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Effect of Socio-economic Characteristics on the Farm Productivity Performance of Yam Farmers in Nigeria

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Abstract
The study assessed the effect of socio-economic characteristics on the performance of farmers in production of yam in Nigeria. The study was carried out in Benue State, Nigeria. A multi-stage random sampling technique was employed with the aid of a well structured questionnaire in collecting data from 120 farmers. Descriptive statistics as well as Production function analysis was employed to estimate the parameters of the regression model. Findings showed that 80 percent of the sampled farmers were within their economic active working age. It was also revealed that 84.2 percent were men while 15.8 percent of them were women. Moreover, the analysis of production function indicated that the main determinants of yam production performance in the study area were age, educational level, farming experience, farm distance and income level of the farmers which had positive coefficients as well as statistically significant. However, households size had a negative coefficient though not statistically significant, this negate the a priori expectation. Some recommendations were therefore made as to improve the performances of yam farmers as well as on food security in the country.
Key words: Socio-economic characteristics, production, efficiency, yam farmers.

1. Introduction

Nigeria is by far the world's largest producer of yams, accounting for over 70–76 percent of the world production (Wikipedia, 2011). FAO (1985) reported that Nigeria produced 18.3 million tonnes of yam from 1.5 million hectares, representing 73.8 percent of total yam production in Africa. According to 2008 figures, yam production in Nigeria has nearly doubled since 1985, with Nigeria producing 35.017 million metric tonnes with value equivalent of US$5.654 billion (FAO, 2008). Also in West Africa, average statistics has shown that 95% of the world's output of 34 million metric tonnes (mmt) of yam in 2001was produced and Nigeria alone produced 75% of this total Output.

Yam is in the class of roots and tubers that is a staple of the Nigerian and West African diet. Babaleye (2003) observed that yam contributes more than 200 dietary calories per capita daily for more than 150 million people in West Africa while serving as an important source of income to the people. Interestingly, yam is categorized as chief among the major staple food of Nigerians on account of its indispensability. It's highly produced in all parts of the country and economically significant in that it moves from North to south and vice versa. Also, national food security is strengthened due to variability in production in different part of the country. This was so due to differences in season as a result of different vegetation which characterized farming system of the nation. Awoniyi et al. (2006) reported that in many yam-producing areas of Nigeria, it is said that yam is food and food is yam. This shows that, the importance of yam to the existence of the people cannot be overemphasized. It is therefore worthy of note that yam to an average Nigerian man is indivisible.

Moreover, researchers over the years have been able to look into values of yam health wisely. Ekp (1985) reported that Yam tuber contain pharmacologically active substances such as dioscorine, saponin and sapogenin. Dioscorine which is the major alkaloid in yam is medicinally a heart stimulant while saponin has a bioactivities and therapeutic uses. Saponin has been used as adjuvant in vaccines as well as together with immunotoxins as cure for leukaema, lymphoma and other cancers. It is also used in preparation of traditional medicine. (Wikipedia, 2011). Also, yam tuber is a good source of energy mainly from their carbohydrate contents since it is low in fat and protein. However, yams tend to be higher in protein and minerals like phosphorus and potassium when compared with sweet potatoes though the latter are richer in vitamins A and C (CGIAR, 1997). Also, it has been reported that yam is a good source of industrial starch whose quality varies with species.

Yam is widely consumed especially in West Africa in different dimension and recipe. It is often pounded into a thick paste after boiling (pounded yam) and is eaten with soup. Yam can also be processed into flour that is used in the preparation of the paste. Yam is a preferred food and a food security crop in some sub-Saharan African countries (IITA, 1998). Unlike cassava and other root and tuber crops, one can store yam tubers for periods of up to 4 or even 6 months at ambient temperatures. This characteristic contributes to the sustaining of food supply, especially in the difficult period at the start of the wet season.

However, aside from the economic importance of yam, considerable amount of ritualism has developed

around the production and utilization of yam. The most important manifestation of this ritualism is in the new yam festival celebrated at the beginning of the harvest season. This is common to virtually all producing villages and towns in all parts of the country. No other crop has taboo and festivity as yam. Yam is currently being exported from West Africa and Caribbean countries to Europe and North America where sizable population of yam consumers are found. This portrays the socio-cultural as well as economic significance of yam production to rural dwellers, especially the farmers. Socially, the crop is harvested and declared ready for consumption by the community head coupled with lots of cultural displays, festivities and celebrations. Also, the farmer and his households welcome the harvest period with lots of economical expectations, as it forms their major source of income.

However, in spite of significance of yam production in the economic and socio-cultural aspect of Nigeria as a nation, it has not been accorded the needed attention (Orkwor and Aseidu , 1999). This was reflected in the fall in output percentage growth rate of yam from 42% in 1990 to 16.3% in 2001, despite the increase in land devoted for the production of crop from 120 million hectares in the same period (Federal Ministry of Agriculture, EMA 2001). In spite of the tremendous importance of the yams in the West African sub region, Babaleye 2003 affirms that the crop has hitherto been neglected in policy decisions related to research, crop production and marketing. Most of the efforts of the policy makers and researchers have been concentrated on cash crops or the more familiar crops (FAO, 1990).

According to Akoroda and Hahn (1995), the production of yam in Nigeria is grossly inadequate and cannot meet the ever-increasing demand for it under present level of input use. One of the major factors that contribute immensely to this fallout in productivity of yam over the years is the problem of production inefficiency. This is so as production efficiency is directly related to increase in production. Efficiency is concerned with the relative performance of the processes used in transferring given inputs to outputs. It is therefore imperative to assess the socio-economic factors that influence the performance of yam farmers in Nigeria. The specific objectives are to examine the socio-economic characteristics of yam farmers and determine the effect of socio-economic factors on the expansion and production of yam in the study area.

2. Materials and Methods

2.1. The study area

This study was carried out in Benue State, Nigeria. Benue State (acclaimed “food basket of the nation”) lies in the middle belt region of Nigeria between longitude 6°35E to 10°E of the Greenwich meridian and latitude 6°30N to 10°N of the Equator. The state has a landmass of 30,955 square kilometers (Benue State Government 2002) as well as estimated population of 4,219,244 and is also made up of 413,159 farm families (N.P.C., 2006). Most of the people in the state are farmers while inhabitants of the riverine areas engage in fishing as their primary or important secondary occupations. Benue State experiences two distinct seasons, the wet season and the dry season. The rainy season lasts from April to October with annual rainfall in the range of 150-180mm and the dry season begins in November and ends in March. Benue State is acclaimed the nation’s food basket because of its diverse rich agricultural produce which includes yams, rice, beans, cassava, soya beans, benniseed, maize, millet, tomatoes and a lot of fruits. Poultry, goat, sheep, pigs and cattle and the major domestic animals kept.

2.2. Method of data collection

The targeted population for this study was yam farmers in Benue State. A multi-stage random sampling technique was employed in the survey. A well-structured questionnaire was used as a tool in collecting data from 120 randomly selected respondents in the study area on the basis of yam production activities in the six (6) out of the twenty three (23) Local Government Areas in the state.

The respondents were the yam producing farmers in the study area. Information collected from them includes; socio-economic and demographic characteristics such as age, sex, marital status, households size, religion, educational status, occupation (full time farmers or part time), farming experience, farm size, involvement in cooperatives society, labour utilization, land acquisition methods and constraints facing farmers in production of yams.

2.3. Analytical techniques

The data collected were analyzed with the use of descriptive statistics tool as well as production function analysis. Descriptive statistics such as tables, percentages and frequencies were used to summarize and describe the socio economic characteristics and problems militating against yam production in the study area. Production function analysis was employed to estimate the parameters of the regression model. The multiple regression equation was used to estimate the production function for yam production in the study area.

Model specification: The model is specified explicitly as;

$Y_i = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e_i$ ……..(1)

Y_i = Value of yam output (Naira)

X_1 = Age of respondents (years)

X_2 = Farming experience (years)
X_3 = Household size (Number of people)
X_4 = Farm size (Hectare)
X_5 Educational level (years)
X_6 = Income level (Naira)
X_7 = Farm distance (km)
b_0 = constant
b_1-b_7 = Regression coefficient of X_1 - X_7
e_i = Stochastic error term
The model specified was subjected to four functional forms and the lead equation was selected based on the economic, econometric and statistical criteria. The four functional forms fitted were linear, semi log, Cobb-Douglas and exponential.
Explicitly, the three functional forms are shows below;

$Y_i = b_0 + b_1X_1 + b_2X_2 + \ldots b_7X_7 + e_i$ ……Linear (2)

$Y_i = \log b_0 + b_1 \log X_1 + b_2 \log X_2 + \ldots + b_7 \log X_7 + e_i$ ……..Semi Log (3)

$\text{Log } Y_i = \log b_0 + b_1 \log X_1 + b_2 \log X_2 + \ldots + b_7 \log X_7 + e_i$ ……..Cobb-Douglas (4)

$\text{Log } Y_i = b_0 + b_1X_1 + b_2 X_2 + \ldots b_7X_7 + e_i$……..Exponential (5)

Where variables are as earlier defined.

3. Results and Discussion

3.1. Socio-economic characteristics of the sampled farmers

3.1.1. Age distribution of the respondents

Analysis of the respondents' age structure in table 1 shows that more than half of the survey households are within their active working age. 5 percent of the respondent were below 30years, 10.8 percent fell within the age group of 31-40 years and most of the respondent (36.7 percent) fell within the class of 41 to 50 years, 27.5 percent were within the age group of 51-60years and while 13.3percent fell within the age group of 61-70 years and 6.7 percent were above 70 years. This shows that yam farmers in the study area were still active and virile and this is expected to influence their production positively.

3.1.2. Gender distribution of the respondents

Moreover, table 1 shows that 84.2 percent of the respondents in the study area were men while 15.8 percent of them were women. This shows that men dominated yam farming activities in the study area. This is expected since yam farming requires lots of energy.

3.1.3. Distribution by household size

The household size distribution as shown in table 1 reveals that about 91 percent of the farmers had household size greater than five (5). This implies that farmers have large family size and this is expected to influence yam production positively. It has been shown that decisions are made by the farm family, since the various farming operations are carried out by the members of the family. Also the family size constitutes a major source of labour available in yam production. This is the reason why there is need to increase the numbers of hands working on the farms.

3.1.4. Distribution of respondents by educational Level

As shown in table 1, approximately 55.8 percent of the sampled farmers had no formal education ranging from primary to tertiary level. Those that attended primary school constituted about 20 percent. Also only 16.7 percent of the respondents attended secondary schools. In addition, only 7.5 percent had tertiary education. The farmer's educational level is expected to have a positive influence on the adoption of improved technologies such as farm mechanization, fertilizer usage, agro-chemical, high yielding seeds variety which should have high potentials to increase farm productivity.

3.1.5. Distribution by marital status

The result of the survey in table 1 depicts that larger percentage of the farmers were married (81.7 percent), 11.7 percent were widowed, 5 percent were divorced and only 1.7 percent were single. The very high percentage of the married yam producers could be attributed to the fact that respondents require helping hands to carryout tedious process of yam production. This is also an indication that most farmers depends on family members as cheap source of labour.

3.1.6. Distribution by farming experience

Experience is usually said to be the best teacher. Table 1 shows the farming experience of the sampled farmers, expressed as number of years the farmers have been in yam production. This table reveals that farmers in the area were not new in yam production as about 67.5 percent had farming experience of 15 years and above.

3.1.7. Distribution by farm size

Farm size is one of the major factors determining labour requirement. Past studies have shown that the larger the farm size, the more the number of labour required. Table 1 shows farm size distribution of yam farmers. About

65.8 percent had farm size between 1 and 10 hectares while 34.2 percent cultivated not less than 11 hectares of land.

3.1.8. Distribution of respondents based on the nature of occupation

Moreover in Nigeria, most farmers engage in other income generating activities besides farming. This is a way of generating more income in order to ensure food security for the family. However, it cannot be ruled out that several other farmers still depends solely on agriculture. It is therefore relevant to categorize the respondent into either part-time or full time occupation. Table 1 therefore shows that most (65.8%) of the farmers were full time while 34.2 percent were part-time farmers.

3.1.9. Distribution by involvement in cooperatives societies

One of the roles of the cooperative societies is to boost the performance of farmers. However, not all farmers are educated on the importance of being a member of cooperative societies. Table 1 shows the involvement and loyalty of farmers to cooperative societies in which 88.3 percent were members and 11.7 were non-members.

3.1.10. Distribution by land acquisition methods

Ownership and acquisition of Land is one of the pivots that sustain efficiency in food production. From Table 1, findings of land acquisition method reveals that 48.3 percent owned their farm and this constituted the greatest percentage, while 22.5 percent purchased the land, 25 percent of the respondents inherited their land and only 4.2 percent acquired their land through rent. This indicates that most of the yam farmers in the study area owned their own land and this will enhance more production of yam.

3.1.11. Constraints facing respondents in yam productions

Technical efficiency has over the years trivialized by several constraints facing yam production practices. However, table 1 reveals the problems that serve as constraints to yam producers in the process of cultivating yam. These constraints range from inadequate capital (44.2%), high cost of labour (48.3%) to insufficient input (7.5%).

3.1.12. Distribution of respondents by labour utilization

Also, table 1 shows the labour utilized by the yam farmers. Finding reveals that all the farmers used family, hired and cooperative labour for their operation. But both hired and family labours were highly used with 8.3 and 86.7 percent respectively while 5 percent used cooperative labour.

3.2. Regression Analysis for Determinants of Yam Output

Production function analysis was employed to estimate the parameters of the regression model. The multiple regression equation was used to estimate the relationship between value of yam output and factors that influence productivity as well as households' socio-economic variables. Four functional forms (Linear, semi-log, Cobb Douglas and Exponential) were fitted into the data collected. The lead equation Cobb-Douglas was chosen for having the largest co-efficient of multiple determination (R^2) and the least standard error.

As shown in table 2, the coefficient of multiple determinations (R^2) is 0.99, this indicates that about 99 percent of the total variations in the output of yam produced were successfully explained by the explanatory variables and the remaining 1 percent was due to random errors. This shows that 99 percent of variation in output of yam produced in the study area were explained by age (X_1), farming experience (X_2), household size (X_3), farm size (X_4), educational level (X_5), incomes level (X_6) and farm distance (X_7).

Moreover, age, farming experience, farm size, educational level, income level and farm distance have positive coefficients. This implies that a unit decrease (increase) in each of the variables X_1, X_2, X_4, X_5, X_6, and X_7 will decrease (increase) the output of yam in the study area.

Surprisingly, against the a priori expectation, that increase in family size will increase productivity. The coefficient of household size (X_3) was negative and this indicates that an increase in household size will result to decrease in the value of yam output. This can be accounted for since increase in households' size will increase consumption.

In addition, age, educational level, farming experience and farm distance had coefficients that were statistically significant at I percent level of significance. From the result presented in table 2, resources were inefficiently used in the production of yam. Household size was found to be over-utilized due to the negative signs while other six variables with positive signs were under-utilized on the respondent farms.

3.3. Elasticities of production and Returns to Scale

Table 3 shows the change in output of yam, relative to a unit change in an independent variable while other inputs are held constant. Elasticity is said to be unitary when ratio is equal to 1 (one) and output changes at the same rate as input. When the ratio is greater than one, this shows that the change in output is greater than the change input used and production is said to be relatively elastic. But when the ratio is less than one, the proportion change in output is less than that of the input and production is said to be inelastic. The sum of regression coefficient indicates returns to scale and this gives a direct measure of the percentage change in output caused by one percent change in all inputs at a time. Increasing returns to scale occurs when the sum is greater than 1 (one), constant when the sum equals 1 (one) and decreasing when the sum is less than 1 (one). Return to scale for yam production is 0.96. This shows that yam production exhibits decreasing return to scale in the study

area.

4. Conclusion

The study examined effects of socio-economic characteristics on the performance of yam Farmers in Nigeria. The study was carried out in Benue State, Nigeria. A multi-stage random sampling technique was employed in selection of 120 respondents from 6 Local Government Areas of the state. Data were collected with the aid of well structured questionnaire. Information collected from the respondents includes; socio-economic and demographic characteristics such as age, sex, marital status, households size, religion, educational status, occupation (full time farmers or part time), farming experience, farm size, involvement in cooperatives society, labour utilization, land acquisition methods and constraints facing farmers in production of yam. Data collected were analyzed with the aid of descriptive statistics as well as production function model.

Findings from descriptive statistics show that 80% of the sampled households were within their economically active working age. Also, it was revealed that 84.2 percent of the respondents in the study area were men while 15.8 percent of them were women. Moreover, the analysis of production function reveals that the main determinants of yam production performance in the study areas were age, educational level, farming experience, farm distance and income level of the farmers which had positive coefficients as well as statistically significant. However, household size had negative coefficient though not statistically significant. This negates the a priori expectation.

Based on the major findings of this study, the following recommendations are made in order to increase production performance of yam farmers.

- Family and hired labour supply must be reduced to enhance productivity of yam with emphasis on mechanization.
- Formal education should be encouraged to enhance adoption of improved technology in the study area.
- Government should aim at solving the major constraints of farmers especially in facilitating access to loans to aid production, fertile agricultural land, making needed inputs available in time and, all subsidized rate, provision for all season, rural access roads and deployment of experienced extension workers to aid the farming populace.
- Since government cannot tackle these problems single handedly, non-governmental organizations and cooperate bodies should be encouraged to establish programmes that will improve the productivity of yam as well as development of rural areas.

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Table 1: Distribution of respondents by their socio-economic characteristics

Variables	Frequency	Percentage
Age (yrs)		
Below 30	6	5.0
31-40	13	10.8
41-50	44	36.7
51-60	33	27.5
61-70	16	13.3
Above 70	8	6.7
Gender		
Male	101	84.2
Female	19	15.8
Household size		
1-5	11	9.2
6-10	38	31.7
11-15	51	42.5
16-20	13	10.8
>20	7	5.8
Educational level		
No formal Education	67	55.8
Primary Education	24	20.0
Secondary Education	20	16.7
Tertiary Education	9	7.5
Marital status		
Married	98	81.7
Widowed	14	11.7
Divorced	6	5.0
Single	2	1.6
Farming experience (yrs)		
Less than 15	39	32.5
15-25	48	40
Above 25	33	27.5
Farm size (Ha)		
1-10	79	65.8
11-20	31	25.8
>20	10	8.4
Nature of occupation		
Full-time	79	65.8
Part-time	41	34.2
Cooperatives societies' membership		
Members	106	88.3
Non-members	14	11.7
Land acquisition		
Owned	58	48.3
Purchased	27	22.5
Inherited	30	25.0
Rent	5	4.2
Production constraints		
Inadequate Capital	53	44.2
High cost of labour	58	48.3
Insufficient inputs	9	7.5
Labour utilization		
Family	104	86.7
Hired	10	8.3
Cooperative	6	5

Sources: Field survey, 2012

Table 2: Regression Analysis for Yam Farmers

Function/ Parameter	Linear	Semi log	Cobb Douglas	Exponential
Constant	-593.154	-23139.2	8.582	9.397
	(-0.533)	(-0.415)	(73.248)	(43.531)
Age (Yr)	0.017	0.157	0.007***	-0.077
	(2.288)	(2.798)	(0.002)	(-1.120)
Farming experience (Yr)	-0.022	0.284	0.019***	0.116
	(3.338)	(0.833)	(0.007)	(1.883)
Household size	-0.009	-0.506	-0.030	0.078
	(1.01)	(2.340)	(0.914)	(2.130)
Farm size (Ha)	-0.002	0.944	0.851	0.915
	(-0.407)	(13.937)	(133.594)	(14.502)
Educational level (Yr)	0.997	-0.122	0.004***	0.095
	(147.764)	(3.060)	(0.001)	(2.411)
Income level (Naira)	-0.002	-0.089	0.020**	0.024
	(0.319)	(1.385)	(0.010)	(0.411)
Farm distance (Km)	0.324	0.032	0.000***	0.026
	(0.458)	(-0.926)	(0.067)	(0.711)
R^2	0.998	0.871	0.998	0.85
Standard Error	1793.44	15563.78	0.033	0.324

Figures in bracket are standard error. *** and ** coefficients are significant at 1% and 5% respectively.

Table 3: **Production Elasticity and Return to Scale**

Variables	Elasticities
Age	0.070
Farming Experience	0.019
Household size	-0.030
Farm size	0.851
Educational level	0.004
Income level	0.020
Farm distance	0.026
Returns to scale (RTS)	0.960