

Social Capital Dimensions and Intensity of Fertilizer Usage Among Farming Households in Kogi State, Nigeria

Ayanlere, A. F^{1*}, Omotesho, O. A.² and Muhammad-Lawal, A.²

¹ Division of Agricultural Colleges, Kabba College of Agriculture, Ahmadu Bello University, Kabba, Nigeria.

² Department of Agricultural Economics and Farm Management, University of Ilorin, Nigeria.

*Corresponding author: fatismaone@yahoo.com

ABSTRACT

The role of fertilizer in the sustenance of agricultural productivity growth in many developing countries is enormous. In spite of this, level of fertilizer usage in small-scale agricultural production in Nigeria is generally low. This can however be improved upon through enhanced access to social capital. Therefore, this study examined the influence of social capital dimensions on intensity of fertilizer usage among small scale farming households in Kogi State, Nigeria. A multistage sampling procedure was employed in the selection of 352 farming households. Primary data were collected between February 2014 and March 2015 through the use of structured interview schedule. The data were analyzed using descriptive statistics and Tobit regression model. The result of the Tobit regression model revealed mean age of the household heads to be 51.20 + 9.49 years and about 83% had one form of education or the other. The mean heterogeneity index and decision-making index were 42.67% and 64.90% respectively. The result of the Tobit regression model revealed that intensity of fertilizer usage increases with increased social capital indices such as heterogeneity index and decision-making index ($p < 0.05$). The study recommends that farmers should be enlightened and given proper orientation by extension agents on proper application of fertilizer.

Key words: descriptive statistics, fertilizer usage, Kogi State, Social capital, Tobit regression

INTRODUCTION

Increased soil nutrients depletion and low crop yield among farmers in sub-Saharan Africa as observed by Azagaku and Anzaku (2002) is a result of continuous cultivation without planned replenishment of depleted soil nutrients (Wanyama et al., 2009). In addition, many farmers in sub-Saharan Africa face declining crop yields, which have adverse effects on the region's economic growth (Akpan et al., 2012). The depletion and degradation of land and water pose serious challenges to producing enough food and other agricultural products to sustain livelihoods in the rural areas and meet the need of the urban population (World Bank 2014).

Therefore, restoring soil fertility levels is crucial to increasing agricultural productivity which has become a necessity in the sub-Saharan Africa, especially Nigeria. One of the fundamental ways of improving agricultural productivity is through effective use of chemical fertilizer (hence forth, fertilizer). Ayinde et al. (2009) rightly pointed out that Nigerian agriculture needs to embrace the use of fertilizer, improved seeds and crop protection products since the possibility for land expansion in order to increase agricultural productivity is limited. Fertilizer can therefore

be said to be a powerful productivity enhancing input. It is in fact very crucial for crop production by small scale farmers. Increased use of mineral fertilizer has played an important role in many developing countries that have experienced high and sustained levels of agricultural productivity growth. Indeed, one-third of the increase in cereal production worldwide has been attributed to fertilizer related factors (FAO, 2008). Increased consumption of chemical fertilizer in China's farming sector from an average of 169kg/ha to 390kg/ha contributed to the increase in the country's grain yields increase from 3.7 tons to 5.3 tons per hectare between 1983 and 2008 (Zhou et al., 2010). Likewise in India, according to FAO statistics, 50 percent of the increase in India's grain production has also been attributed to fertilizer related factors. Therefore, importance of fertilizer in crop production cannot be overemphasized. Furthermore, agricultural sector in Kogi is hindered by many factors. According to Kogi State Ministry of Agriculture (2014), the factors include the average land holding and yield per hectare which is generally low due to inadequate supply of fertilizer and other farm inputs, as well as lack of access to micro-credit.

Information about use of fertilizer to increase crop output may be more effective if shared through social interactions (Abdul et al., 2011). This is because when individuals share common interests and beliefs, communication among them is more likely to be effective. Social capital which generally refers to trust, social norms, and networks have effect on the productivity of the rural community. It facilitates coordination and cooperation, for the mutual benefits of the members of the association. It is a set of supportive interpersonal interactions that exists in the family and community (Isreal et al., 2001). Social capital, as built through households and community involvement, may enhance social responsibility thereby promoting the use of sustainable agricultural farming practices including use of fertilizers. Social capital is therefore crucial for increased crop production by promoting farmers' access to information about fertilizer and fertilizer usage as well as access to fertilizer. This is possible because social capital provides social networks, relationships and linkages that enable poor people to cooperate, coordinate, share information and resources, and act collectively.

In spite of importance of social capital on access to fertilizer, there is no known empirical research in Kogi State that has attempted to examine the role of social capital in influencing fertilizer usage for improved crop production. Studies in Nigeria such as Okunmadewa et al. (2007); Yusuf (2008); Balogun and Yusuf (2011); and Anyiro (2014) on social capital are largely devoted to issues like poverty, access to micro credit and adoption of certain technologies. Not much has been done as regards the role of social capital on the use of fertilizer in crop production. Also, previous studies such as those of Hazell et al. (1997), Isham (2000) and Esilaba et al. (2001) to mention a few (although not in Nigeria) indicated that social capital plays an important role in technology adoption but did not investigate its effects on fertilizer use. As a result there is little information on how social capital may influence use of fertilizer. This therefore created a gap that this study aims to bridge by examining the different indices of social capital among farming households in Kogi State so as to understand better how they influence fertilizer usage in crop production.

METHODOLOGY

The Study Area

This study was conducted in Kogi State Nigeria. Kogi State was created out of Benue and Kwara States on August 27, 1991 and presently has 21 Local Governments Areas (LGAs). It is located in the Guinea Savannah agro-ecological zone and the North Central geo-political zone of Nigeria. The State has estimated population of 3,278,487 million people, which comprised 1,691,736 males and 1,586,750 females (NPC, 2006). The state has distinctive

wet and dry seasons, the dry season lasts from November to March while the wet season starts from April and ends by October. The mean annual temperature of the state ranges between 27°C and 37°C and relative humidity is between 30 and 40 percent in January rising to between 70 – 80 percent in July/August. The state has an annual rainfall of between 1,100mm and 1,300mm. The suitable ecological and climatic conditions make it possible to cultivate wide varieties of crops (Kogi State Government, 2015).

Method of Data Collection

This study adopted a multi-stage sampling procedure in selecting the respondents. In the first stage, two agricultural zones (A and C) out of the four in the state were randomly selected. In the second stage, two blocks (LGAs) from each of the selected agricultural zones were also selected at random giving a total of four blocks. The third stage involved a random selection of four cells (villages) from each of the blocks making a total of sixteen cells selected from the two selected zones. Lastly, a total number of 352 farming households were randomly selected across the zones based on proportional allocation. The proportional allocation used in selecting the sample size is expressed as:

$$n_h = \frac{n.N_h}{N} \dots\dots\dots (1)$$

n_h = number of farming households to be selected in stratum/zone h

n = total number of farming households sampled

N_h = number of farming households population in stratum/zone h

N = total number of farming households population

Descriptive statistics such as frequency, mean, tables and percentages were used to describe the socio-economic characteristics of farming households in the study area. Tobit regression model originally developed by Tobin (1958) and used by Omonona (2000); Adejobi (2004) and Muhammad-Lawal (2008) was adopted for this study. It was used to determine the social capital factors affecting intensity of fertilizer usage.

$$V_j = \beta U_{ij} + e \dots\dots\dots (2)$$

$$V_j = V_j^* \text{ if } V_j > 0$$

$$V_j = 0 \text{ if } V_j^* \leq 0$$

$$j = 1, \dots, 352$$

V_j^* = limited dependent variable. It is the measure of extent of households' fertilizer usage. It is defined as; $\frac{(Z - Y_j)}{Z}$

$$\dots\dots\dots (3)$$

Where;

Z = fertilizer usage threshold (recommended minimum fertilizer rate)

Y_j = j th households quantity of fertilizer use per ha (fertilizer use intensity (FUI))

β = parameter estimates

U_{ij} = vectors of the explanatory variables

$$i = 1, \dots, 7.$$

Fertilizer use intensity (FUI) as defined by Maiangwa et al. (2007) and Olayide, Arega and Ikpi (2009) also adopted by Akpan et al. (2012) is described as follows;

$$FUI = \frac{\text{Quantity of fertilizer by } j\text{th farming household in kg}}{\text{Area of land cultivated by } j\text{th farming household in Ha}} \dots (4)$$

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Farming Households:

Table 1 presents the socio-economic characteristics of the household heads in the study area. The mean age of the household heads was 51.20 ± 9.49 years. Age has been identified as one of the factors that affect labour as well as farm productivity. It determines the quality and quantity of

work a farmer can do and the ease with which agricultural innovations are accepted (Fatoba, 2007; Ojeleye, 2015). People tend to reduce in energy as they advance in age and may no longer be capable of providing the type of efforts required by rudimentary farming. About 60 percent of the household heads are within the modal age group of 41 to 60 years. This result indicates that the household heads are tending towards old age and may imply decline in labour productivity with time. This is in line with the findings of Fatoba (2007) who found 46 percent of fadama rice farmers to be about 50 years of age and in contrast to Anyiro (2014) who found mean age of farm households to be 40.79 years. Minimum age recorded was 35 years while maximum was 75 years. Only about 20 percent of the households are less than 40 years of age. The Nigerian National Youth policy (2009) defines youth as adult between the age of 18 and 35 years.

Table 1: Distribution of the Farming Households by Socio-economic Characteristics in the Study Area

Characteristics	Frequency (Percentage)	Mean	Std dev	n = 352	
				Min	Max
Age of household head (years)					
≤ 40	70(19.89%)	51.20 ±	9.49	35	75
41 - 50	108(30.68%)				
51 – 60	102(28.98%)				
Above 60	72(20.45%)				
Sex of household head					
Male	320(90.91%)				
Female	32(9.09%)				
Educational status					
No formal education	45(12.78%)				
Primary school	179(50.85%)				
Secondary	70(19.89%)				
Tertiary	58(16.48%)				
Marital status					
Married	284(80.68%)				
Not married	68 (19.32%)				
Adjusted Household size					
1-4	35(9.94%)	6.89 ±	2.98	1	16
5 – 8	213(60.51%)				
9-12	73(20.74%)				
Above 12	31(8.81%)				
Farming experience					
≤ 10	5(1.42%)	23 ±	10.79	6	53
11-20	17(4.83%)				
21-30	124(35.23%)				
31-40	129(36.65%)				
41 and above	77(21.87%)				
Group participation					
Participation	224	63.64			
Non-participation	128	36.36			
Type of group					
Not applicable	128	36.36			
Government funded group	141	40.06			
Agric based mutual support group	32	9.09			
Agricultural cooperatives	51	14.49			

Source: Field survey, 2015.

Std dev = standard deviation

Table 2: Summary statistics on the indices of social capital in the study area

Social capital Index (%)	Means	Minimum	Maximum	Standard Deviation
Density of membership	34.59	20	60	8.94
Heterogeneity index	42.67	7.14	71.43	13.94
Decision making index	64.9	0	80	34.13
Meeting attendance index	75.43	33.33	96.47	30.62
Cash contribution index	10.05	0	100	15.96
Labour contribution index	47.35	0	100	33.11

Source: Computed from field survey data, 2015

This result may clearly indicate that youths participate less in agricultural groups as well as crop farming in the study area. This probably is because youth in the study area want easy and quick money so they are more engaged in motorcycle riding than farming. The sex of household head may determine the level of involvement of household members, kind of activities engaged in on the farm and types of crop cultivated. Farming has always been a household business, where every member participates in one activity or the other. Women and children have been known to participate in less rigorous activities on the family farms. They are also known to be engaged more in processing and marketing of agricultural produce. This result shows that farming activities tend to be dominated by males in the study area. Education gives room for self-development and exposes the farmer to greater opportunities. It assists the farmer to test and accept innovative and improved ideas available to him. It also enhances farmers' ability to make accurate decisions on production and farm management activities. Only a small proportion (13%) of the farming household heads had no formal education. The rest had one form of education or the other ranging from primary to tertiary. This enhances their access to and usage of fertilizer as well as credit facilities and extension messages. This finding is in conformity with that of Ojeleye (2015) who found 10 percent of crop farmers in Kaduna State having no formal education. Also, it is in line with the findings of Omotesho (2015) who also found higher proportion (68%) of crop farmers in both Kwara and Oyo States of Nigeria to possess one form of formal education or the other.

It is generally believed that marital status may be used to assess level of adult's sense of responsibility. In fact, marriage has been linked to being financially and socially stable in the rural communities. This study finds marital status distribution of the farming households in general to be skewed. Majority (81%) were married while only 19 percent were not married. For the purpose of this study, other categories of marital status such as divorced and widowed were classified as not married. Household size to a large extent determines labour supply particularly in small scale farming. It may therefore indicate the quantity of crop output a given household may likely produce considering

availability of family labour. Household size was adjusted by estimating the adult – male equivalent. An approximate value of 7 ± 2.98 was obtained as mean household size for the entire study area with minimum of 1 and maximum of 16. Majority (61%) had 5-8 members per household.

About 72 percent of the household heads had between 21 and 40 years of experience in farming. The minimum year of experience was 5 while maximum was 52 years. The result further shows an average of 23 ± 10.79 years farming experience. It is expected that with increasing years of farming, farming households would gain more experience in the art of farming leading to the increased crop productivity.

A large proportion (64%) of the farming households belong to one agricultural group or the other. About 36 percent of the household's heads sampled were not members of any group or association. Those who belong to agricultural groups were mostly (40%) members of government funded groups like Fadama Users Group (FUG), National Special Programme for Food Security (NPFSS), Root and Tuber Expansion Programme (RTEP). Few (9%) belong to agricultural- based mutual support groups like the Cassava Growers Association while others (14%) were members of agricultural cooperatives. Also, about 16 percent of farming households have members who belonged to groups outside their community. Those who belong to groups have advantage over those who do not. This is because information gathered during the survey revealed that, most of the times, farmers in the study area enjoy benefit from government and banks only if they are identified with a particular group. For example, it was found out that the State government in conjunction with the Bank of Agriculture issued credit facility worth of ₦100,000 to individual farmers to aid agricultural production in the State. But beneficiaries were drawn from registered agricultural groups. Farmers who are not in groups do not enjoy this type of offer.

Social Capital Indices:

This section presents the social capital variables used in this study following Yusuf (2008) and Anyiro (2014) as density of membership, heterogeneity index, decision making

index, meeting attendance index, cash contribution index and labour contribution index. The summary statistics for each of the indices is presented in Table 2.

As shown in Table 2, the index of membership density of about 35 percent is low. Households which belong to agricultural groups belong to at least one group, on the average, households belong to two associations. Percentage mean heterogeneity index obtained was also about 43 percent indicating a less than average level. This percentage could still be considered as moderate level of diversity of group membership in the area. Heterogeneity of groups according to Okunmadewa et al. (2005) can enhance flow of information particularly in the area of access to fertilizer, fertilizer usage and credit, when people from diverse backgrounds come together as a group. Participation in decision making was found to be high (65%). Many of the household members who belonged to groups played leadership roles. Households with very high decision-making index are likely to be the most committed to the course of their groups and hence possessed higher social capital. This may also facilitate their access to certain benefits as leaders. Meeting attendance was equally high (75%), this may be attributed to the groups having frequent meetings and because majority who played leadership role probably were forced to attend meetings. The study revealed an average of 14 times scheduled meeting per annum while average number of attendances by farm household heads was found to be 11. This finding may have implication for information dissemination to members from groups. Attendance in meetings may enhance quick access to useful information that may help in crop production activities. Cash contribution index was however, low with value of 10.05 percent. Cash were contributed by households to their associations in form of savings, membership dues, fine for absenteeism and lateness to meetings as well as loan repayment. This result compares favourably with Anyiro (2014) except for meeting attendance which he found to be low (25%) among rural farming households in Abia State Nigeria.

Level of Fertilizer Usage among Farming Households:

Table 3 shows fertilizer usage among the households. Majority (85%) of the farmers used fertilizer. This may be connected to the fact that large proportion of the household heads belonged to groups and are also connected to governmental organizations. This finding is similar to the finding of Mohammed et al. (2014) who found that 74 percent of male farmers use fertilizer in Yagba East area of Kogi State. Similarly, 89 percent of maize farmers in Ijumu area of the State used fertilizer (Ayanlere et al., 2014).

The two major types of fertilizer used in the area were NPK 15: 15: 15 and Urea. Highest proportion (50.85percent) of the household heads used NPK fertilizer. Average quantity of fertilizer used was 120.74kg per hectare. Quantity used varied among households, ranging from minimum of 0kg

for those that do not use at all to maximum of 518.52kg per hectare.

Table 3: Distribution of farming households according to type, quantity and source of fertilizer used

	Frequency	Percentage n= 352
Fertilizer usage		
Used	298	85
Not used	54	15
Type of fertilizer used		
None	54	15.34
NPK	179	50.85
NPK and Urea	111	31.53
Urea	8	2.27
Fertilizer use intensity(kg/ha)		
< 100	182	51.7
100-200	131	37.22
201-300	17	4.83
301-400	10	2.84
401-500	3	0.85
>500	9	2.56
Source of fertilizer		
None	54	15.34
Input traders/Open market	115	32.67
ADP/Fadama	140	39.77
Other farmers	29	8.24
Farmers association	14	3.98

Source: Field survey, 2015

The proportion of farmers using the recommended fertilizer rates (200kg/ha to 500kg/ha depending on the type of crop) by FFD (2011) is low. This conforms to the findings of Ayanlere, et al., (2014) that, maize farmers in Ijumu Area of Kogi State Nigeria used an average of 166.39kg/ha/season of fertilizer, which they observed was far below the recommended 8 to 10 bags of 50kg per hectare rate for maize based cropping system. Source of fertilizer include open market, ADP, other farmers and farmers associations. Majority (about 40%) sourced fertilizer through ADP while a few others (8.24%) sourced from other farmers. This may be as a result of the fact that many of the household heads were registered under the Growth Enhancement Support Scheme (GESS) of the Federal Government. Moreover, information gathered revealed that some farmers who are beneficiaries of the scheme collected the fertilizer and sold to other farmers and input traders.

Social Capital Factors Affecting Intensity of Fertilizer Usage among Farming Households:

Empirical results of the maximum likelihood estimate of the Tobit regression analysis are presented in Table 4.

Table 4: Parameter estimates from Tobit regression model for farming households in the study area

Variables	Coefficient	Standard error	t-value	p-value
Constant	0.4523**	0.0989	4.57	0
Density of membership	0.00057	0.0014	0.4	0.693
Heterogeneity index	0.0029**	0.00082	3.61	0
Decision making index	0.0033**	0.0011	2.93	0.004
Meeting attendance index	0.0006	0.00089	0.68	0.497
Cash contribution index	-0.00048**	0.00019	-2.49	0.013
Labour contribution index	-0.00212**	0.00083	-2.57	0.01

Source: Field survey, 2015. ** Significant at 5 percent

Table 4 shows that all the variables fitted were significant factors affecting intensity of fertilizer usage, except density of membership and meeting attendance index. These variables are heterogeneity index, decision making index, cash contribution index and labour contribution. A positive coefficient indicates that a higher value of the variable increases the likelihood of fertilizer usage intensity. Similarly, a negative value of the coefficient implies tendency of decreasing probability of fertilizer usage intensity. Heterogeneity index and decision-making index positively influenced intensity of fertilizer usage by virtues of their positive sign. That is, increase in these two variables increase intensity of usage. However, cash and labour contribution index had negative coefficients implying an inverse relationship with intensity of fertilizer usage. This means that increase in these variables reduces fertilizer usage intensity. Social capital has long been noted to facilitate adoption of technology, access to useful information and access to agricultural incentives. It is therefore not surprising that the variables fitted as expected *a-priori*, the positive and significant heterogeneity index, decision making index, and participatory norms implies that increase in these variables tend to increase the intensity of fertilizer usage. Heterogeneity of members may likely increase the intensity of fertilizer usage because of the influence of the diversity of members. This result compares unfavourably with Anyiro (2014) who obtained a negative effect of heterogeneity index on poverty status of households in Abia State, Nigeria.

The coefficient of decision making being positive implies that, if household heads play leadership roles and are involved in decision making for their group, this may likely increase their level of fertilizer usage. Oladele and Wakatsuki (2012) found a similar result among farmers in Ghana and Nigeria. The negative sign of cash and labour contribution index imply probability of reduced intensity of fertilizer usage with increase in both variables. This result may be linked to the fact that contributing cash, labour and time to group may reduce the amount of cash committed to purchase of fertilizer; thus, reducing the level of usage of fertilizer.

CONCLUSION

Based on the empirical evidence emanating from both descriptive and inferential statistics employed for this study, it can be concluded that there is high potential of increasing crop output in the study area if farming households intensify the use of fertilizer. Social capital also has positive influence on fertilizer usage, indicating that there is a link between social capital and fertilizer usage. Therefore, strengthening social capital would enhance fertilizer usage which will further be reflected in the increased productivity of crop farming in the study area.

It is thus recommended that:

- There should be increased awareness about activities of agricultural groups by government and extension agent for non-members to develop interest in group membership. This could be achieved through broadcasting of group programmes on radio and jingles.
- Government should strengthen agricultural groups in the area by making them channel for loan delivery with a view of increasing the financial capacity of members and encouraging non-members to join groups.
- To derive maximum benefit from use of fertilizer, farmers should be adequately informed, enlightened and advised by extension agents on proper application of fertilizer based on crop specific needs and farming systems adopted by farmers. This could be achieved through adequate extension service and trainings organize by groups.

ACKNOWLEDGEMENTS

I wish to express my profound gratitude to Ahmadu Bello University Zaria, for enabling me to benefit from staff training grant from Tertiary Education Trust fund (TET fund) for the PhD research titled “Analysis of Social Capital and Fertilizer Usage in Small-Scale Crop

Production In Kogi State, Nigeria” from which this manuscript was extracted.

REFERENCES

- Abdul B., Munasib, A. and Jeffrey, L. J. (2011). The effect of social capital on the choice to use sustainable agricultural practices *Journal of Agricultural and Applied Economics*, 43(2), 213–227.
- Adejobi, A.O. (2004). Rural Poverty, Food Production and Demand in Kebbi State, Nigeria. Ph.D. Thesis, Department of Agricultural Economics University of Ibadan, Nigeria
- Akpan, S.B., Udoh, E.J. and Nkanta, V. S. (2012). Factors influencing fertilizer use intensity among small holder farmers in Abak agricultural Zone in Akwa Ibom State, Nigeria. *Journal of Biology, Agriculture and Healthcare*. 2(1), 54-66.
- Anyiro, C.O. (2014). Social capital dimensions and its implications on poverty status of rural farm households in Abia State, Nigeria. *The Nigerian Agricultural Journal*, 45(1&2), 102-118
- Ayanlere, A.F. Mohammed, A. B., Muhammad-Lawal, A., Oloniruha, J.A. and Olugbemi, Y.Y. (2014). Use of chemical fertilizer in maize production among small scale farmers in Ijumu Area of Kogi State, Nigeria. *Journal of Sustainable Environmental Management*, 6, 8-17.
- Ayinde, O.E., Adewumi, M.O. and Omotosho, F.I. (2009). Effect of fertilizer policy on crop production in Nigeria. *The Social Sciences*, 4(1), 53-58.
- Azagaku, E. D. and Anzaku, H. (2002). Effect of NPK fertilizer levels on the growth and development of early Maturing Maize Cultivar (TZESR –W). In M. Iloeje, G. Osuji, Udoh H. & G. Asumugha (eds). *Agriculture: A basis for poverty eradication and conflict resolution*. Proceedings of the 36th Annual Conference of the Agricultural Society of Nigeria Held at the Federal University of Technology Owerri, Nigeria, 20- 24 October 2002, PP.106-111.
- Balogun, O. L and Yusuf, S. A. (2011): Effect of social capital on welfare of rural households in south-western states, Nigeria. *Journal of American Science*, 7(3), 506- 514.
- Esilaba, A. O., Byalebeka, J. B., Nakiganda, A., Mubiru, S., Ssenyange, D., Delve, R. J., Mbalule, M. and Nalukenge, G. (2001). Integrated nutrient management in Iganga district, Uganda: Diagnosis by participatory learning and action research. Centro Internacional de Agricultura Tropical (CIAT), Network on Bean Research in Africa, Kampala, UG. 71p (CIAT Africa occasional publications series no.35). Retrieved from http://ciatlibrary.ciat.cgiar.org/Articulos/ciat/op35_diagnostic.pdf
- Fatoba, I.O. (2007). Economics of Rice, Sugarcane and Soyabean Production Technologies in the Guinea Savannah of Nigeria. Ph. D. Thesis, Department of Agricultural Economics and Farm Management. University of Ilorin, Nigeria
- Federal Fertilizer Department (FFD), (2011). *Fertilizer use and management practices for crop in Nigeria*. 4th edition. Abuja: Federal Ministry of Agriculture and Rural Development.
- Food and Agricultural Organization (FAO) (2008). Current world fertilizer trends and outlook to 2011/12. Rome: Food and Agricultural Organization of the United Nations.
- Hazell, P., McCulloch, A. K. and Meinzen-Dick, R. (1997). *Property rights, collective action and technology adoption: A conceptual framework*. Baltimore: Johns Hopkins University Press.
- Isham, J. (2000). Can Investments in Social Capital Improve Local Development and Environmental Outcomes? A Cost-Benefit Framework to Assess the Policy Options. Paper prepared for Middlebury College’s (21st Annual Conference on Economic Issues). Middlebury, VT.
- Isreal, G, Beaulieu, L. and Hartless, G. (2001). The influence of family and community social capital on educational achievement. *Rural Sociology*, 66, 45-68.
- Mohammed, A.B., Ekenta, C.M., & Ayanlere, A.F. (2014). Analysis of gender factors and profitability of yam production in Yagba East local government area of Kogi State Nigeria. *Journal of Sustainable Environmental Management*. 6, 26-33.
- Muhammad-Lawal, A. (2008). Analysis of Food Insecurity Situation in Rural Households in Kwara State, Nigeria. Ph.D. Thesis, Department of Agricultural Economics University of Ilorin
- National Population Commission NPC, (2006). *National Population Commission Census Data*.
- Nigeria National Youth Policy (2009). Nigeria factsheets. Retrieved from www.youthpolicy.org/factsheet/.../Nig...
- Ojeleye, O.A. (2015). Analysis of farm Household and Community Food Security in Kaduna State, Nigeria. Ph.D. Thesis, Department of Agric.

- Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria
- Okunmadewa, F.Y., Olaniyan, Y.O., Yusuf, S.A., Bankole, A.S. Oyeranti, O.A., Omonona, B.T., Awoyemi, T.T., and Kolawole, K. (2005). Human Capital, Institutions and Poverty in Rural Nigeria. Research Report Submitted to African Economic Research Consortium (AERC) Kenya for the Second Phase of Collaborative Research Project.
- Okunmadewa, F.Y., Yusuf, S.A. and Omonona, B.T. (2007). Effects of social capital on rural poverty in Nigeria. *Pakistan Journal of Social Science*. 4(3), 331-339.
- Oladele, I. O., & Wakatsuki, T. (2012). Socio-economic features, dynamics of farmers associations and adoption of sawah rice production technology in Ghana and Nigeria. *Journal of Food, Agriculture and Environment*, 10(2), 434-437.
- Omonona, B.T. (2000). Poverty and its Correlates among Rural Farming Households in Kogi State Nigeria. Unpublished Ph.D. Thesis, University of Ibadan
- Omotesho, K.F. (2015). Assessment of the Use of Demand Driven Approach to Agricultural Extension by Farmers in Kwara and Oyo State of Nigeria. Unpublished Ph.D. thesis, University of Ilorin, Nigeria
- Tobin, J. (1958). Estimation of Relationships for Limited Dependent Variables. *Econometrica*, 26, 24-36.
- Wanyama, J. M., Moses, L.O. Rono, S. C., Masinde, A.O., & Serem, A. (2009). *Determinants of fertilizer use and soil conservation practices in maize based cropping system in Transzonia district, Kenya*. Kitale: Kenya Agricultural Research Institute.
- Yusuf, S.A. (2008). Social capital and household's welfare in Kwara State, Nigeria, *Journal of Human Ecology*; 23(3), 219-229
- Zhou, Y. Yang, H., Mosler, H. J. and Abbaspour, K.C. (2010). Factors affecting farmers' decisions on fertilizer use: A case study for the Chaobai watershed in Northern China. *The Journal of Sustainable development*, 4(1), 80-102.
