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## **Analysis of Structure of Agricultural Land use among Small Scale Arable crop Farmers in Oruk Anam Local Government Area of Akwa Ibom State, Nigeria**

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### **ABSTRACT**

The study analyzed the structure of agricultural land use and assessed the socioeconomic features of small scale arable crop farmers in Oruk Anam Local Government area of Akwa Ibom State, Nigeria. Cross sectional data were collected from 100 arable crop farmers using structured questionnaire. Descriptive tools, multiple regressions based on Ordinary Least Squares and Herfindhal index were used to analyze the data in line with the specific objectives. Analysis of the socio-economic characteristics of respondents revealed that majority of the farmers were female while an average age of about 44 years and average farming experience of about 15 years as well as an average year of formal education of about 8 years, were discovered among respondents. In addition, the social networking among farmers was poor in the region. The result also showed that land ownership structure was basically through inheritance while the average annual farm income was ₦89, 222.00. Analysis of land use pattern revealed that mixed cropping was preferred over mono-cropping, while fluted pumpkin, cassava, water leaf and pepper were the most preferred crop combinations in the area. The study also identified fluted pumpkin and cassava as the most preferred arable crops by farmers in the area. An average Herfindhal index of 0.4174 was obtained among farmers, implying that, the frequency of land use intensity among farmers was moderate, but the intensity of cropping was on the rise. The result however implies increasing agricultural diversification and increasing non-farm income generating opportunities in the study area. The empirical findings further reveal that farm land has a negative inelastic relationship with the arable crop output. This implies that, land utilization occurs in the irrational stage (stage III) in the classical production surface and hence is best to reduce the intensity of usage. Akwa Ibom State government should intensify effort to provide adequate and accessible land through restructuring of land ownership system and should embark on reclamation of marginal lands in order to expand cultivable land in the State.

**Key words:** land use, arable crop, crop intensity, farmers, Akwa Ibom

### **INTRODUCTION**

In Nigeria, the supply of domestic food is far less than the demand and this has resulted to a rise in food imports and

declined in the level of national food self-sufficiency (Chauvin *et al.*, 2012). The country's agricultural sector is faced with several challenges such as; poor land

ownership structure, low level of irrigation development, limited adoption of research findings, high cost of farm inputs, poor access to credit, inefficient fertilizer procurement and distribution, inadequate storage facilities and poor access to markets have all combined to keep agricultural productivity low with high postharvest losses and waste (FAO, 2017).

However, previous increased in food production in Nigeria has been mostly attributed to expansion in cultivated land area rather than farm factor productivity. The inherent limitation of this approach is however evidence in the declined in Nigeria's agricultural land area by 1.67% between 2012 and 2013 and 1.14% between 2010 and 2014 (FAOSTAT, 2017). In response to this, the arable land area increases from 36.2% in 2001 to 37.3% in 2013. Such agricultural system that increases output following increase in land area, undermines farm factor productivity and might not be sustainable given the pressure on land imposed by population growth and urbanization process among others. Although, literature on intensive use of land (Erbaugh, 1999 and Saka *et al.*, 2011) has affirmed the potential of achieving agricultural growth through land intensification; but commensurate use of inputs were identified as a fundamental condition for sustainable growth. Despite this envisaged advantage of increased land use intensity, it could lead to rapid depletion of soil fertility, decline in productivity, loss of soil structure, soil erosion and land degradation (Levi, 2006).

In recognition of the important of land as a critical farm resource, most agricultural policies and programmes in Nigeria were aimed at improving it quality and accessibility as well as maintaining a sustainable fertility status through provision

of irrigation, land reclamation and currently development of Fadama areas. In the Southern part of Nigeria, the accessibility of most agricultural lands depend largely on land tenure system and the extent of competition by non-agricultural land uses (Udoh 2000). For instance in Akwa Ibom State, due to continuous increase in population density, availability of agricultural land has constituted a serious hindrance to agricultural development in the region. One of the attendance effects of this is the proliferation of fragmented lands and subsequence practiced of small scale subsistence farming in the region. Amidst these limitations imposed by land fragmentation, arable crop farmers in the region have devise and adopted several cropping patterns in order to avert risks inherent in crop production. Some have also subjected their farm lands to non-agricultural uses in order to earn more income to augment family expenditures.

Given these occurrences, there is inconclusive decision concerning the degree of agricultural land use in the State. For instance, literature has provided evidence on increasing agricultural diversification among arable crop farmers in the State (Udoh *et al.*, 2011); while others have stressed on increase land intensification (Njungbwen and Njungbwen, 2011). Hence, there is an overwhelming need to unveil the true situation concerning the degree of land usage and the prevailing land use pattern among predominant small scale arable crop farmers in the State.

Land as a factor of production is a critical input in agricultural production. The criticality is imposed by its availability, accessibility, quantity and quality. Following this importance role of land, many researchers have delved into land issue in a bit to provide clearer

understanding of land use. For instance, Lawal *et al.*, (2010) studied land use pattern and sustainability of food crop production among Fadama farms in Niger State, Nigeria. They identified mixed cropping as the dominant cropping system among Fadama farmers in the region. The result also revealed that, two and three crop combinations were most practiced by respondents. In a similar way, Saka *et al.*, (2011) examined the structure of land-use intensification in food crop production among farmers in Southwestern Nigeria. The results showed that land-use intensification was characterized by high frequency of cultivation (79%) and high cropping intensity estimated as 1.24years/ha. They also affirm that increase in family size is an incentive to land intensification in the region.

In tune with the same area of research, Udoh *et al.* (2011) investigated the agricultural land allocation pattern and the level of land use intensification among farming household heads in Uruan local government area of Akwa Ibom State. The socioeconomic analysis of respondents revealed an average age, household size, farm size, farming experience and years of formal education of 49 years, 8 members, 0.85ha, 10 years and 8 years respectively. The result also showed an average farm income of about of N250 000/annum. The result further shows that, about 57.93% of farming household heads acquired farm land through inheritance; while the predominant cropping pattern was mixed cropping. An average Herfindahl-index of 0.641 was discovered; while the preferred crop combination was fluted pumpkin, cassava, maize, and white yam. Uchua, (2011) carried out a study on mapping and analysis of agricultural systems in part of the lower River Benue basin in Nigeria. He found that 96.8% of the farmers practiced mixed

cropping. Analysis of the socio-economic characteristics of farmers in the region revealed that 56.8% constituted the active farming population; an average household size of 12 persons was discovered while 73.2% of farmers acquired up to secondary school education.

In an attempt to uncover the relationship between arable crop output and farm size among farmers, Akpan *et al.*, (2012) analyzed farm input productivity of vegetable farmers in the southern region of Nigeria. The Cobb-Douglas production function for fluted pumpkin production revealed significant negative inelastic relationship between output of fluted pumpkin and farm size. In addition, Oladeebo and Adekilekun (2013) studied the relationship between land use intensity and food crops production efficiency among crop farmers in Osun State of Nigeria. They discovered moderate land use intensity of 20.00% among sampled farmers. Results also showed that majority of the food crop farmers were in their active age, educated and highly experienced in food crop production. In a similar vein, Adewumi and Omotesho, (2002) and Raufu (2010) have previously provided evidence of increasing change in land use pattern and land use intensification indices among arable crop farmers in Nigeria.

Despite the numerous empirical literature on land use pattern in Nigeria, none has specifically focused on Oruk Anam area of Akwa Ibom State. Since the type of agricultural activities practiced by farmers has a strong correlation with the geography of the area, results derived from other parts of the State might not perfectly applied to Oruk Anam area. Hence, this justifies the need for this study. Again, the indices generated in this study provided policy makers with reliable tools to formulate

appropriate and sustainable policy framework that might reduce the consequences derivable from intensive use of agricultural lands in the State. Therefore to address the issue of land use in the study area, the study majorly focused on the analysis of the structure of agricultural land use among small scale crop farmers in Oruk Anam Local Government Area of Akwa Ibom State. In order to achieve this broad objective, the study specifically:

- 1) described the socio economic characteristics of small scale arable crop farmers in the study area;
- 2) identified the pattern of agricultural land use among small scale arable crop farmers in the study area;
- 3) estimated the extent of agricultural land intensification among small scale arable crop farmers in the study area; and
- 4) estimated arable crop production elasticity with respect to land size.

## MATERIALS AND METHODS

This study was carried out in Oruk Anam Local Government Area of Akwa Ibom State. The Local Government Area is located in the Southern part of Akwa Ibom State, Nigeria. It lies between latitude 4° 40'N and 5° N of equator, and longitude 70° 30'E and 70° 50'E of Greenwich Meridian. It has a land mass of 511.73km sq. representing 7.23% of the State total land mass. The area comprises of two major political units, the Oruk zone and the Anam zone. It is characterized by a typically humid tropics climate with a distinct dry and wet season. The agricultural season last for up to 9 months. The mean annual rainfall is heavy and lies between 2000mm to 4000mm and has a temperature range of 26°C – 28°C. The rainy season last from March to November and it's characterized by high relative humidity and heavy cloud cover while the dry season last from December to February.

Its inhabitants are mostly farmers, Craft men and civil servants. The population of the local government is about 172,654 out of which males are 86,239 and females are 86,415 (NPC, 2006). Oruk Anam has common boundaries with Ukanafun and Abak in the north, Ikot Abasi in the south, Mkpato Enin in the East and in the West by Ukanafun and Imo River running through the borderline of Rivers and Abia state. It is predominantly agrarian with notable food crops like yam, cassava, cocoyam, maize, pumpkin, okra, melon, oil palm, plantain and banana.

Following the work of Cochran (1963), a representative sample size from a large population of farmers in the study area was obtained using the equation (1) specified below:

$$S_n = \frac{z^2 \rho(1 - \rho)}{D^2} \dots \dots \dots (1)$$

Where  $S_n$  is the required sample size; “Z” is the standard normal value (at 95% confidence interval, type 1 error; 1.96). “P” is the expected proportion of farmers in the population (from the Agricultural Development Programme projection, about 95% of the population of the study area are farmers). “D” is the absolute error or precision at 5% type 1 error. The sample size is derived as shown in equation 2.

$$S_n = \frac{(1.96)^2 0.95(1 - 0.95)}{(0.05)^2} = 73 \dots \dots (2)$$

However, based on the distribution of villages, the study adopted proportional sampling method in the study area, hence a total of 100 (one hundred respondents) were used in the study.

Multistage random sampling method was used to select respondents in the study. The study area consisted of 9 clans (Inen, Obio Akpa, Ibesit Nung Ikot, Nung Ikot, Nung Ita, Ndot, Ibesit, Ekparakwa, and

Abak/Midim). The first stage involved random selection of 5 out of the 9 clans in Oruk Anam. In the second stage, two villages were selected using random sampling technique from each clan. A total of 10 villages were used in the study. The third stage involved random selection of 10 arable crop farmers from each of the selected village. Then a total of 100 respondents were randomly selected and used in the study. Respondents were arable crop farmers engaged in sole cropping or and mixed cropping.

### Sources and Type of data

Cross sectional data were collected from selected arable crop farmers in the study area. Data were collected using structured questionnaires and were complemented by personal interview to ensure consistency and accuracy of collected data.

### Analytical technique

Descriptive statistics which consisted of percentages, frequency count, tables, means and Herfindhal index were used to analyze data collected in line with the study's objectives. The Herfindhal index measures the degree of land intensification as follows:

*Herfindahl index (HI)*

$$= \sum_{i=1}^n \left( \frac{Y_k}{Y_i} \right)^2 \dots \dots \dots (3)$$

Where  $Y_k$  is income from farm sources;  $Y_i$  is total income of  $i^{\text{th}}$  farmer. This index was estimated for each of the respondent. The index was categorized and frequency generated for the sampled population. When the index approaches unity, it means that a farmer has intensified the use of his/her farmland and farmland constitute a serious constraint. A perfect value of one (1) implies that farmer's farmland is continuously and fully cultivated year in, year out and its availability is highly constrained; whereas, value approaching zero implies less constraint on farm land availability and

increasing diversification or increase household income from non-farm sources.

### Production Elasticity of Arable crop farms in Oruk Anam Local Government Area

In order to measure the stage of production of farm land in the study area, a simple cobb-Douglas production function is specified as follows:

$$\begin{aligned} \text{LogOutput} = & \phi_0 + \phi_1 \text{Loglabour} \\ & + \phi_2 \text{Logfertilizer} \\ & + \phi_3 \text{Logland} \dots \dots \dots (4) \end{aligned}$$

Where,

Output = Arable crop output (Kg)

Labour = Labour measured in Mandays

Fertilizer = Quantity of fertilizer used (Kg)

Land = Farm size in Hectare

The coefficients of farm factors represent production elasticity and it gives the extent of factor usage with respect to output of arable crops. It shows the magnitude of change in output as a result of a change in the respective farm inputs.

## RESULTS

### Socio economic Characteristics of Farmers

The socio economic characteristics of arable crops farmers in the study area are summarized and presented in the Table 1 and Table 2 below. The finding reveals that arable crop farming was dominated by the female folks, who made up to about 69.00% of the total arable crop farmers sampled; while the male counterpart constitutes the remaining 31.00%. Also, the result revealed that about 20.00% and 26.00% of arable crop farmers fell in the age range of 31– 40 years and 50 and above years respectively, whereas about 39.00% were in the age bracket of 41 to 50. An average age of 44.26 years was obtained for the entire

respondents. The marital status indicated that, about 71.00% of arable crop farmers in the study area were married and 19.00% were widows. About 4.00% were divorced, 1.00% separated and 3.00% were single. The result also shows that about 14.00% of arable crop farmers in the study area have farming experience of 1 to 5 years; 24.00% represented 6 to 10 years while 20.00% fell in the range of 11-15 years. Majority (26.00%) of the farmers had 16 -20 years of farming experience. About 16.00% have

been in arable crop cultivation for more than 20 years. An average farming experience of 15.25 years was obtained among respondents. Structure of educational attainment of respondents revealed that majority (57.00%) of respondents acquired up to primary education; while 30.00% went up to secondary education level. Only 13.00% attempted tertiary education. An average of 8.27 years of formal education was obtainable among respondents.

**Table 1:** Socio Economics Characteristics of Arable Crop Farmers in Oruk Anam Local Government area of Akwa Ibom State

Characteristic	Frequency	Percentage
<b>Gender (number)</b>		
Male	31	31.00
Female	69	69.00
Total	100	100.00
<b>Age Distribution (Years)</b>		
<20	0	0.00
20- 30	15	15.00
31– 40	20	20.00
41– 50	39	39.00
>50	26	26.00
Mean	44.26	
<b>Marital Status of Farmer (number)</b>		
Single	3	3.00
Married	71	71.00
Widowed	19	19.00
Widower	2	2.00
Divorced	4	4.00
Separate	1	1.00
<b>Farming Experience (Years)</b>		
<1	0	0.00
1-5	14	14.00
6-10	24	24.00
11-15	20	20.00
16-20	26	26.00
>20	16	16.00
Mean	15.25	
<b>Educational status of respondents (Years)</b>		
No formal education	0	0.00
Primary school	57	57.00
Secondary school	30	30.00
Tertiary	13	13.00

<b>Mean</b>	<b>8.27</b>	
<b>Membership of Social Organization (Years)</b>		
<1	88	88.00
1-5	6	6.00
>10	6	6.00
<b>Mean</b>	<b>0.74</b>	

**Source:** Field Work, 2016.

**Table 2:** Socio Economics Characteristics of Arable Crops Farmers in Oruk Anam Local Government area of Akwa Ibom State

Characteristic	Frequency	Percentage
<b>Family Size of Respondents (number)</b>		
1-5	34	34.00
6 -10	66	66.00
>10	0	0.00
Mean	6.00	
<b>Farm income per year (Naira)</b>		
>10,000	0	0.00
10,000-20,000	6	6.00
21,001-40,000	25	25.00
41,001-60,000	28	28.00
61,001-100,000	18	18.00
>100,000	23	23.00
Mean	89,222.40	
<b>Mode of farmland acquisition</b>		
Inheritance	50	50.00
Leased	41	41.00
Contract	0	0.00
Purchase farm	9	9.00
<b>Distribution of Secondary occupation</b>		
Civil Servant	9	9.00
Pensioner	3	3.00
Okada /Bus driver /Keke driver	2	2.00
Trading on Large Scale	0	0.00
Petty Trading	21	21.00
Others	62	62.00
Artisan	3	3.00

**Source:** Field Work, 2016.

In addition, the finding reveals that majority (88.0%) of arable crop farmers in the study area do not belong to any form of social or farmers' organization. Only 12.00% of arable crop farmers in sampled spent some years in any farmers' or peers group related social organization. An average of 0.74 year

was obtainable for all respondents in the study area. The distribution of family size among respondents revealed that, majority (66.00%) of the arable crops farmers have family size of 6 to 10 members; while 34.00% have 1 to 5 members. No respondent has more than 10 household

members. An average household size among respondents was 6 members.

The findings also reveals that around 6.00% of respondents earned from ₦20,001 to ₦40,000 per annum with an average of ₦32,766.67 within the range; while 25.00% received from ₦40,001 to ₦60,000 per annum with an average of about ₦50,990 within the range. Also, about 28.00% of the arable crop farmers made ₦60, 001 to ₦80, 000 per annum with an average of ₦70, 007.14 within the range. Around 18.00% of the respondents made between ₦80, 001 – ₦100, 000 per annum with an average of ₦91, 188.89 within the range. In addition, about 23.00% of the respondents made more than ₦100, 000 per annum with an average income of ₦167, 360 in this category. The overall average of ₦89, 222.40 was discovered among sampled farmers in the study area.

The finding reveals prominent types of land ownership structure among farmers in the study area. The result showed that, about

**Table 3:** Distribution of farming household heads according to crop combinations pattern

Cropping pattern	Frequency	Percentage
Sole crop	2	2.00
Two crop combination	10	10.00
Three crop combination	30	30.00
Four crop combination	38	38.00
Five crop combination	13	13.00
Six crop combination	6	6.00
Seven crop combination	1	1.00
Total	100	100.00

**Source:** Field Work, 2016.

The result revealed that multiple cropping or mixed cropping was commonly practiced by majority (98.00%) of arable crop farmers in the study area. The breakdown showed that, only 2.00% of farmers practiced sole cropping, while 10.00% and 30.00% of farmers cultivated two crop and three crop combinations respectively. About 38.00% and 13.00% of respondents practiced four and five crop combinations in the study area. The result also revealed that, only 6.00%

50.00% of farmers acquired farmland through inheritance, 41.00% acquired land through leased arrangement. Only 9.00% acquired farmland through outright purchase and no farmer had contract agreement on land acquisition. The study also identified secondary occupations of respondents in a bit to reveal the extent of agricultural diversification among them. It is revealed that majority (62.00%) of the respondents were actively involved in various unidentified occupations in the study area. About 21.00% of them were into petty trading; while 9.00% were civil servants. Artisans and Pensioners constituted 3.00% each of the entire sampled population.

#### **Identified Pattern of Agricultural Land use among Farmers in the Study Area**

Results in Table 3 show the frequency of respondents in addition to identified crop patterns and the corresponding percentage of respondents that practiced them.

and 1.00% of famers cultivated 6 and 7 crop combinations respectively. The prominent crop combinations identified in the study area were:

- 1) Fluted Pumpkin, cassava
- 2) Fluted Pumpkin, Cassava, Water leaf
- 3) Fluted Pumpkin, Cassava, Pepper
- 4) Fluted Pumpkin, Yam, Cocoyam, Sweet Yam
- 5) Fluted Pumpkin, Water Yam, Maize, Okra and Yam



The result also revealed that, fluted pumpkin is the most farmers' preferred arable crop in Oruk Anam area. Fluted pumpkin is represented in all farmers' combinations in the study area. It is also discovered that, farmers adopted or planted up to about seven crop combinations in a single piece of land depending on the need of the farmers and farm size. Majority of the farmers planted three and four crop combinations (68.00%) in their farmlands. Other prevalent types of cropping system from mono cropping to mix cropping identified were:

1. Cassava

2. Fluted Pumpkin, Cassava, Waterleaf, Pepper
3. Fluted Pumpkin, Cassava, Yam, Water yam, Sweet yam
4. Yam, Fluted Pumpkin, Cassava, Waterleaf, Pepper, Yam, Cocoyam

#### **Extent of Agricultural Land Intensification among Arable crop Farmers**

The Herfindhal index was proxy of land used intensification index among farmers in the study. Table 4 shows the estimated Herfindhal index categories, frequencies and corresponding percentage for each category.

**Table 4:** Agricultural land intensification among arable crop farmers in the study area

Herfindhal Intensification Index	Frequency	Percentages
0.0010 – 0.200	20	20.00
0.2001 – 0.400	36	36.00
0.4001 – 0.600	21	21.00
0.6001 – 0.800	15	15.00
0.8001– 1.000	8	8.00
Minimum index	0.07438	
Maximum index	0.957178	
Mean index	0.417358	

**Source:** Field Work, 2016.

**Table 5:** Agricultural land intensification among arable crop farmers in the study area

Variables	Coefficient	Std. Error	t-ratio	p-value
Constant	0.347977	1.41527	0.2459	0.8064
Log Farm Size	-0.232817	0.12844	-1.813	0.0734*
Log Fertilizer	0.174575	0.11097	1.5730	0.1194
Log labour	0.466714	0.15429	3.0249	0.0033***
R-Square	0.1647			
F-Calculated	5.6534***			
Normality test	8.8869**			

Asterisks \*\* and \*\*\* represent 5% and 1% significance levels respectively. Variables are as defined in equations (4).

The result shows that most farmers in the study area have low land intensification index. For instance, about 20.00% and 36.00% of farmers have intensification indices in the range of 0.001 to 0.2000 and

0.2001 to 0.400 respectively. Only 21.00% of farmers have intensification index that spanned from 0.4001 to 0.800; while 8.00% of farmers fell in the region of 0.8001 to unity. The findings also revealed a minimum

and maximum as well as the mean Herfindhal indices of 0.07438 and 0.957178 and 0.417358 respectively.

### **Production Elasticity with respect to land and other factors of production**

Result in Table 5 presents estimates of Cobb Douglas Production function for arable crop farms in the study area. The findings revealed that, arable crop output has a negative and inelastic relationship with farm size. This implies that, farm size utilization is in phase III in the classical production surface. This is irrational stage of production and required that, farm factors used in this stage should be reduced. This is because; continuous increase in usage *ceteris paribus* will lead to decrease in productivity as well as income of farmers.

### **DISCUSSION**

The gender composition of respondents is as expected because male farmers in the region concentrate more on permanent crops cultivation such as oil palm than arable crops farming. Women are mostly involved in arable crop business as a way of generating additional income and food stuffs to the family. The age distribution of respondents implies that, most arable crop farmers in the study area are in their active years and are fast ageing, suggesting that, youths in the area should be encouraged to involve in agricultural activities. since agricultural activities is highly labour intensive, the involvement of youths will help in land development and in ameliorating labour constrained in the region. The result on marital status is similar to the results obtained by Udoh et al., (2011) and it suggests that arable crop farming in the area is an integral part of farmers' culture. The years of farming experience discovered among respondents was not significantly different from the report of Oladeebo and Adekilekun (2013) and Udoh et al., (2011). This result means that arable

farming business is a well-established venture among farming households in the study area. This implies that, farming households are experienced in terms of land management and pattern of cropping adopted by them. Educational qualification of farmers attested to the fact that, most arable crop farmers in the area are educated and this serves as incentive for agricultural innovations adoption and high potential for technology diffusion among them. This finding is in consonance with the report of Udoh et al. (2011); Oladeebo and Adekilekun (2013) and Uchua (2011). The social capital formation among arable crop farmers in the study area is extremely low. Low social capital formations among groups could stagnate growth and rather increase the tendency of being conservative and promote agricultural diversification among farmers. This is however contrary to the report submitted by Udoh et al. (2011) in the State. Farmer household size is moderate and it implies that household labour is fast becoming a serious constraint to agricultural production in the region. This report deviated from the research report previously submitted by Uchua (2011).

The size of farm income generated by farmers suggests that arable crop farming in the study area is not too lucrative compared with other types of business available to farmers. The lean income earned could be one of the causes of increase agricultural land diversification and upsurge in non-farm income generating activities among farmers in the region. The dominance of inherited land over other forms of land ownership is directly linked with the cultural composition of the area. Concerning leasing arrangement, the system limit the right of the farmer on the use of land while inherited land and purchase land provides property right to the farmers who are at liberty to observe longer fallow period and less land use intensity or

otherwise. Udoh *et al.* (2011) has reported similar results in Akwa Ibom State. Also the structure of secondary occupation among respondents suggests that, the urge to diversify from agricultural activities among farmers is growing in the study area. This also showed signs of dissatisfaction in income generating potentials of arable farming in the region.

The result on pattern of agricultural land use among farmers in the study area could be attributed to several factors including: global climate change, as a means of averting unnecessary risks and uncertainties in crop production, maintenance of soil fertility, control of weeds and insects and to suppress plant diseases as well as increase overall crop productivity in addition to the efficient use of scarce resources to the fullest. But on the other hand, the issue of inherited cultural practices by farmers could also play a major role in adoption of cropping pattern among small scale arable crop farmers. It is worth to note that, the study area being a rural area was not significantly influenced by urbanization, population pressure and even land fragmentation. It was noted that land fragmentation is an integral part of the cultural practices of farmers in the study area. The study also discovered that, cassava was the commonest sole crop grown under mono culture in the region. The need to create security against potential risk of mono culture has been identified as one of the driving forces behind intercropping as a form of diversification among smallholder farmers (Adegboye, 2006).

Further analysis revealed that, majority of arable crop farmers in the region preferred fluted pumpkin, cassava and water leaf combinations to other available combinations. It is suggested that, this preferred combination might be due to the cultural component of the peoples' diet, the ease of cultivation, adaptability and acceptability of these commodities, high

demand and perhaps their profitability status. This clearly indicates the high preferences accorded multiple cropping patterns among small scale crop farmers and which is also strongly correlated to the land ownership structure in the region. It has been revealed that respondents with combined crops made more monthly farm income than those that adopted mono cropping. Based on this result, farmers mostly practiced intercropping or mixed cropping as a means to avert farming risks and to generate more revenue as well as increase family food production. Crop combination and cropping system are known to be the major factors influencing the degree of stress to which land is subjected to, this could lead to fertility depletion, and could also create opportunity for soil fertility maintenance and regeneration. Uchua, (2011); Saka *et al.* (2011), Lawal *et al.* (2010) and Udoh *et al.* (2011) have reported similar result.

The results in addition revealed the degree of land intensification and by implication the extent of land use as well its availability to arable crop farmers in the study area. The average land intensification index estimated for sampled farmers indicates that arable crop farmers in Oruk Anam Local Government Area cultivate their farmlands moderately or have moderate land use intensity. This result suggests that, either arable farm lands have alternative uses or it is not readily cultivated intensively in the region. The result could also be seen as emerging evidence of increasing agricultural land diversification or increasing non- farm income sources among farmers in the region. This implies that, an average arable crop farmer in Oruk Anam local government area of Akwa Ibom State cultivates his/her farm land sparsely during each planting season. This means that, there are still possibilities among farmers to practice

fallow system in the area. The findings could be explained by the constraints imposed by excessive land fragmentation and issue related to soil fertility depletion in the study area. In addition, the issues of insufficient labour and increasing opportunities for non-farm income activities by farmers are worth mentioning. Farmers faced with these constraints have no option than to adopt sparsely or moderate land use. Most famous concession to this situation has identified low profitability of farming business, long gestation period of agrobusinesses, poor soil fertility, poor access road to farm settlement and high yielding alternative land use. Previous findings have shown that large household size and increase access to market are more likely to motivate farmers to subject land to increase cultivation intensity while farms that are located further away from farmers home would likely be cultivated less frequently (Saka *et al.*, 2011). However, in the study area, arable crop farmers have moderate family size coupled with labour constrained and this adversely affected land use intensification. Household food need is another important driver of land intensification especially as it dictates the magnitude of crop diversification which in turn has a significant bearing on the level of cropping intensity (Erbaugh, 1999).

However, due to increase global interactions and urbanization, there is also the influence of acculturation which has resulted to change in food preference among rural dwellers. For instance, many rural dwellers preferred cheap well package processed food items to natural and poorly preserved ones present in the village. This goes a long way to reduce interest in crop cultivation, but rather promotes agricultural diversification among arable crop farmers in the rural areas.

The empirical results that relates arable crop output and farm size further substantiates the previous findings reported earlier. This connotes that; majority of arable crop farmers over utilized/stressed their farm land due to the practice of multiple cropping in their farms. The over utilization could be in terms of the frequency of cultivation and or the number of crops planted at a time. This result implies that, farm land use intensity (in terms of number of crops planted) is increasing, but at the decreasing rate of farm productivity. That is, increase use of land in terms of multiple cropping and frequency of cropping do not add significantly to arable crop output among small scale farmers in the study area. This result also portrays the problem of farm factor productivity inherent in small scale agricultural production in the region. Hence, one of the greatest challenges in the region is how to improve the efficiency of resource use and the productivity of predominantly small scale farmers. Contrary to the result on farm size, labour utilization has a positive and inelastic relationship with arable crop output. This means that, as the use of labour increases, the arable crop output increases too. Given the magnitude of labour elasticity, it implies that, labour is rationally utilized and its level of utilization should be sustained for optimum farm productivity. The use of fertilizer did not cause significant variation in output of arable crop in the region. The scale of production (0.4085) connotes decreasing return to scale. Akpan *et al.*, (2012) has reported similar results in southern Nigeria.

## CONCLUSION

This study has shown evidence of moderate land use intensity and predominantly multiple or mixed cropping pattern practiced among arable crop farmers in the study area. The empirical result has also confirmed the negative inelastic relationship between output of arable crops and farm size. This further substantiates the huge pressure imposed on land as the result of multiple cropping. Following the findings, it is obvious that, the small scale arable crop farmers in the region do not utilized land factor efficiently as to produce optimum output. Due to the criticality of land in agricultural production; there are needs to build a data bank on land use indices and patterns of cropping in all local government areas of the State. This is even more important now that the federal government of Nigeria is exploring ways of sourcing revenue from non-oil sectors. There is also need to further investigate the conditions under which small scale arable crop farmers can maximize factor productivity and output. It is also necessary to explore whether the prevailing land use pattern among farmers has the potential for the desired growth in the food sub sector of the State's agriculture. In addition, the Akwa Ibom State government should intensify effort to provide adequate and accessible land through restructuring of land ownership system and should embark on land reclamation of marginal lands in order to expand hectares of cultivable land in the State.

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