The implication is that the ability to read and write could enhance them to easily adopt new innovation and expose them to information which could lead to more efficient farming activities. This is in line with the study of Singh *et al.,* (1997) which showed the relationship between the level of education and access to information among cassava farmers are positive.

Further-more eighty-seven percent (87%) of the respondents were married, while only 12.0% were single and 1.0% widowed. The high percent of married respondents is a good indication that those married cassava farmers have access to family members (wives and children) who could supply free family labour, thus making more hands available for productive activities on respondents' cassava farms. Furthermore seventy-seven percent (77.4%) of the respondents were Yoruba, while 15.4% were Igbo and 7.2% are Hausa. The high number of Yoruba farmers is a good indication that the farmers would find it easy to communicate among them-selves. Result from the table below indicates that 55.3% respondents has between 1-5 years' experience in cassava cultivation, and 27.9% had between 5 and 10 year experience while 16.9% had more than 15 years' experience. 91.1% of the respondents started the cultivation of cassava less than 15 years and that had justified their experience in cassava production. The result further shows that 66.3% of the farmer's household was within the

range of 1-5, 31.7% were within 6-10 while 1.9% was above 10. This indicates that farmer's household will help in the farming activities of the respondent, increase their income and reduce their consumption. 61.5% of the respondents were Christians and 38.5% were Muslims. The result also revealed that 56.7% of the respondents were farmers, 42.8% artisan and 0.5% were clergy. Which implies that majority of the respondents were farmers and that they engage in other activities as a means of survival.

Table 3: Benefits derived from Agricultural transformation agenda

Variables	D	SD	UD	A	SA
Reduce production cost	4(1.9)	8(3.8)	21(10.1)	71(34.1)	104(50.0)
Improves cassava quality	6(2.9)	14(6.7)	34(16.3)	114(54.8)	40(19.2)
Reduces post-harvest loss	12(5.8)	12(5.8)	44(21.2)	92(44.2)	48(23.1)
Facilitate empowerment	9(4.3)	18(8.7)	45(21.6)	73(35.1)	63(30.3)
Source of income	6(2.9)	5(2.4)	30(14.4)	91(43.8)	76(36.5)
Improve production	3(1.4)	12(5.8)	53(25.5)	66(31.7)	74(35.6)

Source: Field Survey

Result above reveals that 1.9% respondents disagreed that ATA reduces production cost, while 3.8% respondents strongly disagreed that ATA reduces production cost, 10.1% respondents were undecided, 34.1% respondents agreed that ATA reduces production cost, and 50% respondents strongly agreed that ATA reduces production cost of farmers, this indicates that the cost of cassava production of the farmers has reduced ever since the introduction of ATA. This in line with Akinwumi (2012), who stretched out that ATA, will reduce the cost of production among the rural farmers. More-so 2.9% respondents disagreed that ATA improves the quality of cassava produced by the farmers in the study area, 6.7% respondents strongly disagreed that ATA improves the quality of cassava produced, 16.3% respondents were undecided, 54.8% respondents agreed that ATA improves the quality of cassava produced and 19.2% respondents strongly agreed that cassava improves the quality of cassava produced.

Furthermore 5.8% respondents disagreed that ATA reduces post-harvest loss, another 5.8% respondents strongly disagreed that ATA reduces post-harvest loss, 21.2% respondents were undecided, 44.2% of the respondents agreed that ATA reduces post-harvest loss and 23.1% respondents strongly agreed that ATA reduces post-harvest loss. 4.3% of the respondents disagreed that ATA facilitate empowerment of rural cassava enterprise, 8.7% respondents strongly disagreed that ATA empowers rural cassava enterprise, 21.6% respondents were undecided, 35.1% respondents agreed that ATA facilitate empowerment of rural cassava enterprise, and 30.3% respondents strongly agreed that ATA facilitates empowerment of rural cassava enterprise. More-so 2.9% of the respondents disagreed that ATA is a source of income and employment, 2.4% strongly disagreed that ATA serves as sources of income and employment, 14.4% were undecided and 43.8% agreed while 36.5% were strongly agreed that ATA serves as source of income and employment. Also 1.4% of the respondents disagreed that Agricultural transformation agenda strengthen and improve production, processing and marketing of cassava product. 5.8% of the respondents strongly disagreed that ATA improves production of cassava, 25.5% were undecided, 31.7% agreed that ATA improves cassava production, while 35.6% of the respondents strongly agreed that ATA improves production, processing and marketing of cassava product. This supports Odeyemi (2013) assertion that ATA tends to reduce the level of poverty and hunger among the rural and local farmers in Nigeria.

Table 4: Constraints faced by farmers on Agricultural Transformation Agenda

Variables	Low	Moderate	High
Poor knowledge and assess to Agricultural technologies	8(3.8)	30(14.4)	170(81.7)
High cost of farm land	18(8.7)	76(36.5)	114(54.8)
Inadequate government policies to empower cassava farmers	37(17.8)	88(42.3)	83(39.9)
Insufficient knowledge of source	32(15.4)	107(51.4)	69(33.2)
Inadequate awareness about Government program	41(19.7)	91(43.8)	76(36.5)
Inadequate assess to supporting Institutional facilities	51(24.5)	82(39.4)	75(36.1)
Poor storage facilities	46(22.1)	78(37.5)	84(40.4)
Poor road network	37(17.8)	69(33.2)	102(49.0)
Market saturation during harvesting period leading to low prices	48(23.1)	71(34.1)	89(42.8)
Low private sector participator	60(28.8)	88(42.3)	60(28.8)
Low supply of skilled manpower	59(28.4)	73(35.1)	76(36.5)
Politicization of land by government	58(27.9)	84(40.4)	66(31.7)
Lack of buy back from Government	36(17.3)	90(43.3)	82(39.4)
Inadequate and untimely funding	30(14.4)	72(34.6)	106(51.0)
Lack of start-up capital	15(7.2)	51(24.5)	142(68.3)
Poor coordination of ATA	18(8.7)	46(22.1)	144(69.2)

Source: Field Survey

Table 4 shows the constraints faced by cassava farmers on Agricultural transformation agenda. According to the table below, 81.7% of the respondent's support's that poor knowledge to agricultural technology is high, 14.4% support that it is medium and 3.8% support low, and this indicates that farmer's knowledge about ATA is very poor. This project work supports the work of Ogunsumi *et al.,* (2013) that farmers lack adequate knowledge about the on-going ATA. Also 54.8% of the respondents support that there is high cost of farm land, 36.5% support moderate and 8.7% support low. 17.8% of the respondents support that there is low level of inadequate government policies to empower cassava processing industries, 42.3% is moderate and 39.9% support high. This shows that governmental policies towards empowering infant cassava processing industries are inadequate.

More-so 15.4% of the respondent's support that insufficient knowledge of credit source is low, 51.4% is moderate and 33.2% support high. This shows that the credit scheme allocated to the farmers by the government is moderately distributed to the farmers. Furthermore 19.7% of the respondents support that lack of /or inadequate awareness and assess about government program on Agricultural transformation agenda is low, 43.8% is moderate and 36.5% is high. 24.5% of the respondents' support that lack of access to supporting facilities is low, 39.4% is moderate and 36.1% is high. Result of this project work further explains that 22.1% of the respondent's support's that non-availability of storage facilities is low, 37.5% support moderate and 40.4% is high. This indicates that there is no proper storage facilities put in place for the farmers to store their produce. Furthermore 17.8% of the respondent's support's that poor road network low, 33.2% supports that the poor road network is moderate while 49.0% of the respondent's support's that the poor road network is high. This result shows that the road network leading to the respondent's farm are very poor and this would discourage the farmers in farming, also this will reduce the income of the farmers.

Furthermore 23.1% respondent's support's that the market saturation during harvesting period leading to low harvesting is low, 34.1% supports its moderate while 42.8% respondents support it is high. More-so 28.8%

respondents support that private participator is low, 42.3% supports that private participator is moderate while 28.8 supports that it is high. Furthermore 28.4% respondent's support's that supply of skilled manpower to drive the agricultural sector is low, 35.1% supports that it is moderate and 36.5% supports that it is high. The result of this work further shows that 27.9% respondent's supports that politicization of land allocated by government is low, 40.4% supports that it is moderate while 31.7% supports that it is high. Also 17.3% respondent's support's that lack of buy back by the government is low, 43.3% supports its moderate while 39.4% supports that it is high. More-so 14.4% respondent's support that inadequate or untimely funding is low, 34.6% supports that it is moderate while 51.0% supports that it is high. 7.2% respondents support that lack of start-up capital among the farmers is low, while 24.5% is moderate and 68.3% supports that lack of start-up capital among farmers is high. Furthermore 8.7% respondents support that ATA is not been coordinated properly thereby leading to poor coordination, 22.1% respondents support that the coordination is moderate while 69.2% respondents support that poor coordination of ATA is high. This indicates that ATA has been poorly coordinated by the various agencies, and this is in line with Ogunsumi *et al.,* 2013 work that ATA is not been coordinated properly either by the government or by the various approving agencies.

Table 5: Chi-square test of socio-economic characteristics and benefits derived from ATA by the respondents

Variables	X^2	DF	P value	decision
Age vs benefit derived	30.441	5	0.000	S
Marital status vs benefits derived	3.092	3	0.378	NS
Educational status vs Benefits derived	38.394	4	0.000	S
Tribe vs benefits derived	14.308	2	0.001	S
Religion vs benefits derived	0.493	1	0.483	NS
Household size vs benefits derived	6.655	2	0.036	S
Years of experience vs Benefits derived	9.921	3	0.019	S
Primary occupation vs Benefits derived	19.896	2	0.000	S

Source: Field Survey

The Pearson chi-square analysis shows that there is a significant relationship (P<0.05) between the socio-economic characteristic of the respondents (age, educational status, tribe, household size, years of experience and primary occupation) and benefits derived from a by the respondents

Relationship between constraint and benefits derived

From the table below, it is revealed that there is no significant relationship (p=0.315 > 0.05) existing between the constraints and benefits derived by the respondents from agricultural transformation agenda. This implies that the constraints faced by cassava farmers has no significant relationship with the benefits derived by the farmers, therefore null hypothesis is rejected and alternate hypothesis is accepted.

Table 7:PPMC Analysis of the constraints and benefits derived

Variable	**Constraint**	**Benefits Derived**
Benefits Derived Vs	1	0.315
Constraint	0.315	1

Conclusion

Findings of this study shows that only registered farmers with government receive and enjoy full benefits from the government on Agricultural transformation agenda. Most of the cassava farmers in the study area were familiar with policies in place on Agricultural Transformation Agenda. It also indicated that the low illiteracy level among the respondents might increase their access to information and this shows the relationship between the level of education and benefits derived from agricultural transformation agenda of cassava farmers.

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ASSESSMENT OF YOUTH PARTICIPATION IN COMMERCIAL AGRICULTURAL DEVELOPMENT PROGRAMME IN EKITI STATE.

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Abstract
This study assessed youth participation in Commercial Agricultural Development Programme in Ekiti state. Method of data collection were done through interview schedule on one hundred and eighty-four (184) of both active and non-active youth participants using structured questionnaire. Data analyses were through the use of frequency, percentages, means and regression analysis. Also, t-test statistics was used to test the hypotheses of the study. The findings revealed that the majority of youth sampled were male (92% and 88.1%), majority between the ages of 31-35 years (56%) with mean age of 35 years. Most of them were married (93.3% and79.8%) Also, majority of them were illiterate (86.7% and79.85%) and had been farming for a period of 6-10 years of active participant also, non-active (50.5%) had farming experience of less than 5years. Majority of active participants (76%) were full time farmers while (68%) of non-active were part-time farmers. The result revealed that youth have positive attitude towards the YCAD programme. Majority of the beneficiaries that left YCAD held the perception that farming was not a viable career option because the objectives stated for the programme were not met. These objectives include transportation, incentive, storage facilities and marketing of agricultural products. The regression analysis shows that a unit increase in age and marital status will lead to an increase in participation of youth in the programme. Also 89% of active and non-active 79% of variations in the dependent variable (output level) was explained by the independent variable (socio-economic characteristics). It is concluded that the youth commercial agricultural programme have positive effects on youth participation in the programme. It is recommended that the program should focus on youth that are already in Agri-business especially University graduates than secondary school leavers because they are more exposed to see agriculture as a business. The program should take cognizance of gender disparity in order to encourage female youth to participate in the programme. Efforts should be made by the government to facilitate more extension contacts and increased awareness of the opportunities that abound in youth engagement with YCAD to boost youth confidence and sustainable engagement in the programme.

Keywords: Youth participation in commercial Agriculture Development programme in Ekiti State

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Introduction

The role of agriculture remains significant in Nigeria economy despite the strategic importance of the oil sector. Agriculture primarily provides employment for Nigerians and accounts for more than one third of total gross domestic product (GDP). More than 70% of the working populations in Nigeria are employed in the agricultural sector directly or indirectly and over 90% of Nigeria 's agricultural outputs come from peasant farmers who live in rural areas (Abubakar, 2011). The reliance on agriculture for food production and food security at domestic, regional and global levels depend on youth productive force. This is the generation which is expected to rise in the coming years for food production and food security (proctor and Lucchese, 2012).Agriculture in Africa has untapped potential to create jobs both directly and indirectly in order to attract young people, agriculture will need to be more dynamic and appealing than it is now and young people will need to view the sector more positively than they do now (Institute of development studies, 2012) Fayemi,(2012) noted that without effective policies and agenda on youth development, the benefits of economic growth will continue to by-pass a significant proportion of Nigerians, including our teeming population of youths.

Globally, youth is described as the period in an individual's life, which runs between the end of childhood and entry into the world of work (Onuekwusi and Effiong 2007). Youth is seen as universal stage of development, According to Nigeria's

National Youth Development Policy, the youth comprise all young persons of age 18-35 who are citizens of the Federal Republic of Nigeria. A major concern of the federal Government in Nigeria is how to tackle the problem of unemployment among the youths in the country. Various regions in Nigeria have designed and executed several self-empowerment programmes to enhance the economic empowerment of youths (Umeh and Odo 2002).one of such programmes is Youth Commercial Agricultural Development Programme (YCAD) which was initiated in 2012 to accelerate the process of Agriculture commercialization in Ekiti State and help to increase employment opportunities for youths, value addition of specific agriculture products and increased Internally-Generated Revenue (IGR). It is crafted to systematically mobilize the youths into sustainable commercial agriculture, generate employment opportunities to potential young entrepreneur by promoting high value crop (HVC) production, processing and marketing under a holistic value development agenda. The programme focused on youth who are graduates, Diploma and school certificate holders. Its area of major food production focused was Arable crops, Nursery, Processing, Livestock and Aquaculture.

The successive regimes at the Federal Government level have introduced various agricultural development schemes with the aim of encouraging the youth and boosting food production and farmers' income through provision of agricultural infrastructure, inputs and effective extension work (Jibowo, 2005).The effort to restore the past glory of agriculture through the creation of youth programmes and project has not yielded the expected results. Despite these incentives and the expanding markets for primary and secondary agricultural commodities, the involvement of the youth in agricultural activities has steadily declined in recent years (Adekunle *etal* 2009). Since the inception of the Programme in 2012, few attempts have been made to study and assess the Programme on productivity of the participants. This study, therefore intends to provide answers to the following research question: -What are the socio-economic characteristics of youth participants in the Programme? What is the level of participation of youth in YCAD agriculture? What is the effect of the socio-economic factors on youth participation in YCAD programme? And what is the perception of the youth on the extent to which the objectives of the programme have been met?

This study will help the youth to participate actively in agriculture and in turns provide avenues for them to be engaged thereby reducing their rate of unemployment. The study will also assist in correcting the negative effects of the youth towards agriculture, thus enabling them to contribute immensely to agricultural production. This study will also assist other researchers by providing information that is suitable for further studies such as Government (policy makers), Extension agencies, NGOs and office of YCAD.

Methodology

The Study Area

The study was conducted in Ekiti State, Nigeria. The state which lies entirely within the tropics is located between latitude 7^0 15' to 8^0 5' North of the equator and Longitude 4^0 45' to 5^0 45' East of the Greenwich meridian. It enjoys a typical tropical climate with two distinct seasons, the rainy season which last roughly from April to October and the dry season which prevails for the remaining months of the year. Ekiti is basically an agrarian state with a land area of about 5,307 square kilometers of which over 90% is available for farming and agricultural related enterprises. Equally, the state is endowed with favourable agro climatic conditions suitable for agricultural productions of tree crops such as oil palm, citrus, mango, kola nut and guava and arable crops such as maize, rice, plantain, tomato, okro, melon and water melon. Ekiti State has about 70% of her population engaged in farming (NAERLS and NPAFS 2010). The state is bounded in the North by Kwara and Kogi States, in the West by Osun State. It is bounded in the East and South by Ondo State.

Sampling Procedure and Sample size

The sampling frame for the study was the list of all 239 registered participants of the YCAD programme. The list was further segregated into two; active participants and inactive participants. A simple random technique was used to select of 70 % of 83 active participants. In addition, 70% of the 156 non-active Participants were also randomly selected to give a total sample size of 184 respondents. The instrument that was used to collect data for the study was a structured questionnaire. Primary data collected data with the aid of structured questionnaire was used in the study.

Measurement of Variables

The dependent variable for this study was youth participation in commercial agriculture. While the independent variables are: The socio-economic characteristic of the respondent was measured such as age, gender, marital status, level education, level of youth participation.

Dependent variables include:

To examine the effect of the socio-economic factors on youth participation in YCAD programme, thirteen-item statements was presented and assessment based on a 5 – point Likert scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) Strongly Disagree (SA) and scores of 5, 4,3,2,1 was assigned to the corresponding responses for positive statement and the reversed scores for the negative statements. Assess the youth perception of the extent to which the objectives of the programme met was measured using a 4- point likert-type scale of highly satisfied=1, satisfied =2, Dissatisfied =3, highly Dissatisfied =4. This was asked from the respondent maybe the programme has influenced them positively or negatively.

Data Analysis

The statistical tools that were used for data analysis for this study include both descriptive and inferential statistics. Descriptive statistics involving frequency counts, percentage, and mean and ranking were used to analyze objectives 1, 2, 3 and 4 While Regression Analysis and t-test were used to test the hypotheses of the study.

Results and Discussion

This chapter provides information on the analysis and interpretation of data based on the outlined objectives of the study. The analysis, interpretation, and discussion of findings are presented along the background of the stated objectives.

Socio – Economic Characteristics of Youth

Table 1 Distribution of Respondents according to their socio-economic characteristics

Variable	**Active n= 75**			**Non-Active n= 109**		
	frequency	**%**	**Mean**	**Frequency**	**%**	**Mean**
Age						
25 – 30	5	6.7		9	8.2	
31 – 35	42	56		33	30.3	36
36 – 40	28	37.3	35	56	51.4	
41 – 45	0	0.0		11	10.1	
Gender						
Male	69	92		96	88.1	
Female	13	8		13	11.9	
Education						
Secondary	10	13.3		22	20.2	
Tertiary	65	86.7		87	79.8	
Marital Status						
Single	5	6.7		22	20.2	
Married	70	93.3		87	79.8	
Household size						
1 – 5 members	70	93.3		99	90.8	4

6 –10 members	5	6.3	4	10	9.2	
Farm experience						
≤ 5	24	32		55	50.5	
6 – 10	25	33.3	10	37	33.9	7
11 – 15	15	20		10	9.2	
16 – 20	8	10.7		7	6.4	
≥ 21	3	4		0	0.0	
Nature of participation						
Full time	57	76		34	31.2	
Part time	18	24		75	68.8	

Source: Field Survey 2016

Table 1 revealed the socio-economic characteristics of active participants about'56% of the respondents were within the age of 31 – 35 years while the non-active participants about 51.4% of respondents were within the age of 36-40 years, the active participants are in line with the study conformed to the United Nation (2010) definition of youths as people within the mean age of 35 years. Also, Chikezie (2012), reported that the majority of youth are at the productive age where by their energies could be harnessed and utilized for productive venture in agriculture. Therefore, it can be seen that, individuals within the age of 35-40 are the active segment in the production activities of a country. majority of both active and non-active respondents (92%) and (88.1%) were male Chikezie (2012) revealed that the low percentage of the female youth participation in agriculture production could attribute to the fact that female usually involved in several other activities outside farming like food vending, tailoring, petty trading and hair dressing.

Oladele *et al.*, (2012), also revealed that males are often more energetic and could readily be available for energy demanding jobs like agriculture production. Majority of the respondents both active and non-active attained basic level of education while (86.7%) and (79.8%) attained tertiary education. This finding is confirmed by Muhammad-Lawal et al (2009) whose study showed that a greater percentage of the participants (93.64%) in youth agriculture programme in Nigeria had some form of formal education. Participants with some form of education are not likely to have much difficulty in understanding and adopting modern agricultural technologies and innovations.

Furthermore, the majority (93.3%) of the active participant were married while the non-active majority (79.8%) of the participant was married, also revealed that a high proportion of the active respondents (93.3 %) have a household size of 1-5 while the non-active respondent (90.8%) of the same household size. The field results also showed that about (33.3%) of active participant have had farming experience of 6-10 years and non-active (50.5%) had farming experience of less than 5 years in faming may be is the reason they left the programme. Majority of the youths interviewed (76%) of active participant were full-time farmers, while majority (68.4%) of non-active were part-time farmers. These show maybe non active participants have something doing somewhere that is more profitable than agriculture.

Level of Youth Participation in YCAD Program

Table 2: Distribution of Youth based on their Level of Participation

Variable	Active n= 75				Non-Active n= 109			
	Frequency	**%**	**Means**	**Remarks**	**Frequency**	**%**	**Means**	**Remarks**
Farm work per week								
1 – 2 day in a week	5	6.7		Low	57	52.3		High
3 – 4 days in a week	31	41.3		Moderate	38	34.9	4	Moderate
5 – 6 days in a week	39	52	5	High	14	12.8		Low
Time spend per day on farm								
< 4 hours	17	22.7		Moderate	78	71.6		High
4 – 8 hours	48	64	7	High	25	22.9	5	Moderate
> 9 hours	10	13		Low	6	5.5		Low
Agricultural activities								
Arable crop production	47	62.7		High	67	61.5		High
Poultry production	11	14.7		Moderate	20	18.3		Moderate
Nursery	7	9.3		Moderate	11	10.1		Moderate
Processing	2	2.7		Low	3	2.6		Low
Fish production	8	10.7		moderate	8	7.3		moderate

Source: Field Survey 2016

Table 2 shows that (52%) of active participants engaged in farm work using 5-6 days in a week while (52.3%) of non-active engaged in farm work 1-2 days in a week. this because they have another business apart from agriculture. Majority (64 %) of the active respondents spend an average of 4 - 8 hours on the farm per day, while (71.6 %) spend less than 4 hours on the farm per day. This implies that majority of the active youth spend moderate number of hours in the farm per day thus making them to participate more in the programme.

Also, about 62.7% of the active youth were highly involved in arable crop production, poultry (14.7%), Nursery (9.3%), Processing (2.7%) and fish production (10.7%) while the non-active youths participate in arable crop production by (61.5%), poultry (18.3%), Nursery (10.1%) and participate very lowly in Processing (2.6%) and fish production (7.3%). The finding implies that youths participate more in crop production than livestock production. This is in conformity with the study by Gwary, Pur and Bawa (2008) in their study which reported that youths were interested in crop production than livestock, probably due to the short gestation period of the crop varieties produced, which ensures quick turnover. In addition, livestock production could be more capital intensive than crop production, hence this informs the choice of crop production by most youth.

Effects of YCAD Programme on Youth

Table 3: Distribution of Effects of YCAD Programme on Youth

	SA(5)		**A(4)**		**D(3)**		**SD(2)**		**U(1)**		**MEAN**	
	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active
The agric programme is a source of employment to me	35 46.7 %	28 25.7%	36 48%	9 8.3%	2 2.7%	24 22%	2 2.7%	46 42.2%	0 0.0%	2 2.7%	4.38	3.56
The programme has reduced my poverty in Ekiti	22 29.3%	16 14.7%	43 57.3%	11 10.1%	6 8%	23 21.1%	3 4%	56 51.4%	1 1.3%	3 2.8%	4.09	3.67
The programme has increased my status in the society	15 20%	11 10.1%	31 41.3%	16 14.7%	19 25.3%	30 37.5%	9 12%	50 45.9%	1 1.3%	2 1.8%	3.72	3.64
The programme has exposed me to great opportunities in agriculture	24 32%	16 14.7%	32 42.7%	13 11.9%	16 21.3%	35 32.1%	2 2.6%	45 41.3%	1 1.3%	0 0.0%	4.05	3.57
Agric products usually attracts low price	26 34.7%	41 37.6%	28 37.3%	56 5.4%	15 20%	10 9%	3 4%	2 1.8%	1 1.3%	0 0.0%	4.04	3.62
The adoption of private and public partnership arrangement is the best option for commercial farming	30 40%	41 37.6%	41 54.7%	60 55%	2 2.7%	7 6.4%	1 1.3%	1 0.9%	1 1.3%	0 0.0%	4.30	3.66
Agricultural funds from government is easily accessible through the programme	19 25.3%	16 14.7%	28 37.3%	17 15.6%	6 8%	33 30.3%	22 29.3%	43 39.5%	1 1.3%	0 0.0%	2.84	2.96
Ycad programme has made farming an attractive occupation for me	19 25.3%	17 15.6%	41 54.7%	19 17.4%	14 18.7%	19 17.4%	2 2.7%	54 49.5%	0 0.0%	0 0.0%	**3.50**	3.38
The adoption of value added	25 33.3%	10 9.2%	43 57.3%	15 13.8%	7 9.3%	36 33%	0 0.0%	48 44%	0 0.0%	0 0.0%	**3.56**	3.29

chain approach has a significant effect on the development of agriculture in Ekiti state												
There should be continuity of the programme	40 53.3%	20 1 8.3%	20 26.7%	22 20.2%	11 14.7%	29 26.6%	3 4%	38 34.9%	1 1.3%	0 0.0%	**4.25**	3.77
The provision of agricultural input supplied through Ekiti state ministry of agriculture is the best option for Ycad program	5 6.7%	4 3.7%	19 25.3%	12 11%	11 14.7%	32 29.3%	30 40%	60 55%	10 13.3%	3 2.8%	**2.68**	3.04

Source: Field Survey 2016

Table 3 shows the effects of YCAD on youth's participation in agriculture. A great number of active participants agreed that the programme should continue because it has reduced their poverty level while most of non-active disagreed with this perception with the mean ratio of 4.25 and 3.77. Majority of the active participants agreed that the programme has been the source of employment while non active participant strongly disagreed with this with the mean ratio of 4.38 and 3.56. This implies that Agriculture primarily provides employment for Nigerians and accounts for more than one third of total gross domestic product (GDP). More than 70% of the working populations in Nigeria are employed in the agricultural sector directly or indirectly. (Abubakar, 2011).

Table.3 also reveals that active participants agreed with the perception that the programme has reduced their poverty in Ekiti state while non active participants strongly disagreed with the opinion with the mean ratio of 4.09 and 3.67. Also, active participants agreed that the programme has increased their status in society while non active participants strongly disagreed with the perception with ratio of 3.72 and 3.64. Majority of active participants agreed with the perception that YCAD programme has made farming an attractive occupation while non active participants strongly disagreed with ratio of 3.50 and 3.38. The result opined with (Amadi, 2012) Youth thus look down upon agriculture, thus shying away from it because people who engage in agriculture do not get any recognition. Table 3 also reveals that both active and non-active participants disagreed with the perception of agricultural input supplied through Ekiti state ministry that it is not the best option for YCAD programme. Also, both active and non-active participants agreed that the adoption of private and public partnership arrangement is the best option for commercial farming with ratio of 4.30 and 3.66. This implies that an agriculture practice is time bonding.

Overall, majority of the non-active participants showed unfavourable effects towards agriculture as a livelihood occupation. The result confirms the study by Amalu (1998) that attitudes of youth towards agriculture and agricultural methods have not changed as much as they need to. He further noted that rural youth have migrated to the cities in growing numbers and have become consumers rather than producers of food. The implication of the findings is that youth are unfavourably effects to participate in agricultural productivity. Also, youth are not interested to join agriculture because they do not view the agriculture field as an attractive area to work (Abdullah *et al.,* 2012).

Assess Youth Perception of the Extent to which the Objective of the Program has been met

Table 4. Youth Perception towards the Objective of the YCAD Program

YCAD OBJECTIVE	**Highly satisfied (1)**		**satisfied (2)**		**Dissatisfied (3)**		**Highly dissatisfied (4)**		**Mean**		**Rank**	
	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active
Incentive	8 10.6%	0 0.0%	31 41.3%	7 6.4%	31 41.3%	45 41.3%	5 6.6%	57 52.3%	2.44	2.78	9th	1st
Credit facilities and subsidies	6 8%	3 2.8%	29 38.6%	28 25.7%	36 48%	73 66.9%	4 5.3%	5 4.6%	2.50	2.73	8th	10th
Modern agricultural equipment's	9 12%	7 6.4%	38 50.6%	42 38.5%	28 37.3%	58 53.2%	0 0.0%	2 1.8%	2.25	2.50	17th	16th
Basic social amenities	2 2.6%	0 0.0%	17 22.6%	14 12.8%	38 50.6%	65 59.6%	18 24%	30 27.5%	2.96	3.14	4th	6th
Land/Land tenure system	2 2.6%	1 0.9%	48 34%	61 55.9%	22 9.3%	43 39.4%	3 4%	4 3.7%	2.34	2.45	14th	17th
Long investment period in agriculture	4 5.3%	3 2.8%	42 56%	36 33%	22 9.3%	56 51.4%	7 9.3%	14 12.8%	2.43	2.74	11th	9th
Marketing of agric products	3 4%	3 2.8%	10 13.3%	16 14.7%	36 48%	50 45.9%	26 34.6%	40 36.7%	3.13	3.16	2nd	3rd
Training	13 17.3%	11 10.1%	40 55.3%	48 44%	9 12%	25 22.9%	13 17.3%	25 22.9%	2.29	2.58	16th	15th
Transportation	3 4%	1 0.9%	11 14.6%	15 13.8%	33 44%	47 43.1%	28 37.5%	46 42.2%	3.14	3.14	1st	4th
Storage facilities	3 4%	1 .9%	14 18.6%	23 21.1%	30 40%	37 33.9%	28 37.5%	48 44%	3.10	3.22	3rd	2nd
Technical support from agric extension agencies	6 8%	2 .8%	36 48%	41 37.6%	28 37.3%	53 48.6%	5 6.6%	13 11.9%	2.42	2.70	10th	11th
Access to financing services in loan and lease	3 4%	2 1.8%	28 37.3%	29 26.6%	35 46.6%	66 60.6%	9 12%	12 11%	2.66	2.80	6th	7th
Structured disbursement/repayment of acquired loan	1 1.3%	0 0.0%	22 29.3%	24 22%	44 58.6%	75 68.8%	8 10.6%	10 9.2%	2.80	2.78	5th	8th
Training of farmers on modern and technical input usage by service providers	7 9.3%	5 4.6%	36 48%	32 29.4%	31 41.3%	65 59.6%	1 1.3%	7 6.4%	2.34	2.67	15th	13th
Labour availability	5 6.6%	3 2.8%	17 22.6%	18 16.5%	51 68%	68 62.4%	2 2.6%	20 18.3%	2.66	2.96	7th	5th

Technical skills	8 10.6 %	6 5.5 %	46 61.3 %	56 51.4 %	19 25.3 %	42 38.5 %	2 2.6%	5 4.6%	2.20	2.42	18th	18th
Supply of inputs such as seeds, agro-chemicals and fertilizers	7 9.3%	5 .6%	34 45.3 %	33 30.3 %	30 40%	62 56.9 %	4 5.3%	9 8.3%	2.41	2.68	12th	12th
Supply of commercial farm management skills and capacity building services by international development institutions	6 8%	4 .7%	38 50.6 %	34 31.2 %	29 38.6 %	66 60.6 %	2 2.6%	5 4.6%	2.36	2.66	13th	14th

Source: Field Survey 2016

Table 4 shows that perception of youth towards the objectives of the programme. Majority of the youth are highly dissatisfied with the Marketing of Agric products for both active and non-active participants as this occupied the second and third position on the ranking with Mean ratio of 3.13 and 3.16, also a great number of respondents dissatisfied with this perception of not giving incentives from government as this occupied the first and ninth position on the ranking with Mean ratio of 2.44 and 2.78.Majority of youth were dissatisfied with the storage facilities for both active and non-active participants as this occupied the third and second position on the ranking with Mean ratio of 3.10 and 3.22. This implies that Lack of infrastructure and essential input also hinders youth to participate in agricultural and rural development activities. (Onuekwusi and Ottah (2006)

Table 4 also revealed that the first and fourth ranking position with mean ratio of 3.14 is the perception that youth are highly dissatisfied about the transportation of their product to the final consumers. Also majority of the youth are dissatisfied about credit facilities and subsidies this occupied the eight and tenth position on the ranking with Mean ratio of 2.50 and2.73.This is in collaboration with Adekunle et al (2009) which implied a range of constraints the youth perceived to militate against their active participation in agricultural production activities to include inadequate credit facilities, poor returns to agricultural investment, lack of agricultural insurance for produce during glut period and lack of access to tractors and other farm inputs.

Table 4. showed that both active and non-active participants are satisfied with technical skill, training, Modern agricultural equipment's and technical support from Agric extension agencies as this occupied the eighteen, sixteen, fifteen, seventeen and tenth position respectively on the ranking order. The result is in line with Nor and Madukwe (2000) who asserted that increased agricultural productivity and enhanced farmers income are only attainable when an effective agricultural extension system is put in place. Other perception followed in like manner. The revelations from the respondents showed that most of the objectives of YCAD have not been met; it has been observed that majority left the YCAD due to faulty objectives of the programme. (Onuekwusi and Ottah (2006)

Hypothesis of the Study

H_{01}: There is no significant relationship between the selected socio-economic characteristics of the participants and youth participation in YCAD programme.

H_{02}: There is no significant difference between the effects of active and inactive participants.

Table 5: Regression Analysis Showing the Linear Relationship between the Selected Socio-Economic Characteristics and Youth Participation in YCAD Programme

Variables	Beta		t-value		F		DECISION	
	Active	Non-Active	Active	Non-Active	Active	Non-Active	Active	Non-Active
Age	0.279*	0.289*	0.339*	0.339*	0.0015	0.003	Significant	Significant
Gender	0.373*	0.273*	0.745	0.745	0.0019	0.024	Significant	Significant
Level of education	0.073*	0.093*	0.982	0.982	0.0028	0.329	significant	Not significant
Marital status	1.251	0.281*	2.319	2.319	0.0042	0.022	significant	Significant
Household size	-0.212	-0.212	-2.115	-2.115	0.342	0.007	Not significant	Significant
Year of experience	0.233	0.233	2.228	2.228	0.008	0.028	significant	Significant

For both active and non-active R^2=0.89/0.79 R^2=measure of degree of variation in dependent Variable Y that was explained by the independent variable. Std. Error of the Estimate =2.340/2.205

Number of independent variables=6 Number of respondents = 75/109
**=significant at 0.01, *=significant at 0.05
Source; Field Survey, 2016

Hypothesis 1: There is no significant relationship between the selected socio-economic characteristics of the participants and youth participation in YCAD programme.

The data in table 5 shows that age of both active participants (b=0.0015, P≤ 0.01), and non-active participants (b=0.003, P≤ 0.01), had positive significant relationship to benefit of YCAD at 0.01 level of significant. This implies that increase in age of both active and non-active participants, the more the benefit of participants.

The data in table 5 shows that gender of both active participants (b=0.0019, P≤ 0.01), and non-active participants (b=0.024, P≤ 0.01), had positive significant relationship to benefit of YCAD at 0.01 level of significant. This implies that the male participants benefit more both in the active and non-active participants; the male tends to benefit more the female counterpart in both active and non-active participants.
The data in table 5 reveals that marital status of both active participants (b=0.0042, P≤ 0.01), and non-active participants (b=0.022, P≤ 0.01), had positive significant relationship to benefits of YCAD at 0.01 level of significance. This implies that majority of the participants are married for both active and non-active participants, there they are more responsible and stands to benefit more from the programme.

The data in table 5 shows that years of experience of both active participants (b=0.008, P≤ 0.01), and non-active participants (b=0.028, P≤ 0.01), had positive significant relationship to benefit of YCAD at 0.01 level of significance. This implies that increase in number of years of experience of both active and non-active participants, the experience in them makes them much more productive and hence they benefit more from the programme.

Further analysis shows that household size of (b= -0.212, P=0.342) active participants had inverse relationship with benefits of the YCAD programme. Hence, the Null hypothesis is rejected. This means that the larger the household size in the active participants, the less they benefit from the programe. Also, the level of education (b= -0.982, P=0.329) of non-active participants had inverse relationship on the non-active to benefit from the YCAD programme. Hence, Null hypothesis is rejected. This indicates that the decrease in the level of education of non-active participants, the less they benefit from the YCAD programme.

This is in line with study by (Enete *et al.,* 2002) that years of experience had a positive impact on production systems among youth in Nigeria. Also, a negative and significant relation was found between the attitude of participants and house hold size of active participants (b= -1.342, P≤ 0.010, and level of education of non-active (b= -1.329, P≤ 0.01).

This, also about 89% of active participants and non-active participants 79% of the variations in the dependent variable (i.e., output level) were explained by the independent variables (i.e. the socio-economic characteristics).

The mean effects scores of active and non-active participants were compared by the use of t-test (Table 6).

Table 6: Summary of t-test Analysis Mean active participants	**Mean non active participants**	**t-cal**	**Sig.**
3.071	2.103	0.05	P = 0.05

Source: field survey, 2016

Hypothesis 2: The result showed that there was no significant difference in compared the mean effects scores of active and non-active to YCAD programme. The youth in the study area have positive effects to agricultural development intervention programmes.

Conclusion and Recommendations

Based on the findings of this study, it can be concluded that level of participations among active participants is high because they spent more time and days in farming activities of their chosen enterprise while non active participants spent less time and days in farming activities.

Furthermore, both active and non-active participants were faced with the challenges of storage facilities, transportation, marketing of agric products and incentives. Majority of the participants were still in their active age and they have school education which would assist them to communicate and make them to participate more actively in the programme.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The program should focus on youth that are already in Agri-business.
2. More focus on university graduates than secondary school leavers because they are more expose to take agriculture as a business.
3. The program should be take cognizance with gender disparity in order to encourage female youth to participate in the programme.
4. Efforts should be made by the government to facilitate more extension contacts and increased awareness of the opportunities that abound in youth engagement with YCAD to boost youth confidence and sustainable engagement in the programme.
5. Market outlets and storage facilities should also be put in place such that output of the youth could be accessed.
6. Government or relevant agencies should create credit facilities to youth with low interest rate to encourage more youth in the programme to venture into agribusiness.

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