YAM PRODUCTION AS PILLAR OF FOOD SECURITY IN LOGO LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

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Abstract

Food production is a necessary condition in reducing hunger and ensuring food security, especially to the poor rural dwellers that are vulnerable to misfortune. This contribution is an attempt to explore the importance of yam production, socioeconomic characteristics of farmers, constraints to yam production, and yam as an integral of food security in the Logo Local Government of Benue State, Nigeria. The primary data for the study were collected from the I40 yam farmers who were randomly selected with a structured questionnaire. The data are mostly analysed with frequency and percentage. The findings of the study show that the majority of the respondents are males. The main reasons for yam farm as indicated by the respondents were food security, income and employment. The major constraints to yam production as reported by the respondents were lack of fertilizer, access to finance, modern farm inputs, and pest and diseases. To improve the level of yam production and ensure food security in the area, constraints to yam production should be tackled by both public and private sectors by assisting farmers with a wide range of farm input subsidies and affordable credit facilities to invest in yam production for higher productivity, and establishing yam processing industries for value addition.

Keywords: Food security, fertilizer, finance, inputs, yam

Introduction

Nigeria is an agricultural country that is endowed with enormous food and agricultural resources such as yam, cocoa, cassava, rice, sugar cane, maize, and millet. Ojo and Adebayo (2012), in the 1940s and early 1950s, the country did not have to contend with the issue of food insecurity. During this period, food produce in Nigeria was not only enough to feed her citizens, but also exports its surplus food items. Nigeria was relatively self-sufficient

in food production. Igberaese and Okojie-Okoedo (2010), Symptoms of poverty, hunger and food insecurity are everywhere in Nigeria.

Unemployment and poverty have been identified as the main source of food insecurity in countries, especially in the rural areas (Gomatee, Waseem and Ashraf, 2013). Nigeria has been a net importer of food since the mid-1970s. The country has a high rate of unemployment (23.9%) and the poverty rate (over 60%). Consequently, the majority of the population cannot afford to access food even if available. More so, farmers could not afford to finance their farms. Thus, the possibility of ensuring sustainable food and nutritional security in the region is threatened.

Yam production is regarded as a source food security and employer of labour in many areas where it is cultivated. However, partly due to the lack of farm inputs, finance, and high rate of poverty, limited added value and the loss of soil fertility in the areas, total annual yam output has not been increasing as expected. Despite the importance of yam as a pillar of food security, income and employment generation, its production has not been given the utmost attention in the Logo Local Government area, in particular, and Nigeria, in general.

Some empirical evidence

Some researchers have empirically investigated factors that determine yam production in Nigeria and elsewhere in the world. For instance, Bamire and Amujoyegbe (2005) find a positive relationship between net returns (profitability) in yams output and land improvement techniques in Nigeria. Zaknayiba and Tanko (2013), find that lack of access to farm inputs, high cost of inputs, poor producer prices, high incidences of pests and diseases and inadequate of storage facilities have negatively affected yam production. Similarly, Ike and Inoni (2006); Maikasuwa and Ala (2013) results indicate that the factors of production such as labour, finance and material inputs like fertilizer have influenced on yam production. Donye et al. (2012) find a robust relationship between farm size, marital status and yam cultivation in Wukari Local Government Area of Taraba State, Nigeria.

In the same direction, studies by Etim, Thompson and Onyenweaku (2013) suggest that farmers' education, family labour, extension contact and experience of farmers have a positive effect on the farm level technical efficiency and yam output. Similarly, Shehu et al. (2010) find out that land, seed yam, family labour, education, and fertilizer are the drivers that influence yam production in Nigeria.

Published research works on this topic are only in other regions in Nigeria and elsewhere in the world. To the best of our knowledge, there is no

study about yam production in the Logo Local Government of Benue State, Nigeria, thus, the relevance of this study.

The aim of this contribution is an attempt to explore the importance of yam production and yam as an integral of food security in the Logo Local Government of Benue State, Nigeria. The paper also aimed to assess the socioeconomic characteristics of yam farmers, and constraints to yam production in the area. Finally, make some policy recommendations that would improve yam production and food security status of the farmers in the region.

Food Security

In recent years, global attention has been focused on the need to eliminate food insecurity and hunger across the globe (Babatunde, Omotesho and Sholotan, 2007), especially in the developing countries where chronic hunger and malnutrition still persist. Attaining food security is presently one of the major problems households are facing in (Irohibe and Agwu, 2014), as elsewhere in West Africa.

What is **food security?** Food security *"exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"* (World Food Summit, 1996, p. 1). Food security is ensured when people have access to adequate food at all times for healthy and active life (World Bank, 1986). Thus, food security implies that the food must be available to the consumers. Food must also be able to meet acceptable nutritional levels in terms of calories, proteins and minerals that are needed by the body (Davies, 2009).

Dimensions of Food Security

Globally, food security has a complex definition (FAO, IFAD, and WFP, 2013). Food security is divided into four dimensions as follows: firstly, food availability entails the sufficient quantities of appropriate quality of food, supplied through national outputs or imports. Secondly, food access is where individual consumers have adequate means of acquiring desirable foods for a nutritious diet. Thirdly, food utilization refers to food use through adequate diet, sanitation and health care to attain a state of nutritional well-being of the people. Food stability takes place when consumers have access to enough food at all times. Food stability can, therefore, refer to both the availability and food accessibility (FAO, 2006).

Naturally, food availability, food access and utilization are in hierarchical order. More so, food availability is necessary, but not enough for its accessibility and access is necessary but not sufficient for utilization. They are two factors that determine food security: supply side and the

demand side factors. The supply-side is the factors that determine the food availability to the consumers. Whereas the demand side are those factors that determine the level of food accessible to individual households in countries. The stability of food demand and supply side of both factors is necessary for food security to be sustained (Omonona et al., 2007).

Table1: Food security status in Nigeria, 2012-2014

	Score/100			**Rank/109**		
Dimension/year	2012	2013	2014	2012	2013	2014
Overall score	33.8	33.1	36.5	89	88	87
Affordability	15.3	15.1	21.7	107	107	102
Availability	48.7	48	47.7	68	71	73
Quality and safety	38.9	36.7	42.4	88	86	81

Source: Economist Intelligent Unit

Food stability implies that the availability of food is not affected by any shocks that might affect food production and supply at all times (Akinyele, 2009). Food availability is a function of the combination of national food production, food imports, food aid, as well as the underlying drivers each of these factors (Omonona et al., 2007). Availability of enough food in the country does not mean that all people within the country are food secured (Osayande and Ada-Okungbowa, 2014). As shown in table 1, Nigeria is still facing food security crisis. On the global food security index, weighted total of all category scores (0-100 where 100 = most favourable), Nigeria scored 36.5/100 and ranked 87/109. On food availability, the country scored 47.7/100 relatively higher than the overall food security score.

Yams

Yams (*Dioscorea* species) are annual root tuber-bearing plants with more than 600 species out of which six are socially and economically important in terms of food, cash and medicine (IITA, 2009). Some of its species are water yam (*Dioscorea alata)*, white yam (*Dioscorea rotundata*) and yellow yam (*Dioscorea cayanensis)* (FAO, 1998; Ike and Inoni, 2006; Zaknayiba and Tanko, 2013). Yam as a staple food crop is grown in tropical regions (Thouvenel and Fauquet, 1979) and mostly produced in the savannah region of West Africa, where rainfalls are divided into wet and dry seasons (Etejere and Bhat, 1986; FAO, 1998). Yams are the fifth most harvested crops in Nigeria, following after cassava, maize, guinea corn, and beans/cowpeas. More so, after cassava, yams are the most commonly harvested tuber crops in the country (NBS, 2012).

Yam plays significant roles in the social-cultural and economic wellbeing of thousands of people in Nigeria and elsewhere in the world. Yam is among the major cash and most consumed food crops West African countries (GTZ, 1999) like Nigeria (Babaleye, 2003; NBS, 2012). Its

cultivation is very profitable despite high costs of production and price fluctuations in the markets (IITA, 2013; Izekor and Olumese, 2010). An average profit per seed yam, after harvest and storage, was calculated at over US$13, 000 per hectare harvested, and over 60% of people grow yams as a primary source of livelihood in Nigeria (IITA, 2013).

Table 2: Nutrient contents of root and tuber staple foods

STAPLE:	**Yam [Y]**	**Potato [D]**	**Cassava[E]**
Component (per 100g portion)	Amount	Amount	Amount
Water (g)	70	79	60
Energy (kJ)	494	322	670
Protein (g)	1.5	2	1.4
Fat (g)	0.17	0.09	0.28
Carbohydrates (g)	28	17	38
Fiber (g)	4.1	2.2	1.8
Sugar (g)	0.5	0.78	1.7
Calcium (mg)	17	12	16
Magnesium (mg)	21	23	21
Phosphorus (mg)	55	57	27
Potassium (mg)	816	421	271
Sodium (mg)	9	6	14
Zinc (mg)	0.24	0.29	0.34
Vitamin C (mg)	17.1	19.7	20.6
Vitamin B6 (mg)	0.29	0.3	0.09
Vitamin A (IU)	138	2	13

Note: [Y] = yam, raw; [D] = potato, raw, flesh, skin; [C] = cassava, raw
Source: The National Agricultural Library (USDA), 2014

Nutritionally, yam is an essential source of carbohydrates for the consumers, especially in the tropical and subtropical regions (Coursey, 1967). Many yam belt areas in Nigeria continuously proclaimed "yam is food and food is yam" (Maikasuwa and Ala, 2013, p. 2). As presented in table 2, root and tuber crops (yam, cassava and potato) place in the diet and source of food security for smallholder farmers and other consumers cannot be ignored.

Despite the importance of yams to people and as a source of food security, the attention to yam production is still questionable, as many rural dwellers are still living in hunger in Nigeria.

Yam production has gone some dramatic changes in many parts of the world. However, production process from bush clearing, cultivation, chemical application, harvesting and transporting to markets is still labour-intensive (Ennin, Otoo and Tetteh, 2009). Maximum food production and availability is threatened where inputs are used inefficiently (Udoh and Etim, 2007). Annual statistical data available from FAO (2014) shows that the area harvested in the world has increased from 1.15 million (Ha) in 1961 to

5.04 million (Ha) in 2012. Yield (Hg/Ha) in the world also increased from 72.35 thousand metric tons in 1961 to 116.65 thousand metric tons in 2012.

Over 58.8 million tons of yams were produced in the world in 2012, out of which 92.2% were from West Africa.

Table 3: Annual yam production in the world and Nigeria, (1961-2012)

Yams Elements	Areas	1961	1980	1990	2000	2010	2012
Area Harvested (Ha, 1,000)	World	1,151	1,362	2,247	4,032	4,942	5,037
Production (MT million)	World	8.32	12.1	21.76	39.55	53.60	58.75
Production (MT million)	Nigeria	3.50	5.25	13.62	26.21	34.16	38.00
Production (% of the world)	Nigeria	42	44	63	66	64	65
Yield (Hg/Ha) (thousand)	World	72.35	88.16	96.90	98.09	108.47	116.65
Yield (Hg/Ha) (thousand)	Nigeria	77.78	105.38	106.77	98.98	119.07	131.03

Source: FAOSTAT, 2014

Nigeria is the largest producer of yams in the world. The country accounted for over 65% (with 38 million metric tons) of the world production value at $7.75 billion and cultivated about 2.9 million hectares of land in 2012 (see table 3). Depending on the variety of yam products, its yield potential ranges from 20 - 50 tons per hectare. During the bad season, the yield could be around 10 tons per hectare (FAO, 1985). The development of yam output could be partly attributed to the use of modern farm inputs even though the inputs are not sufficiently available to farmers.

Materials and Methods

We have employed the service of a local person in the study area to collect data from yam producers through questionnaires. Personally, one of the authors has interacted and interviewed some farmers and went to the some yam farms for observation.

Study area

The primary research is carried out in the Logo Local Government, has an area of 1,408 km2 and a population of about 170,000 inhabitants (2006 census). The local government is located in the north-eastern part of Benue State, North Central Nigeria. Lies between latitudes 6° 25’ and 8° 8’N and longitudes 7° 47’ and 10° 0’E. The state lies within the tropical (AW) climate and experiences two distinct seasons, the wet/rainy season and the dry/summer season. The rainy season lasts between April and October with annual rainfall in the range of 100-200mm. The dry season lasts between November and March. Logo local government produces numerous agricultural products such as yam, cassava, rice, fish, sugar cane, maize, beans, potatoes, soybeans, sorghum, millet and cocoyam.

This study area was selected because it is among the major yam producing areas in Nigeria. More so, yam is among the staple food in the

area, both farmers and consumers eat yams year round. The researchers believed that the findings of the Logo Local Government would reflect the present characteristics of farmers and issues related to yam production and its availability as an integral pillar of food security in Nigeria.

Sampling techniques

The population for the study comprises of the village farm-families who also double as yam consumers in the Logo Local Government of Benue State, Nigeria. Sample selection for this article was carried out using a simple random sampling approach, within the four districts (wards) in the area. Finally, we have selected 140 farming households from the 20 villages sampled for the research. Structured questionnaire is applied to determine the level of yam production; challenges faced by yam producers/farmers during yam production and post-harvest. Targeted rural farmers are asked to respond to close-ended questions. Data collected from the respondents were analysed using a descriptive method.

The distribution of the participants

The respondents are distributed and collected from them the following information: Age, gender, marital status, household size, educational status, farm size, years of farming, access to finance, access to inputs, etc.

Socioeconomic characteristics of the respondents

In this study, the socioeconomic characteristics of the respondents in the Logo local government area of Benue State, Nigeria are presented in the tables below.

Table 4 shows that over 53.57% of the respondents were between 41 and 50 years; 26.43% were between 31 and 40 years. More so, 14.29% were from 51 years and above, whereas 5.71% represents respondents who were between 18 and 30 years old. This implies that the more elderly population engaged more in yam production than the younger population. As a result, the future of yam production in the area is threatened as older farmers might not have enough strength to carry out the tedious tasks that are associated with yam farming. The majority of the young respondents stressed that they still farm because there are no job opportunities in the area.

The results in table 4 according to gender distribution indicate that the majority (76.43%) of the respondents were males with females constituting the remaining 23.57%. This shows that men constitute a greater proportion of the yam producers in the area. Males dominated women as they are not allowed by the men to have their farms in some areas. More so,

in some villages, women were not allowed to participate either in the interviews or fill in the questionnaire.

Table 4: Age, gender, marital status and household size

Variable	Frequency	% of Respondents
Age		
18-30	8	5.71
31-40	37	26.43
41-50	75	53.57
51+	20	14.29
Total	140	100.00
Gender		
Male	107	76.43
Female	33	23.57
Total	140	100.00
Marital status		
Single	16	11.43
Married	124	88.57
Total	140	100
Household size		
1.5	28	20
6.10	89	63.57
11.15	16	11.43
16+	7	5.00
Total	140	100.00

Source: Field survey

Historically, women in the region have been immensely contributing to the attainment of family farm objectives and ensuring household food availability in particular and food security in general. Despite men's dominance, the importance of women in yam cultivation and other agricultural related activities in the area cannot be overemphasised.

Results in table 4 also show that 88.57% of the respondents were married, while the remaining 11.43% were single. According to the married people, farming is a necessary condition for them to lift their households out of poverty and ensure the hunger free in their homes. For these reasons, they are more engaged in agriculture than unmarried people in the area.

The results also indicate that the majority (63.57%) of the respondents have between 6 and 10 household members. This implies that the birth rate in the area is still high. Traditionally, yam as a labour intensive, family size was a necessary for the size of the farm, food security and wellbeing of farmers in this area. However, with money, it is possible for small family members to have large farms as they can apply chemicals and employed people to work for them. Therefore, family size to some extend is no longer a major factor for a sustainable yam production and food security in the area.

Table 5: Educational qualification, occupation and farming experience

Variable	Frequency	% of Respondents
Educational qualification		
No formal education	15	10.71
Primary education	65	46.43
Secondary Education	42	30
Tertiary education	18	12.86
Total	140	100
Primary occupation		
Farming (mostly yam)	93	66.43
Public service	37	26.43
Trading	10	7.14
Total	140	100
Farming experience (years)		
0-10	16	11.43
20-Nov	43	30.71
21-30	57	40.71
31+	24	17.14
Total	140	100.00

Source: Field survey

Respondents were grouped into four categories based on the level of their educational attainment. Table 5 shows that 10.71% of yam farmers have no formal education (illiterate). The majority of yam farmers' (46.43%) have primary education, followed by the secondary education (30%) while only 12.86% have tertiary education. This implies that the majority of the farmers in this area did not attain tertiary institution. This implies that, the majority of the respondents are not likely to have vast knowledge on the modern farming practices and techniques. Nevertheless, most of them have worked as yam farmers for several years.

As shown in table 5, agriculture, mostly yam appears to be the largest employer of labour (66%) in the area. While the remaining the remains 26.43% and 7.14% of the respondents engaged in public service and trading respectively. The result also indicates that the majority of farmers have farming experience.

Research Findings and Discussion

Reasons for yam production: There are many reasons for yam production. Respondents were asked to choose the main reason(s) why they cultivate yam in the area. The respondents' answered as presented in table 6 reveals that their primary reason for yam farming were to ensure food security (92.85%). Followed by income generation (80.71%), employment generation (44.28%) and to secure land (19.29%). This implies that yam is

not only grown as the major source of food security, but also as the main source of income and employment to the farmers.

Many households in this region eat yam all day round. According to them, yam is the main food they produced and is available for consumption and market, especially during the harvesting season. This implies that yam production is the key pillar of food security to the households within the region. Thus, an increase in yam production is likely to be an integral way of reducing hunger and ensuring food security in the local government and elsewhere it is grown.

Despite the socioeconomic importance of yams to people and as an ingredient for sustainable food security, the attention to its sustainable production is still questionable. Even though, the study area is dominated by the yam farmers, some people are still living in poverty and hunger.

Table 6: Main reasons for yam farming and farm size

Variable	Frequency	% of Respondents
Main reasons for farming		
Consumption/food security	130	92.85
Income	113	80.71
Employment	62	44.28
Secure land	27	19.29
Farm size by hectare (Ha)		
<3	65	46.43
3<5	54	38.57
5>	21	15.00
Total	140	100.00

Source: Field survey

Food security status of the respondents

Table 7 shows food security status among the respondents in Logo Local Government. The respondents were asked to choose whether they have enough food for their daily consumption for healthy consumption or not. As presented in table 7, the majority of the respondents (65.71%) faced food insecurity issues, only 34.29% were reported to have access to adequate food for their daily dietary needs for an active and healthy wellbeing. This implies that the majority of the families in this area face food insecurity challenges.

Table 7: Perception of household food security status

Variable	Frequency	% of Respondents
Food security status		
Food secure	48	34.29
Food insecure	92	65.71
Total	140	100.00
Major source of household food		
Own Production	119	85
Market purchases	11	7.86
Inter-household transfers	10	7.14

Total	140	100.00
Causes of food insecurity		
Inadequate food production	124	88.57
Inability to access healthy food	127	90.71
Inability to preserve food after harvest	105	75.00
Lack of value addition to food produced	128	91.43

Source: Field survey

Respondents were also asked to choose the main causes of food insecurity in their households. Table 7 also shows that lack of value addition (91%), inability to access healthy food (90.7%), and inadequate food production (88.6%) are the principal causes of food insecurity in the area. Due to the difficulties in yam preservation and poverty, producers are compared to either consume or sell all their yam products at low prices before the new harvesting system.

Major crop cultivation in the area

As presented in table 8, majority of the respondents chose yam (63.57%) as their main crop cultivation. Trailing far behind is cassava (17.86%) and rice (12.86%). This implies that yam products are the primary source of food available for the producers in the area. Some households in this area eat yam all day round. Arguably, yam is the mainly staple food available and accessible to them, especially during the harvesting season. Thus, an increase in yam production should be ensured.

Table 8: Major crop cultivation in the area

Variable	Frequency	% of Respondents
Yam	89	63.57
Cassava	25	17.86
Rice	18	12.86
Soybean	8	5.71
Total	140	100
Yam farming system		
Monocrop	101	72.14
Intercrop	39	27.86
Total	140	100.00

Source: Field survey

Constraints to yam production and farm size in the area

Farm inputs (i.e. fertilizer, chemicals, pesticides), finance and manpower, are the three primary drivers of yam production in regions across the globe. Table 6 shows the major problems identified by the respondent as constraints to yam production in the area.

Table 9: Constraints to yam production in the area

Variable	Frequency	% of Respondents
Lack of fertilizer	135	96.43
Lack of finance	123	87.86
Farm inputs (chemicals, machinery)	111	79.29
Modern technology	89	63.57
Labour cost	83	59.29
Yam lost	77	55
Pests and diseases	115	82.14
Infertile land	86	62.43
Climate change/drought	68	48.57

Source: Field survey

As presented in table 9, farmers in the local government report that lack of access to finance (87.86%), fertilizer (96.43%), modern technologies in yam production (63.57%), other farm inputs such as chemicals, machinery (79.29%), pest and disease such as tuber beetles, mealy bugs and fungi (82.14%), declining soil fertility (62.42%), and modern storage facilities to preserve their harvested products for sustainable food consumption and sales are among the major constraints to yam production in the area.

Table 10 shows the respondents' level of access to finance and fertilizer application on their farms in the area. The majority of the respondents' finance their farms through their personal savings (62%). While trailing second is the local cooperative loans (17.9%). More so, over 69% of the respondents do not have access to credit facilities which has militated them from rapid farm expansion in the area. This implies that lack of access to credit facilities is among the constraints to yam production in the area.

A higher percentage of the respondents (90%) also indicated that, fertilizer use on farms increase tuber yield. In order to increase yam output per hectare or farm, yam plantation is followed by thorough weeding and application of fertilizer. However, about 68% of the respondents reported that the prices of fertilizer such as urea and NPK are not affordable. This implies that, lack of funds and fertilizer application are among the major constraints to yam production in the area (see table 9 and 10). These findings are in consonance with the works by Zaknayiba and Tanko (2013); Ike and Inoni (2006); Maikasuwa and Ala (2013), who find that lack of access to farm inputs, high cost of inputs, high incidences of pests and diseases have negatively affected yam production.

Table 10: Access to finance and fertilizer application

Variable	Frequency	% of Respondents
Source of finance		
Personal savings	87	62.14
Local cooperative loans	25	17.86
Individual credit facilities	11	7.86
Friends and family members	13	9.29
Commercial Banks	4	2.86

Total	140	100.00
Do you have access to loans?		
Yes	44	30.71
No	96	69.29
Total	140	100.00
Fertilizer are used		
Yes	78	55.71
No	62	44.26
Total	140	100.00
Fertilizer available on time		
No	81	57.86
Yes	59	42.14
Total	140	100.00
Affordable fertilizer price		
Not affordable	95	67.86
Affordable	55	32.14
Total	140	100.00
Fertilizer influenced of the yam yield		
Increased yam yield	127	90.71
Depressed yam yield	13	9.29
Total	140	100.00

Source: Field survey

Yam storage

The respondents were asked to choose their methods of storing yams after harvest or purchases. Table 11 shows the results of both the traditional and modern methods of storing yam for future consumption (food security), market and replantation. The majority of the respondents (75.7%) use the traditional method, while the remaining 24.3% use a modern method. Many of the respondents stressed that, they still use the traditional method because they cannot afford to buy chemicals, fungicide treatment and other things that could control rotting, sprouting, etc.

Table 11: Traditional and modern ways of the yam storage

Variable	Frequency	% of respondents
Traditional storage methods (wooden platform, cool and well-ventilated room or barns, covered with dry glasses, left in the soil for temporary, stored in a thatched shed, etc.)	106	75.71
Modern storage (fungicide treatments, use of chemical treatment, and controlled rotting storage, storage in the cold room, refrigeration, etc.)	34	24.29

Source: Field survey

In order to partly ensure food security in the region, yam storage is very important. In other words, yams are stored either for future consumption, higher market prices or for replantation (yam seeds) in another season. Due to the difficulties in yam preservation, the majority of the yam farmers are compared to either consume or sell all their yam products at low prices before the new harvesting season. Consequently, before new harvesting period, they are bound to suffer food security crises.

Conclusion and Policy Implications

The primary objective of the research was to explore the importance of yams, the current socioeconomic characteristics yam farmers, and constraints to yam production with reference to food security in the Logo Local Government of Benue State, Nigeria.

In the course of our study, we find out that the yam is the main staple food consumption, source of income and employment generation in the area. This implies that, yam production is a necessary condition in enhancing food security in the area. Nevertheless, the respondents reported that they were facing a food security crisis in the area. The respondents indicated that lack of fertilizer, finance, farm inputs, pests and diseases, among others are the constraints to yam production.

To improve the level of yam production and ensure food security in the area, constraints to yam production should be tackled by assisting farmers with a wide range of subsidies and affordable credit facilities to invest in yam production for higher productivity, establishing yam processing industries, and giving them access to innovation and technology to move away from labour intensive to capital intensive yam production.

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References:

Akinyele, I.O. (2009). Ensuring food and nutrition security in rural Nigeria: An assessment of the challenges, information needs, and analytical capacity (Background Paper No. NSSP 007). Abuja, Washington, DC: International Food Policy Research Institute.

Babaleye, T. (2003). West Africa: Improving yam production technology. *ANB-BIA*, 463, 56-59.

Babatunde, R.O., Omotesho, O.A., & Sholotan, O.S. (2007). Socio-economic characteristics and food security status of farming households in Kwara State, North-Central Nigeria. Pakistan Journal of Nutrition, 6(1), 49-5

Bencini, M.C. (1991). Post-harvest and processing technologies of African staple foods: A technical compendium. Agricultural Services Bulletin No. 89. Rome: *FAO.*

Coursey, D.G. (1967). Yams. London: Longmans.

Davies, A.E. (2009). Food security initiatives in Nigeria: Prospects and challenges. University of Ilorin, Nigeria.

Deutsche Gesellschaft Fur Technische Zusammenarbeit (GTZ) (1999). Market oriented yam storage: Reducing loss and increasing income. Root and Tuber Development Guides (2). Eschborn: *GTZ.*

Donye et al. (2012). Assessment of youth involvement in yam production in Wukari local Government area of Taraba State, Nigeria. Agriculture and Biology Journal of North America, 3(8), 311-317.
Economic Intelligent Unit (EIU) (2014). Global food security index 2014: An annual measure of the state of global food security. New York, NY: The Economist Intelligence Unit Limited.
Ennin, S.A., Otoo, E., & Tetteh, F.M. (2009). Ridging, a mechanized alternative to mounding for yam and cassava production. West African Journal of Applied Ecology, 15.
Etejere, E.O., & Bhat, R.B. (1986). Traditional and modern storage methods of underground root and stem crops in Nigeria. Turriaba, 36(1), 33-37
Etim, N.A., Thompson, D., & Onyenweaku, C.E. (2013). Measuring efficiency of yam (Dioscorea spp) production among resource poor farmers in rural Nigeria. Journal of Agriculture and Food Sciences, 1(3), 42-47.
Ezeike G.O.I. (1995). Successful introduction of improved yam storage methods for Nigerian farmers. Proceeding of the Workshop on the African Experience on Post-harvest Technology Development, Accra (Ghana), 4-8 July 1994. Edited by FAO, Rome.
FAO (1985). 1984 FAO production year book, Vol. 38. Rome: *FAO*.
FAO (1997). Report on the inter-center review of root and tuber crops research in the CGIAR. Rome: *FAO.*
FAO (1998). Storage and processing of roots and tubers in the tropics. *FAO*
FAO 2006. Food security policy brief, Issue 2. Rome: *FAO.*
FAO. 2014. FAOSTAT database [Online]. Available at: http://faostat.fao.org/ [Accessed: 10. August 2014].
FAO, IFAD, and WFP. 2013. The state of food insecurity in the world 2013: The multiple dimensions of food security. Rome: *FAO.*
Gomatee, D., Waseem, S., & Ashraf, A. (2013). An empirical analysis of status of food security among vulnerable rural classes of Bulandshahr district. International Journal of Agriculture and Food Science Technology, 4(8), 751-762
Ike, P.C., & Inoni, O.E. (2006). Determinants of yam production and economic efficiency among small-holder farmers in South-eastern Nigeria. Journal of Central European Agriculture, 7(2), 337- 342.
International Institute for Tropical Agriculture (IITA) (2009). Yam (Dioscorea species). IITA Publications.
IITA (2013). Healthy yam seed production. IITA Publications.
Irohibe, I.J., & Agwu, A. E. (2014). Assessment of Food Security Situation among Farming Households in Rural Areas of Kano State, Nigeria. Journal of Central European Agriculture, 15(1), 94-107.

Izekor, O. B., & Olumese, M.I. (2010). Determinants of yam production and profitability in Edo State, Nigeria. African Journal of General Agriculture, 6(4): 205-21.
Maikasuwa, M.A., & Ala, A.L. (2013). Determination of profitability and resource-use efficiency of yam production by women in Bosso local government area of Niger State, Nigeria. European Scientific Journal, 9(16), 196-205.
Mou, D. (2014). State power, agrarian policies and peasant welfare: Politics of agricultural marketing and commodity boards in Nigeria. Authorhouse.
National Agricultural Library (2014). Nutrient data laboratory. United States Department of Agriculture. Retrieved October 2014.
National Bureau of Statistics (NBS) (2012). LSMS: Integrated surveys on agriculture: general household survey panel 2010/11.
Ojo, E.O., & Adebayo, P.F. (2012). Food security in Nigeria: An overview. European Journal of Sustainable Development, 1(2), 200-220.
Olaoye, J.O., & Oyewole, S.N. (2012). Optimization of some "poundo" yam production parameters. Agricultural Engineering International, 14(2).
Omonona, B., Agoi, T., & Adetokunbo, G. (2007). An analysis of food security situation among Nigerian urban households: Evidence from Lagos State, Nigeria. Journal of Central of European Agriculture. 8 (3), 399-406.
Osayande, I., & Ada-okungbowa, C.I. (2014). Determinants of food security status of yam-based farmers in Orhionmwon Local Government Area of Edo State, Nigeria. International Journal of Agriculture Innovations and Research, 3(1), 281-285.
Shehu et al. (2010). Determinants of yam production and technical efficiency among yam farmers in Benue State, Nigeria. *J Soc Sci*, 24(2), 143-148.
Thouvenel, J.C., & Fauquet, C. (1979). Yam mosaic, a new potyvirws infecting dioscorea cayenensis in the Ivory Coast. *Ann. Appl. Biol.*, 93, 279-283.
Udoh, E.J, Etim, N.A. (2007). Application of stochastic production frontier in the estimation of technical efficiency of cassava based farms in Akwa Ibom State, Nigeria. *Agric. J.* 2(6), 731- 735.
World Bank (1986). Poverty and hunger: issues and options for food security in developing countries. Washington, DC: World Bank Publications.
World Food Summit (1996). Rome declaration on world food security and world food summit plan of action. World Food Summit Conference 13-17 November 1996. Rome. *FAO*.
Zaknayiba, D.B., & Tanko, L. (2013). Costs and returns analysis of yam production among small scale farmers in Karu local government area, Nasarawa State, Nigeria. *PAT*, 9(1), 73-80.