International Journal of Agriculture Innovations and Research
Volume 6, Issue 1, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received: 10/05/2017 | Accepted on : 20/05/2017 | Published : 26/07/2017

Factors Influencing Agricultural Productivity of Smallholder Farmers in Taraba State, Nigeria

G.O. ONOGWU*, AUDU, I. A. and IGBODOR, F.O.
Department of Agricultural Economics and Extension, Federal University Wukari, Taraba State, Nigeria.
*Corresponding author email id: gonogwu@yahoo.com.sg

Abstract **– This study was informed by the perceived declining agricultural productivity in Nigeria. Food production in the country no longer keep pace with population growth and this makes the country to be over dependent on food import in an attempt to bridge the gap between demand and supply of food. The study examined the factors influencing small- holder farmers' productivity within Taraba state Agricultural zone II. Data were collected from 150 small-holder farmers in the study area using structured questionnaire and interview to illicit responses used in the analyses. Descriptive analysis was used to x-ray the frequency distribution of the socio-economic variables of the farmers as presented. Besides, the binary logistic analysis was used in determining the factors influencing farmers' productivity. The variables found to be highly significant and which influenced farmers' productivity include access to formal credit or loan (at 5%), farm size of the respondents (5%), membership of farm based organization (FBO, at 1%)) and number of years the farmers had spent in school (at 10%), among others. The variables that are not highly significant, but exact some influence on farmers' productivity include age, experience, access to extension agent, and gender. It is recommended that farmers should belong to farm based organization irrespective of the volume of credit received since farm based information are most available and cheaply too, in local vernacular during farm based organization meetings.**

Keywords **– Agriculture, Farmers' Productivity, Small Holder Farmers, Taraba State, Binary Logistics.**

I. INTRODUCTION

Agricultural Productivity has been defined by several scholars with reference to their own views and disciplines. Agriculturalists, agronomists, economists and geographers have interpreted it in different ways. Agricultural productivity is defined in agricultural geography as well as in economics as "*output per unit of input* " or "*output per unit of land area*", and the improvement in agricultural productivity is generally considered to be the results of a more efficient use of the factors of production, viz. physical, socioeconomic, institutional and technological. Singh and Dhillion (2000) [1] suggested that the "*yield per unit*" should be considered to indicate agricultural productivity. Many scholars have criticized this suggestion pointing out that it considered only land as a factor of production, with no other factors of production. Therefore, other scholars have suggested that agricultural productivity should contain all the factors of production such as labor, farming experiences, fertilizers, availability and management of water and other biological factors. As they widely accept that the average return per unit does not represent the real picture, the use of marginal return per agricultural unit was suggested.

The economic relevance of the agricultural sector has since declined, with the share of agriculture in GDP falling to 32.2% in the 1975 – 1979 periods (Adewuyi, 2002) [2] and averaging 35% between 1981 and 2006. The fall of agriculture in export share has been even more precipitous. From 1960–1970, the export crop subsector contributed 58.4% annually on averages to the total foreign exchange revenue. This declined to 5.2% over the period 1971–85 and then further to 3% from 1995 – 1999 (Adewuyi, 2002). Similarly, the growth of output in the agricultural sector declined from 3.8% in the 1987–1990 period to 2.2% between 1992–1995 (Adewuyi, 2002). Within the 23 years from 1981 to 2003, aggregate agricultural production grew by only 5.4% (Muhammad-Lawal and Atte, 2006) [3].

As a result of this slow growth in output, Nigeria moved from a food sufficient country in the 1960s to a major importer of food in the 1980s. The estimated current 3.7% food production growth rate cannot keep pace with the 6.5% food demand and fueled by a high rate of population increase, moderately rapid income growth, and relatively high elasticities of expenditure for food (Egwuda 2001[4]; Oviasogie 2005 [5]. Agriculture is a major contributor to Nigeria's GDP and small-scale farmers play a dominant role in this contribution (Rahji and Fakayode 2009) [6], but their productivity and growth are hindered by limited access to credit facilities (Odoemenem and Obinne2010) [7]. Modernizing agriculture requires large infusion of credit to finance the use of purchased inputs such as fertilizers, improved seeds, insecticides, additional labour and so on. In this regard, the provision of agricultural credit can be a powerful economic force for development if used to inject appropriate capital for the purchase of agricultural inputs that are not otherwise available to farmers from their own financial, physical and labour resources (Ololade & Olagunju, 2013) [8].

Nigeria is the most populous country in Africa with over 160 million people. Approximately half of this population, are rural dwellers, most rural residents are engaged in smallholder semi-subsistence agriculture (Oviasogie, 2005; Ajibolade, 2005) [9]. Therefore, agriculture remains a crucial sector in the Nigerian economy, being a major source of raw materials as well as food and foreign exchange; employing over 70 percent of the Nigerian labor force, and serving as a potential vehicle for diversifying the economy. Before the emergence of oil as Nigeria's dominant economic sector, the agricultural sector contributed over 60 percent of Nigeria's Gross Domestic Product (GDP) and 90 percent of her exports (Adewuyi, 2002). The economic relevance of the agricultural sector has since declined, with the share of agriculture in GDP falling to 32.2% in the 1975–1979 periods (Adewuyi, 2002) and averaging 35% between 1981 and 2006. The fall of

agriculture in export share has been even more precipitous. From 1960–1970, the export crop subsector contributed 58.4% annually on averages to the total foreign exchange revenue. This declined to 5.2% over the period 1971–85 and then further to 3% from 1995–1999 (Adewuyi, 2002). Similarly, the growth of output in the agricultural sector declined from 3.8% in the 1987–1990 period to 2.2% between 1992 – 1995 (Adewuyi, 2002) within the 23 years from 1981 to 2003, aggregate agricultural production grew by only 5.4% (Muhammad-Lawal and Atte, 2006). As a result of this slow growth in output, Nigeria moved from a food sufficient country in the 1960s to a major importer of food in the 1980s. The estimated current 3.7% food production growth rate cannot keep pace with the 6.5% food demand and fueled by a high rate of population increase, moderately rapid income growth, and relatively high elasticities of expenditure for food (Egwuda 2001; Oviasogie 2005). Agriculture is a major contributor to Nigeria's GDP and small-scale farmers play a dominant role in this contribution (Rahji and Fakayode 2009), but their productivity and growth are hindered by limited access to credit facilities and some other factors (Odoemenem and Obinne (2010).

The major problem is that food production in Nigeria, no longer keep pace with population growth. Thus creating a wide gap between the demand and supply of food. (Abdulraman, 2013) [10]. This is evident in the observed food deficit and the upward trend in the price of food stuff in the market over the years (Igwe and Esonwune, 2011 [11]; CBN. 2002 [12]). The resulting effect of this imbalance between demand for and supply of food is malnutrition, poverty, and deteriorating living standards (Igwe, and Esomwune 2011; Eze, 2009 [13]). Against this background the growth of Nigeria's economy with reference to agriculture has been import driven rather than production driven. Consequently there is a growing advocacy for improving Nigeria agricultural production in order to achieve food self- sufficiency. The main focus of this study therefore is to examine the factors influencing farmers' productivity in the study area. Specifically, the study sought to:-

(i) Describe the socio – economics characteristics of small holders farmers in Taraba State Agricultural zone II.
(ii) Determine factors influencing farmers' productivity in the study area.

The hypothesis of the study tested is:

H_o: The Agricultural productivity factors of small holder farmers do not significantly influence farmers' productivity in the study area.

II. Research Methodology

The Study Area

The study was conducted in Agricultural zone 11 area of Taraba State comprising three LGAs (Ibi, Wukari and Gassol). The state covers a land area of 60291.82 square kilometers and has a population of 2, 300,736 persons, 1,199,849 males, 1,100,887 females. It is located between latitude $6^0\ 30^1$ and 9^036^1 north and longitude 9^010^1 and 11^050^1 east of the Greenwich meridian (Taraba State Investors Guide, Undated). Agriculture is the bedrock of the state economy. Taraba State lies largely within the middle of Nigeria and consist of undulating landscape dotted with a few mountainous features. They include the scenic and prominent Mambila Plateau. The State lies largely within the tropical zone and has a vegetation of low forest in the southern part and grassland in the northern part. The Mambila Plateau with an altitude of 1800 meters (1600 ft) above sea level has a temperate climate all year round.

Sampling Procedure:

Multistage and simple random sampling techniques were adopted in sampling respondents. In the first stage, three LGAs were purposefully selected as the only LGAs in the State's agricultural zone II. In the second stage five farmers' cooperative societies in each of the selected LGAs were randomly selected, giving a total of fifteen (15) farmers' cooperative societies and in stage three ten farmers each from the fifteen selected farmers' cooperative societies were randomly selected, giving a total of 150 farmers for the study.

Data Analysis:

Objective (i) was analyzed using descriptive statistics such as, tabulation, frequency distribution and percentages, while objective (ii) was achieved using the binary logistic analytical tool which according to literature best fits the analysis of determinant factors of smallholder farmers' access to formal credit (Yehuala, 2008 [14]. During the study, farmers were requested to state the total value product for the year. Farm productivity in this regards were coded as (1), where farmer's total value product is equal to fifty thousand naira (₦50, 000.00); or zero when farmer's total value product is less. The array of these responses from the surveyed farmers formed the dependent variable, while the perceived productivity factors comprising of access to formal credit, Age, experience, farm size, membership of farmers of farm based organization, number of years spent in school by farmers, access to extension agent and gender formed the independence variables. The binary logistic regression analyses were carried out to ascertain the effects of these characteristics factors on farmers' productivity of the surveyed agricultural Zone II.

Model Specification

The generic form of the logistic model is presented as:

$$LogitP(Y) = \beta_0 + \sum \beta_1 X_1 + \mu$$

$$Y = \beta_1(Access) + \beta_2(Age) + \beta_3(EXP) + \beta_4(FARMS) + \beta_5(FBO) + \beta_6(YRSS) + \beta_7(AEA) + \beta_8(GEN) + \mu$$

Where, Y = (1 respondent farm is productive, 0 if otherwise).
Access = Access to formal Loan/Credit.
AGE = Number of years spent on Mother Earth.
EXP = Farming Experience (measured by the numbers of years spent in farming).
FARMS = Farm Size (Ha).
FBO = Membership of Farm Based Organization (1 if respondent is a member of a farmer based organization (FBO); 0 if otherwise).
YRSS = Years in School (measured as numbers years spent in formal school).
AEA = Access to Extension Agent.

GEN = Gender (1 if male, 0 if otherwise).

β = Logistic Coefficients for independent variables.
μ = Error term.

Where Y = productivity; Xi = determinants of productivity, βoβi = coefficients, μ = error term.

III. Results and Discussion

The study reveals the frequency of the socio-economic characteristics of the survey farmers as follows:

Distribution of the Farmers According to Age

The distribution of the age of the respondents ranges from twenty-one to seventy years. However, it can be observed from table 1 that majority of the farmers (44.67%) falls between the ages of 31 - 40, followed by the age group between 41-50 years (34.67%) of the farmers. The distribution depicts that the farmers in the study area comprises 79.34% of active productive group between 31-50 years.

Table 1: Distribution of the Farmers According to Age

Group in years	Frequency	Percent(%)
021-030	16	10.67
031-040	67	44.67
041-050	52	34.67
051-060	11	7.3
061-070	4	2.67
Total	**150**	**100**

Source: Field Survey, 2015.

Distribution of Farmers According to Years of Farming Experience

Percentage distribution of farmers according to years of farming experiences reveals that 38% of the farmers have been farming for the past 11-20 years, while 30.67% have farming experience of between 1-10 years. And 20% of the farmers have farming experience of between 21-30 years but only 11.33% has between 31-50 years farming experience. 68.67% of the farmers are within the farming experience range of 1-20 years as buttressed by table 2 below.

Table 2: Distribution of Farmers According to Years of Farming Experience

Years of Farming Exp	Frequency	Percent (%
001-10	46	30.67
011-20	57	38
021-30	30	20
031-40	14	9.33
041-50	3	2
Total	**150**	**100**

Source: Field Survey, 2015.

Distribution of Farmers According to Farm Size

The frequency distribution of the farmers according to farm size x-rayed the area of farm holdings in hectares. It can be observed in table 3 that eight-two, corresponding to 54.67% of the farmers have a minimum of two hectares which depicts that most of the farmers are indeed small scale, requiring formal loan or credit to improve their scale and productivity. More so, the regression analysis shows farm size as a significant and determining factor of productivity.

Table 3: Distribution of Farmers According to Yarm Size

Number of Hectares	Frequency	Percent (%)
1	1	0.67
2	82	54.67
3	0	0
4	44	29.33
5	23	15.33
Total	**150**	**100**

Source: Field Survey, 2015.

Distribution of Farmers According to total Value Product (Kg/Tons)

Table 4 below reveals that up to 40% of the farmers (majority) produced between 50-100 thousand Naira worth of agricultural products, while only 4 percent corresponding to six out of the 150 survey farmers were able to produce between 301-400 thousand worth of agricultural products within the survey area at the period under review.

Table 4: Distribution of Farmers According to Total Value Product (kg/tons)

Value Product('000)	Frequency	Percent (%)
50-100	60	40
101-150	44	29.33
151-200	19	12.67
201-300	21	14
301-400	6	4
Total	**150**	**100**

Source: Field Survey, 2015.

Distribution of Farmers According to Number of Years in School

Table 5 below reveals that most of the farmers (50%) have spent between 13-18 years in school, while 34.67% spent between 7-12 years in school. This implies that graduates make up half of the farming population within the study area, while first school leaving certificate holders make up about 13.33% of the study area.

Table 5: Distribution of Farmers According to Number of Years in School

Years in School	Frequency	Percentage
00-06	20	13.33
007-012	52	34.67
013-018	75	50
019-25	3	2
Total	**150**	**100**

Source: Field Survey, 2015.

Logistic Classification of Farmer's Productivity in Taraba State Agricultural Zone II

The classification table for Farmer's productivity in the study area shows that our observations of farmers' productivity coded as (value = 0), and observations with

(value =1), yielded a total correct classification of 76.0%. This means that the model distinguished successfully between farmers who were productive and those who were not given the logistic predicted values and the cut values as shown in table 6 below.

Table 6: Classification of Farmer's Productivity in Taraba State Agricultural Zone II

	Observed		Predicted		
			Farmer's Productivity		Percentage Correct
			0	1	
Step 1	Farmer's Productivity	0	83	15	84.7
		1	21	31	59.6
	Overall Percentage				76.0

a. The cut value is. 500

Source: Field Survey, 2015

Factors Determining Productivity of Farmers in Taraba State Agricultural Zone II

Below presents the logistic regression output of the factors determining productivity of farmers in Taraba State Agricultural Zone II, Nigeria. The variables that are highly significant which influenced farmers' productivity include Access to formal credit or loan, farm size of the respondents, membership of farm based organization(FBO) and number of years spent in school, among others. The variables that are not highly significant include age, experience, access to extension agent, and gender.

Table 7: The Factors Determining Productivity of Farmers in Taraba State Agricultural Zone II

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Access	-.981	.486	6.379	1	.043*	.375
Age	.417	.431	2.934	1	.334	1.517
Experience	-.558	.433	3.965	1	.197	.572
Farm S	.906	.448	6.393	1	.043*	2.475
FBO	2.413	.544	21.673	1	.000*	11.169
Years	.772	.465	4.760	1	.097*	.462
AEA	.674	.525	3.649	1	.199	1.961
Gender	.105	.435	2.058	1	.809	1.111
Constant	2.198	.643	11.695	1	.001	.111

a. Variable(s) entered on step 1: Access, Age, Experience, FarmS, FBO, Years, AEA, Gender.

*= Highly significant Variables

Columns in Table 7

Column one shows the variables in the model equation. The second column represents the coefficients (B) of the model equation. The second column gives the standard error (S.E.) of each of the variables. The Wald is the test of significance (it tests whether the coefficient equals 0, and or the unique contribution of each predictor in the context of other predictors- i.e. holding constant other predictors). The next column (df) is the degree of freedom which for categorical variables, the Wald Statistics has degree of freedom equal to one less the number of categories; (in our scenario 2-1=1) i.e. for dependent and independent variables. The discussions of the significant variables are presented after the table below: - The significant variables which include, access to formal loan or credit, age, gender, experience, distance and monthly savings are hereunder discussed below

Access:

Access to formal loan or credit refers to whether or not the farmer obtained credit from formal financial institution to improve farm scale and productivity. From the table below, access to formal loan or credit as a variable has an absolute coefficient of -0.981. With a Wald statistics of 4.079 and a standard error of 0.486 is significant at 5% level of significance. A negative coefficient of 0.981 is an indication that as access to formal credit decreases, farmers' productivity would decreases by 0.375 units as depicted by the column Exp (B) value for access in table 7 below, all things being equal.

Farm Size:

This refers to the total area used by the farmer for farming activities. From **table 7** below, farm size as a variable has a coefficient of 0.906. With a Wald statistics of 4.093 and a standard error of 0.448 is significant at 5% level of significance. This positive farm size coefficient of 0.906 is an indication that farm size has direct relationships with farmers' productivity in the study area; meaning that as the farm increases, the productivity also does. A Wald Statistics of 1.458 is an indication that farm size increases agricultural productivity by 1.458 units all things being equal in the study area.

Farm Based Organization (FBO) Membership:

The coefficient (B) of FBO is 2.413 and its standard error is 0.544. The Wald statistics 19.673, which means that membership of FBO, is significant at 1%. The Exp(B) or odds multiplier which gives the average impact of membership of FBO as a predictor variable on reporting has a value of 11.169. Here, the positive logistic coefficient indicates that membership of FBO as a variable, on the average increases the odds of reporting i.e. farmers' productivity by approximately 1.17 units all things being equal.

Number of Years in School:

The number of years spent in school as a determinant of farmers' productivity has a coefficient of 0.772, with a standard error of 0.465 and a Wald statistic of 2.76. This variable is significant at 10%. Having an odd multiplier Exp (B) of 0.462 indicates that an increase in the number of years in school raises the chances of higher productivity by about 0.5 units all things being equal.

β_0:

This is the constant variable of the generic model equation. In table 11, the value of the coefficient is 2.198, while the standard error is 0.643. And with a Wald statistics of 11.695, the constant is significant at 1% level of significance. The implication of this coefficient of the constant is that farmers produce however small irrespective of the factors that improve their productivity given that the odd of multiplying Exp (B) is 0.111.

Model Summary

The average $R^2 = 51.811\%$, indicating that approximately 52% of the variations in farmers' productivity values were explained by the determining independent variables.

IV. Summary

During the study, descriptive and binary logistic statistics were used to assess the determining factors influencing farmers' productivity in Taraba State Agricultural Zone II, Nigeria. The specific objectives of the study were to identify the socio- economics characteristics of small-holder farmers and the factors that influence productivity of the farmers within the study area. Primary Data were collected using structured questionnaires and personal interview. A total of 150 farmers were surveyed. The selection was through a multistage random sampling as fully specified in the sampling procedure of the study methodology. The results obtained indicate that access to credit, farm size of the farmer, number of years in school and memberships of farm based organization and, significantly influence farmers' productivity. The variables that do not significantly influence farmers' productivity, but have some effects include; experience, gender, access to extension agents and age of the farmers.

V. Conclusions

The reason for assessing the factors influencing farmers' productivity is to properly inform the farming populace of the study area of the factors that impact on their output, which if considered will improve and sustain farm scale and productivity, to ensure food security. These could be achieved through access to more credit, increase in farm size, membership of number of years in school and membership of farm based organization, through which the farmers gain exposures from outreach programmes and spat plots among other information that help to improve their productivity.

VI. Recommendations

(1) Given the positive impact of access to credit on farmers' productivity, it is recommended that farmers should use land as collateral security to obtain the much needed credit facility to improve their production through timely acquisition of inputs.

(2) More so, in respect to positive impact of membership of farm based organization to farmers' productivity; governments should make credit available to those with reasonable farm size, and who are members of one organization or the other. This will increase and sustain their productivity levels. And in turn will increase general agricultural output, improve exports and promote trade in agricultural products thereby diversifying the country's source of revenue.

Acknowledgment

This paper forms part of a study- Factors Influencing Access to Formal Credit in Nigeria: A Case Study of Smallholder Farmers in Taraba State Agricultural Zone II, granted by the Nigerian Tertiary Education Fund (TET fund), via Federal University Wukari. The authors thank TETfund and Federal University Wukari Institutional Based Research Unit for her useful criticisms in an earlier draft that guided this study.

References

[1] Abdulrahaman, S. (2013) Expenditure on Agricultural Sector and Food Security in Nigeria. *Arabian Journal of Business and Management Review (Nigerian Chapter), 1(3),* 41-53.

[2] Adewuyi, S. A. 2002. "Resource Use Productivity In Food Crop Production In Kwara State, Nigeria." Phd Thesis Department of Agricultural Economics University of Ibadan, Ibadan

[3] Ajibolade, E. O. 2005. "Effects of Land Acquisition for Large Scale Farming On the Productivity of Small Scale Farming In Okitipupa, LGA, Ondo State." Master's Thesis, Department of Agricultural Economics And Extension, FUTA, Akure.

[4] Central Bank of Nigeria (2005). Micro Finance Policy, Regulatory and Supervisory Framework for Nigeria. CBN Abuja P. 2.

[5] Igwe, K., & Esonwune, c,. (2011), Determinants of Agricultural output implication on Government funding of Agricultural sector in Abia state Nigeria. Jounal of Economics and sustainable developmemt, 2(4); 86-91. available from http://iiste.org/journals/index.php/jeds/article/view/344.

[6] Egwuda, Joseph Ekwute. 2001. Economic Analysis of Lowland Rice Production in Ibaji LGA of Kogi State. M.Sc. Thesis, Department of Agricultural Economics and Extension, Ahmadu Bello University, Zaria.

[7] Eze, C. Pascal (2009) Divorce appetizers; All you shouldn't eat and what to do when you eat them. Experts in print. ISBN 978-0-98007680705.

[8] Muhammad-Lawal, A. and O. A. Atte. 2006. "An Analysis of Agricultural Production In Nigeria." African Journal of General Agriculture 2(1).

[9] Odoemenem & Obinne, 2010 Odoemenem, I.U. and C.P.O Obinne. 2010. Assessing the factors influencing the utilization of improved cereal crop production technologies by small scale farmers in Nigeria. << http://www.indjst.org/archive/vol.3.issue.2/innocent << http://www.indjst.org/archive/vol.3.issue.2/innocent- 17.pdf>>.

[10] Ololade, R.A. & Olagunju, F.I, (2013) Determinants of Access to Credit among Rural Farmers in Oyo State, Nigeria. Global Journal of Science Frontier Research Agriculture & Veterinary Sciences Vol.13 Issue 2 Version 1.0 Year 2013. Publisher Global Journal Inc. (USA) online ISSN: 2249-4626 & Print ISSN: 0975-896.

[11] Oviasogie, D.I. 2005. "Productivity of Yam-Based Farming System in Edo State, Nigeria." Msc Thesis, Department of Agricultural Economics, FUTA, Akure.

[12] Polit, D. (1996) Data Analysis and Statistics for Nursing Research. Appleton & Lange.

[13] Rahji, M.A.Y., and S. A. Fakayode. 2009. A multinomial logit analysis of agricultural credit rationing by commercial banks in Nigeria. International Research Journal of Finance and Economics, 24: 91. http://www.eurojournals.com/finance.htm

[14] HTTP://siteresources.worldbank.org/nepalextn/resources/publications/415830-1174327112210/complete.pdf; Retrieved on June 8, 2011.

[15] Yehuala S (2008). Determinants of smallholder farmers' access to formal credit: the case of Metema Woreda, North Gondar, EthiopiaNorth Gondar: MSc. Thesis: Haramaya University.