The study investigated the determinants of yam production among farmers in Anambra State, Nigeria. The specific objectives of the study were to: identify socio-economic characteristics of the farmers, ascertain farmers' source of planting materials and also the determinants of yam production in the study area. Purposive and simple random sampling techniques were used in the selection of 160 yam farmers for the study. A structured interview schedule was used for data collection while frequency, percentage, mean score and regression model were used for data presentation and analysis. The results of the findings showed that majority (75%) of the farmers were males; the mean age of the farmers was 45 years while the average farm size was 1.05ha. Majority (61.9%) of the farmers were married while about 78% of them were full time farmers and the mean farming experience was 11 years. Out of the fourteen variables investigated, only six variables were found to be statistically significant as the determinants of yam production in Anambra State. These were farm size ($t = 8.826$, $p = 0.001$), farming experience ($t = 4.050$, $p = 0.000$), sex ($t = 3.908$, $p = 0.000$), perceived constraints ($t = 2.948$, $p = 0.006$), access to extension services ($t = -3.989$, $p = 0.000$) and soil fertility ($t = -3.978$, $p = 0.000$). It is therefore recommended that training among yam farmers should be encouraged and regularized by government just as to rekindle the minds of the farmers on improved yam production practices.

**Keywords:** Yam production, Determinants, Small scale farmers

### INTRODUCTION

Agriculture was the major sector upon which Nigerian economy relied on before the advent of oil boom and it accounted for more than 70% of the Gross Domestic Product (GDP). However, not less than 75% of Nigerian’s export earnings before Nigerian Independence in 1960 (Okonkwo, 2015; Ekundare, 1973). Oji-Okoro (2011) is of the opinion that agriculture resource has been an important sector in the Nigerian economy in the past decades, and is still a major sector despite the oil boom; basically it provides employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy. A strong and efficient agricultural sector would enable a country to feed its growing population, generate employment, earn foreign exchange and provide raw materials for industries. The sector has a multiplier effect on any nation’s socio-economic and industrial fabric because of the multifunctional nature of agriculture (Ogen, 2007). However, the rural population has been unable to move out of poverty principally because they have not been able to transform their basic economic activity which is agriculture. Because of the importance of the sector to the livelihoods of the poor, the World Bank said in its 2008 World Development Report, devoted to Agriculture and Rural Development, that the sector must be placed at the center of the development agenda if the Millennium
Development Goals of halving extreme poverty and hunger by 2015 are to be met. For the majority of African countries, agricultural sector still provides a relatively large share of GDP but productivity in the sector has lagged considerably behind that of other continents and the potential that Africa can reach in the sector (Nicolas et al., 2012).

Yam (Discorea Spp.) is important in the economic and social life of Nigeria and is estimated that Nigerian produce about 37 million metric tones of the crop annually which is equivalent to over 75% of West Africa’s Production (FAO, 2005). Yams are starchy staple food that can be consumed by a variety of people with different cultures. They are in form of large tubers produced annually and perennially through vines growth in Africa, the Americas, the Caribbean, South Pacific and Asia (Ewuziem, Ironkwe, Jokula and Onyenobi, 2015). Therefore, it is a tuber crop that produced as both food and cash crop in Nigeria.

Root and tubers crops comprise crop covering several genera. They are staple food crops, being the source of daily carbohydrate intake for the large populace of the world. The term refers to any growing plant store edible materials in subterranean root, corm or tuber (Oke, 1990; Izek and Olumese, 2010). Yam is a member of this important class of food. Yam is an important food crop especially in the yam zones of West Africa, comprising Cameroon, Nigeria, Benin, Togo, Ghana and Cote d’ Ivoire. This zone produces more than 90% of the total world production which is estimated at about 20 – 25 million tons per year (Izeko and Olumese, 2010). Nigeria is the main producer of yam in the world with about 71% of the world output followed by Ghana, Cote d’ Ivoire, Benin and Togo (FAO, 2002). Available data also shows that yam is one of Nigeria leading root crop (FAO, 1999).

Yam can be grown in nearly all tropical countries provided water is not a limiting factor. In Nigeria it is grown within the coastal region up to latitude 120 N and corresponds to the rain forest, wood savanna and southern savanna belt. This is the region where the annual rain fall exceeds 800mm in amount and 4 months in duration (Ike and Inoni, 2006). In Nigeria, yam cultivation still depends largely on labour intensive, traditional hoe-cutlass techniques of production. Many aspects of production like clearing, planting, weeding, staking and harvesting require considerable inputs of labour. However, as rural labour becomes more scarce and expensive, and the price of inputs increases, the cost of yam in the market increases making it a luxury food rather than a staple. Roots and tuber crops, especially yam, generally require loose soil for better performance. This is because of the manner in which the roots form and penetrate into the soil. Although yams can be grown on the flat soil, holes, ridges or mounds, it is traditionally planted on mounds. The sizes of the mounds vary from place to place depending on the size of the set and the hydromorphic nature of the soil (Ike and Inoni, 2006).

The most important part of the yam plant is the tuber. The yam tuber is a good source of energy derived mainly from their carbohydrate content, since it is low in fat and protein. Vitamin C has been found in unpeeled yam slices (Coursey, 1969). Yam could be eaten as boiled yam, fufu or fried in oil. Yam has other uses other than food. Yam tuber is said to contain some pharmacologically active substances including dioscorine saponin and sapogenin. According to Eka (1985), dioscorine which is the major alkaloid in yam is medicinally a heart stimulant. Nahanga (2015) stressed that low soil fertility, lack of improved yam varieties, poor road networks, high cost of labour and lack of finance to carry out necessary farming activities were the constraints to productivity. Yams like many other crops in Nigeria are labour intensive. The high cost of labour has been among the major constraints to yam production. It has constrained smallholder yam farmers from enhancing productivity (Ayanwuyi, Akinboye and Oyeyoro, 2011; Migap and Audu, 2012). The labour cost of yam production from mounding to staking, especially in the forest areas account for approximately 40% of cultivation costs. In addition, about 50% of the expenditure goes to the planting process (IITA, 2009). In order to reduce labour cost, most family members practically do all the production and marketing activities themselves (Ike and Inoni, 2006). Okeoghene, Egbo and Ose (2013) confirmed that over 65% of smallholder farmers used family labour in Delta State, Nigeria.

Worldwide, yam production in 2007 accounted to 52 million tons of which Africa produced 96%. However, most of the world’s production comes from West Africa representing 94% with Nigeria alone producing 71% which is equaling more than 37 million tons. With the available literature, African countries imported more than 2,000 tons in 2002 and exported 15,500 of which Nigeria exported 12% (FAO, 2005). They provide a major source of cheap caloric energy as starchy food for millions of people in the tropical and sub-tropical regions of the world specifically West Africa, the Carribbean, Asia, South and Central America therein (Asiedu and Sartie, 2010).

Yam as a food crop in Nigeria is evidently becoming expensive in both urban and rural areas as production has not kept pace with the population growth leading to demand exceeding decline in yam production over the years. According to Madukwe, Ayichi and Okoli (2000), yam production is limited due to laborious cultivation methods, the need for staking and the high cost of scarce seed yam which is also needed for consumption. However, pest and diseases are the most important factors treating yam production in Nigeria, because of its important position in the daily food intake, there is equally the need to increase the production of yam not only to satisfy domestic need but also export demand to increase our foreign exchange earnings. In the light of the above,
this research seeks to assess the determinants of yam production by the small holder farmers in Anambra state, Nigeria. The specific objectives of the study were to:

a. identify socio-economic characteristics of the farmers;
b. ascertain their source of planting materials; and
c. identify the determinants of yam production in the study area.

MATERIALS AND METHODS

The study was conducted in Anambra state. The State is presently located in the South-east of Nigeria. The State is bounded by Delta State to the West, Imo State to the South, Enugu State to the East and Kogi State to the North. It has estimated population of 4, 177, 828 million people (National Population Commission, 2006) which stretches over about 60 kilometers between surrounding community. The State lies on the longitude 6° 35E and 7° 21E and latitude of 5.38N and 6° 47E (Wikipedia. org/Wiki anambra State, 2010). Anambra State comprises 21 local governments and is predominantly occupied by Igbo people who are farmers and business oriented. Four local governments out of the 21 local governments in Anambra state were selected due to their intensity on yam production. Awka North, Anambra East, Anambra West and Ayamelum local government were used for the study. Two communities from each local government were selected. Here, Uzum and Isuaniacho in Awka North, Igbariam and Nando in Anambra East, Nzam and Anam in Anambra West, Omor and Anaku in ayamelum local governments area. However, 20 farmers were selected from each community using simple random techniques and this gave a total sample size of 160 farmers. Structured interview schedule was used for data collection. Frequency, percentage, mean scores and regression model were used for data analysis.

Measurement of Variables

To ascertain the determinants of yam production in the study area, regression model was used.

\[
Y = a + b1x1 + b2x2 + b3x3 + b4x4 + \ldots + b14x14 + u
\]

Model Specification

\[
Y = \text{yield of yam (measured in kg/ton)}
\]

\[
a = \text{constants term}
\]

\[
b1 \text{ to } b14 = \text{regression co-efficient}
\]

\[
x1 = \text{Age (measured in years)}
\]

\[
x2 = \text{Sex (dummy variable, male = 1, female = 2)}
\]

\[
x3 = \text{Education level (measured by years spent in school)}
\]

\[
x4 = \text{Household size (measured by the number of people living under one roof)}
\]

\[
x5 = \text{Member of social organization (member = 1, non-member = 2)}
\]

\[
x6 = \text{Farm size (measured in hectare)}
\]

\[
x7 = \text{Farming experience (measured in years)}
\]

\[
x8 = \text{Trading received (Received training = 1, non-training = 2)}
\]

\[
x9 = \text{Soil fertility (dummy variable for good soil = 1, poor = 0)}
\]

\[
x10 = \text{income of the farmers (measured in Naira)}
\]

\[
x11 = \text{Extension contact (access to extension service = 1, No access = 0)}
\]

\[
x12 = \text{Access to credit (access = 1, No access = 0)}
\]

\[
x13 = \text{Farming practice (shifting cultivation = 1, No shifting cultivation = 0)}
\]

\[
x14 = \text{perceived constraints (very serious = 3, serious = 2, no serious = 1)}
\]

\[
u = \text{error term}
\]

RESULTS AND DISCUSSION

Table 1 shows that majority (75.0%) of the farmers were male while 25.0% of them were female. The implication of this is that male participated more actively than their female counterpart in the activities of yam production in the study area. This result agreed with Oguntate, Ihompson and Ige (2010) who said that yam production was dominated by men in Oyo state. About 61.9% of the farmers were married while 6.9% of the farmers were single. The average mean age was 45.00 years. This shows that farmers were still in their active productive years and this could help them to improve their productivities. The average mean household size of the farmers was 6 while 78.1% of the farmers were full time farmers. Moreso, majority (59.4%) of the farmers acquired land by rent while about 84.4% of the farmers cultivated less than or equal to 1ha. The average farm size cultivated by the farmers was 1.05ha. This implies that farmers were still small scale farmers. This result agreed with Chinaka and Udemezue (2015) who said that farmers in Anambra state were small scale farmers. Similarly, majority (46.9%) of the farmers did not have formal education while 28.4% of them completed primary school education. The mean year of farming experience was 11 years. This implies that farmer had long period of farming experience and this could increase their experience with regards to yam production. Majority (84.4%) of the farmers had access to credit while about 76.9% of the farmers did not have access to extension services respectively.

Data in Table 2 revealed that majority (49.4%) of the farmers sourced planting material from input dealers. About 19%, 12%, 12%, and 3.8% of the farmers sourced planting materials from NRCI, extension agent, farmers’ association and their fellow farmers respectively. Similarly, 1.3% of the farmers sourced planting materials from NGOs while about 1.3% of them also used friends/neighbors as their source. Majority (49.40%) of the farmers who sourced planting material from input dealers could probably be due to their easy access to them than the other means of sources. This could also be
Table 1. Distribution of the socio-economic characteristics of the farmers

<table>
<thead>
<tr>
<th>Variables (n = 160)</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Mean (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>120</td>
<td>75.0</td>
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</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>11</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>99</td>
<td>61.9</td>
<td></td>
</tr>
<tr>
<td>Widow</td>
<td>15</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>35</td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td><strong>Age (year):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>30</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>79</td>
<td>49.4</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>35</td>
<td>21.9</td>
<td>45.00</td>
</tr>
<tr>
<td>50 and above</td>
<td>16</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1-5</td>
<td>88</td>
<td>55.0</td>
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</tr>
<tr>
<td>6-10</td>
<td>38</td>
<td>23.8</td>
<td>6.00</td>
</tr>
<tr>
<td>11 and above</td>
<td>34</td>
<td>21.3</td>
<td></td>
</tr>
<tr>
<td><strong>Farm Size:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1ha</td>
<td>135</td>
<td>84.4</td>
<td></td>
</tr>
<tr>
<td>1-2ha</td>
<td>15</td>
<td>9.4</td>
<td>1.05</td>
</tr>
<tr>
<td>3 and above</td>
<td>10</td>
<td>6.3</td>
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<tr>
<td><strong>Occupation</strong></td>
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<tr>
<td>Full time farmers</td>
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<tr>
<td>Trading</td>
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<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Civil servant</td>
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<td>12.5</td>
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<tr>
<td>Pensioner</td>
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<td>5.0</td>
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<tr>
<td><strong>Sources of Farm land</strong></td>
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<td></td>
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</tr>
<tr>
<td>Inherited</td>
<td>30</td>
<td>18.8</td>
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</tr>
<tr>
<td>Rented</td>
<td>95</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td>Purchased</td>
<td>35</td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td><strong>Source of Labour</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>65</td>
<td>40.6</td>
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</tr>
<tr>
<td>Hired labour</td>
<td>95</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td><strong>Educational Level:</strong></td>
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</tr>
<tr>
<td>Non formal education</td>
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<td>46.9</td>
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</tr>
<tr>
<td>Primary school completed</td>
<td>45</td>
<td>28.1</td>
<td></td>
</tr>
<tr>
<td>Secondary school completed</td>
<td>23</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>Tertiary education</td>
<td>17</td>
<td>10.6</td>
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<tr>
<td><strong>Farming Experience (Yrs):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - 10 years</td>
<td>59</td>
<td>36.9</td>
<td></td>
</tr>
<tr>
<td>11 – 20 years</td>
<td>78</td>
<td>48.8</td>
<td>11.00</td>
</tr>
<tr>
<td>21 – 30 years</td>
<td>23</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td><strong>Access to Credit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>135</td>
<td>84.40</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25</td>
<td>15.60</td>
<td></td>
</tr>
<tr>
<td><strong>Access To Extension Service:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37</td>
<td>23.10</td>
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</tr>
<tr>
<td>No</td>
<td>123</td>
<td>76.90</td>
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<tr>
<td><strong>Social Participation</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Member</td>
<td>133</td>
<td>83.10</td>
<td></td>
</tr>
<tr>
<td>Non Member</td>
<td>27</td>
<td>16.90</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016
the fact that extension agents did not discharge their duty diligently there by telling them the mandate of NRCI. This result agreed with Udemezue (2014) who said that farmers in Anambra state sourced agro inputs from input dealers. It also disagreed with Oguntate et al (2010) who said that majority (55.7%) of farmers sourced their planting materials from the previous harvest (self).

### Regression Analysis

The results of regression analysis in Table 3 of the independent variables (age, sex, education, household size, membership, farm size, farming experience, training received, soil fertility, income, extension service, access to credit, farming practice and perceived constraints) on determinants of yam production by farmers show that a strong correlation ($R = 0.976$) exists between dependent variable and independent variables. These variables were able to explain 87% of the variation in determinants of yam production among farmers ($R^2 = 0.869$). Adjusted $R^2$ also supported the claim with a value of 0.732 or 73.2%. This shows that the independent variables explain the behavior of the dependent variables at 73% level of confidence.

Out of the fourteen variables investigated, only six variables were found to be statistically significant as a regard to the determinants of yam production by the farmers in Anambra state. They were sex, farm size, farming experience, soil fertility, access to extension service and perceived constraints.

### Sex

Sex is one of the determinants of yam production in the study area. The implication of this could be the fact that yam production is labour intensive and requires a substantial energy and time of which majority of women could not cope with. This finding is in line with the results of Okwor (1998), who described yam production as a token of masculinity.
Farm Size

Farm size is another determinant of yam production in the findings. Farmers with large farm size are more likely to produce more yams that those with small area of land if all things being equal. Therefore, the positive influence of farm size on the determinants implies that the larger the farm size, the more productivity from the farmers. This result is in agreement with the findings of Oguntate et al (2010) which saw farm size and farming experience as the determinants of yam production in their study.

Farming Experience

Years of farming experience were positive and significantly influenced yam production in the study area. This implies that the contribution of explanatory variables is inversely proportional to dependent variables. Therefore, the more farming experience farmer had, the higher the productivity of yam in the study area.

Soil Fertility

Level of soil fertility has a negative influence on the determinants of yam production in the study area. This implies that the more fertility land is, the higher the productivity of yam provided that all things being equal. On the other hand, it also shows that the lesser the soil fertility, the lower the productivity of the crop.

Access to Extension Service

Extension contact has a negative influence on the determinants of yam production in the study area. This signifies that frequent contact with extension agents by the farmers gives them the opportunity to know about the use of new farming techniques to increase their production while negative contact with extension workers will affect their production due to the fact that they may have missed information or the basic inputs needed to increase production. Therefore, regular contact with extension agents makes farmers being aware of new techniques and how they can apply them to improve their livelihood. This finding is in line with the findings of Udemezue (2014) which found extension visit to be statistically significant to adoption of improved technologies.

Constraints Perceived

Constraint is the fourth variables perceived by the farmers as the determinants of yam production in the study area. It has a negative influence which implies that is inversely related to the dependent variables. Therefore, the higher the perceived constraints by the farmers, the lower the rate of yam production in the study area. Thus, for production rate to be maintained as regards to yam production, constraints have to be less effective.

CONCLUSION AND RECOMMENDATIONS

The yam producers were dominated by male whose average farm size was 1.05ha and had long period of farming experience. Also the farmers sourced planting materials from input dealers and NRCl. Out of the fourteen variables investigated, only six variables were found to be statistically significant as regards to the determinants of yam production in the study area. They were, sex, farm size, farming experience, soil fertility, access to extension contact and perceived constraints.

In view of the above, this study therefore, recommended that agricultural extension workers should work acutely to educate farmers about new farming practice as well as the coping strategies about the perceived constraints. Training among farmers should be encouraged, regularized and implemented by the government just as to rekindle the minds of the farmers about agricultural practices. Extension agents should educate farmers on the alternative use of organic agriculture and soil management practices as to retain soil fertility. More remuneration should be approved to agricultural extension workers in order to discharge their duty effectively.

REFERENCES

Food and Agriculture Organisation (FAO) (1999). Food and Nutrition, creating a well fed world, FAO, Rome, Italy.
Food and Agriculture Organisation (FAO) (2002). Food and Agriculture Organisation year book Volume


