



IMPACT ANALYSIS OF *FADAMA* III PROJECT IN GOMBE STATE, NIGERIA

Kolo, A. and Sani, R. M.

Department of Agricultural Economics and Extension, Faculty of Agriculture and
Agricultural Technology, Abubakar Tafawa Balewa University, Bauchi, Nigeria

Corresponding Authors' E-mail: abdulwahabkolo@gmail.com **Tel.:** 08061572214

ABSTRACT

This study evaluates the impact of *Fadama* III project in Gombe State, Nigeria. Multi-stage sampling technique was used to select 120 beneficiaries and 120 non beneficiaries of *Fadama* III project. Data were collected using structural questionnaire and analyzed using descriptive statistics (percentage change was used to estimate the changes between each period of evaluation) and combination of propensity score matching (PSM) and double difference (DD) estimator to determine average treatment effect (ATE) on project beneficiaries. The result shows that, the value of productive assets increase by 50.18%. The result further shows that income of beneficiaries increased by 51.21% (baseline-midline) and 95.84% (baseline-midline) meaning that *Fadama* project III has superseded its target of 40% of 75% of all beneficiaries. The overall result indicated that there was a substantial increase in the productivities of both the crop and livestock sub-sectors which increase male and female household income by 61% and 33% respectively. *Fadama* III beneficiaries' access to extension advisory services contributed to agricultural productivity and income by 10% at baseline, 44% at midline compared to 58% increase contribution in the endline evaluation. Therefore it can be concluded that *Fadama* III project impacted positively both the intermediate and ultimate target of the project have been adequately met. There is the need for the policy makers/ authorities to consider community-driven development approach for *Fadama* III project meant to benefit the rural communities more.

Keywords: Baseline, Endline, Impact, Income, Midline.

INTRODUCTION

Nigeria is the most populous country in Africa (178.7 million people) and is among the fastest growing economies in Sub – Saharan Africa. In 2014, Nigeria surpassed South Africa as Africa's largest economy. The country has tried to improve its macroeconomic stability and develop its poor infrastructure, but severe challenges including government policy distortions and a lack of transparency in the economic system continue to retard progress. The government also has struggled to end ongoing security threats in some parts of the country with remarkable success.

The population growth rate of the country is 1.9% and the country has a total area of 923,768 Km² (910,768 Km² land area and 13,000 Km² water). Land use of the country involves 33.02% arable crop production, 3.14% permanent crop production; while the remaining 63.84% is devoted to other uses. The country has an estimated irrigated land area of 2,930Km². Furthermore, the country's Gross Domestic Product (GDP) Purchasing Power Parity (PPP) is estimated to be \$1.1 trillion, with real GDP growth rate of 2.7% and GDP per Capita (PPP) of \$6,108.00. The agricultural sector contributed about 47% of the GDP growth between 1990 and 2007 (the largest contribution from a single sector). According to Simonyan and Omolehin (2012) estimates, the country's GDP composition by sector include: Agriculture (30%),



Industry (32%) and Service (38%) while its labour force by occupation comprises agriculture (70%), industry (10%) and service (20%).

The *Fadama* III Project is a comprehensive five-year action program developed by the Federal Ministry of Agriculture & Water Resources (FMAWR) in close collaboration with the Federal Ministry of Environment (FME) and other Federal and State government ministries, local governments and key stakeholders (donors, private operators, NGOs). *Fadama* areas are flood plains and shallow aquifers found along Nigeria's major river systems. The first *Fadama* project (*Fadama* I) focused exclusively on irrigation farming while both *Fadama* II and *Fadama* III are more of agricultural diversification programs, providing financing for the diverse livelihood activities which the beneficiaries themselves identify and design, with appropriate facilitation support.

The Project will intervene in all 36 States plus the FCT. Target groups will include: the rural poor engaged in economic activities (farmers, pastoralists, fishermen, nomads, traders, processors, hunters and gatherers as well as other economic interest groups); relatively disadvantaged groups (women including widows) such as the handicapped, the sick including people living with HIV/AIDS, and the youth; and service providers, including government agencies, private operators and professional/semiprofessional associations operating in the project areas. The Project would reach approximately 2.2 million direct beneficiary households, or about 16 million household members. In addition, it is expected that the Project would also reach at least two million indirect beneficiary households, as members of the *Fadama* communities not benefiting directly from subprojects and non-*Fadama* communities will gain from the investments in public infrastructure and from additional income and employment effects.

Despite the above impressive economic potentials of the country, majority of its people are extremely poor. According to Barca *et al.* (2015) 75% of Nigerian population lives below the international poverty line of less than \$1.25 per day, while unemployment and inflation in the country was put at 4.9% and 9.3% respectively. Majority (70%) of its people lives in rural areas and is engaged in agriculture and agricultural related activities. The severity of poverty among the citizenry suggests that the economics potentials of the country are not fully exploited. In vein, both the present and past administrations have taken the challenge and designed various development frameworks including the Economic Transformation Agenda (ETA). The ETA has ranked agricultural production on top of the major production sectors and has also allocated a substantial portion (US\$37.80 billion) of its four year (2012 – 2015) budget of US\$667 billion to agriculture. The Federal Government of Nigeria (FGN) has taken several steps over the years to use agriculture as the vehicle to alleviate poverty and attain food security. But, this effort is against the background of significant constraints. Agricultural lands have been largely degraded in quality due to production expansion via area expansion at the expense of intensive farming. Folayan (2013) reported that factors in the low and declining productivity of the Nigerian agricultural sector include poorly developed irrigation potential, inadequate and poorly funded and maintained production infrastructure, poorly funded agricultural research and extension systems, inadequate availability and distribution of key inputs, poor land management practices, poor access to livestock inputs and veterinary services, poor or lack of access to financial services for the procurement of needed inputs and services (processing, storage, transportation, etc.). Assessing impact of a project refers to the broad, long-term economic, social and environmental effects resulting from such project (Akinlade *et al.*, 2012). Impact assessment is seen as a critical component of agricultural project that helps

to define priorities of project and facilitate resource allocation among programmes, guide researchers and those involved in technology transfer to have a better understanding of the way new technologies are assimilated and diffused into farming communities. Therefore, the research aim at providing answers to the following questions.

- i. what is the impact of *Fadama* III on productive assets?
- ii. what is the impact of *Fadama* III on household income?
- iii. what is the impact of *Fadama* III on agricultural productivity?
- iv. what is the impact of *Fadama* III on community access to advisory services?

The study was designed with the broad objective to evaluate the impact of *Fadama* III project in Gombe State, Nigeria with the following specific objectives:

- i. determine the impact of *Fadama* III on productive assets;
- ii. evaluate impact of *Fadama* III on household income;
- iii. assess the impact of *Fadama* III on agricultural productivity;
- iv. describe the impact of *Fadama* III on advisory services.

MATERIALS AND METHODS

The Study Area

This study was carried out in Gombe State, Nigeria. Gombe State is a successful socio-political fusion of two distinct groups of people, comprising, the Emirate of Gombe North and ethnic groupings of Gombe South in the North Eastern region of Nigeria. Gombe State is located between Latitudes 9⁰30' and 12⁰30' North and Longitudes 8⁰45' and 11⁰45' east. It lies in the center of North East geopolitical zone of Nigeria and shares boundaries with all other states in the zone; Adamawa and Taraba in the South-south, Bauchi in the West, Bornu in the east and Yobe in the North-east. According to NPC (2006), the population of Gombe State in 2006 census stood at about 2,365,040 while women constitute 1,120,812 and the State has an average population density of 130/km² (GSADP, 2015). The State has 11 local Government areas out of which 11 participated in the present *Fadama* III project (Figure 1).

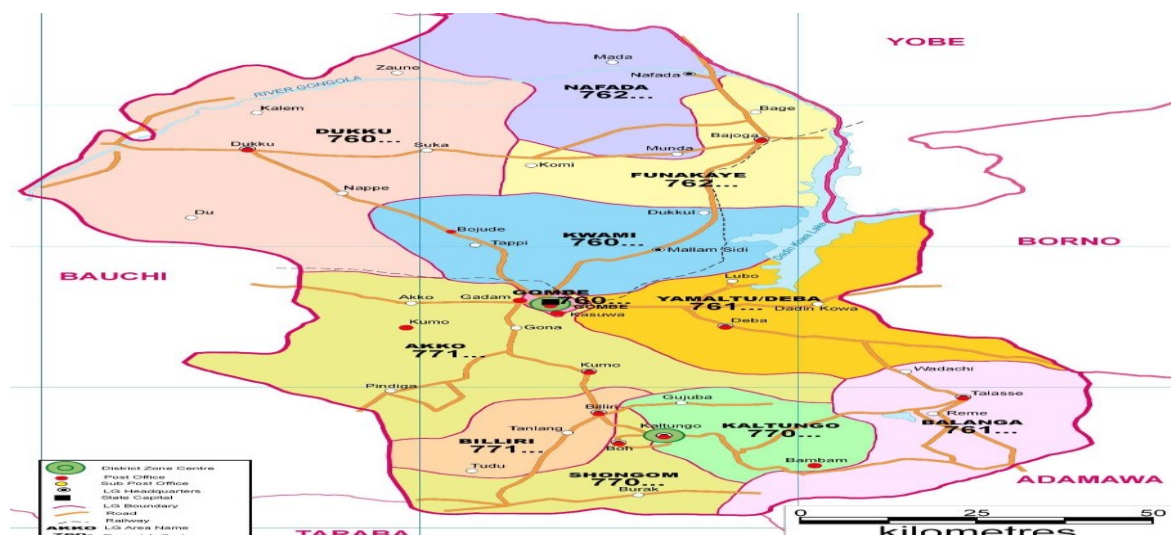


Figure 1: Map of Gombe State showing the 11 participating LGAs



Sampling Technique and Sample Size

The sampling frame for the study was generated from both baseline and midline sample (beneficiaries and non-beneficiaries). Multi-stage random sampling technique was used in the selection of local government areas, *Fadama* III Community Associations (FCAs), *Fadama* III Users Groups (FUGs) and participating farmers and non-beneficiaries of *Fadama* III project (of Midline serve as control group). In the first stage, six (6) Local Governments Areas (LGAs) were randomly selected out of the 11 LGAs that make up Gombe State. In the second stage, two (2), FCAs each were randomly selected from the selected LGAs to give a total of 12 FCAs. These are: Tanglang FCAs and Billiri south FCA in Billiri LGA, Bambam Yiri and Kamo FCAs in Kaltungo LGA, Kumo centre FCA and Bogo/Tabra FCA in Akko LGA, Kwadon and Nono FCAs in Yamaltu-Deba LGA, Malalaru and Waziri south FCAs in Dukku LGA and Rubadu FCA and Wawa FCA in Funakaye LGA. In addition one (1) FUGs were randomly selected from each FCA to give a total of 6 FUGs. From the selected FUGs, five (5) participating rural farmers were randomly selected to give a sample size of 120 beneficiaries. Finally, 120 non-beneficiaries were randomly selected from the villages where the *Fadama* III project operate were selected to give a grand sample size of 240.

Method of Data Collection

Data were collected using structural questionnaire which was divided into six sections. The first section cover Economic Interest Groups, second section covers Participatory Planning of EIGA/FCA & LGAs, third section covers Natural Resource Management, forth section covers EIGA/FCA level investments and the fifth section covers EIG level of economic activities and sharing of benefits.

Analytical Techniques

An experimental approach was used to construct an estimate of the counterfactual situation by randomly assigning FUG/EIG to treatment and control groups. Random assignment ensures that both groups are statistically similar in observable and unobservable characteristics, thus avoiding project placement and self-selection biases (Gray and Kinnear, 2011). Propensity Score Matching (PSM) and Double-difference (DD) were used in this study to address the challenges faced by impact survey of this kind as outlined above to determine average treatment effect (ATE) on the beneficiaries. The PSM method matches *Fadama* III project beneficiaries and comparable non-beneficiaries using propensity score; which is the estimated probability of being included in the *Fadama* III project.

$$ATE = [E (Y_1|p = 1) - (E(Y_0|p = 0))] - [E (Y_0|p = 1) - (E(Y_0|p = 0))] \quad \dots(1)$$

where;

ATE = average treatment effect;

p = participation in the project ($p = 1$ if participated in *Fadama* III project, and $p = 0$ if did not participate in *Fadama* III project);

Y_1 = outcome (income, in this example) of the *Fadama* III project beneficiary after participation in project;

Y_0 = outcome (income) of the same beneficiary if he or she had not participated in the *Fadama* III project.

In this study, only *Fadama* III beneficiaries and non-beneficiaries with comparable propensity scores were used to determine the effect of the project. Double–difference on the other hand, compares changes in outcome from before and after the *Fadama* III project between



beneficiaries and non-beneficiaries, instead of just comparing outcome levels at one point in time.

$$DD = (Y_{p1} - Y_{p0}) - (Y_{np1} - Y_{np0}) \dots(2)$$

where;

Y_{p1} = outcome (e.g., income) of beneficiaries after the *Fadama* III project started.

Y_{p0} = outcome of beneficiaries before the *Fadama* III project started.

Y_{np1} = outcome of non-beneficiaries after the *Fadama* III project started.

Y_{np0} = outcome of non-beneficiaries before the *Fadama* III project started.

RESULTS AND DISCUSSION

Impact of *Fadama* III on Productive Assets

Table 1 presents the results and discussion of the endline impact survey. Specifically the impact of *Fadama* III interventions on productive assets, Household income, agricultural productivity and Advisory (extension) Services and were presented in for of tables and charts to display the outcomes. It was evident from findings that participation in *Fadama* III has made concerted effort at providing productive assets among the beneficiaries.

Table 1: Impact of *Fadama* III on Productive Assets

Treatment type	PSM+DID (Kernel)	PSM+DID (Nearest neighbor)	Two-Stage weighted OLS+DID	PSM ATT	Impact (% change, ATT)
Baseline	14646.9*** (2107.02)	14693.9*** (1210.21)	12916.6*** (1146.53)		18.21
Midline	34646.9*** (2232.11)	34646.9*** (1970.04)	32916.6*** (1417.32)		33.03
Endline	52697.8*** (2857.62)	56426.5*** (2085.02)	56722.4*** (1831.71)		50.18

Note: Values in parenthesis are bootstrapped standard errors of the corresponding ATT. (***) associated ATT is significant at 0.01

The change in the value of productive assets was large and significant endline compared to midline. To estimate the impact of *Fadama* III on productive assets, three different kind of analyses namely the Kernal (PSM+DID), Nearest Neighbor (PSM+DID) and Two-stage PSM (weighted OLS+DID) matching methods were used. However, three types of treatments were analyzed against the control group (baseline) as presented in Table 1. The results consistently indicated positive impacts for *Fadama* III interventions, and all estimated statistic for the three Matching methods were statistically significant ($P \leq 0.05$). At endline recorded 50.18% increase in productive assets, while at midline and baseline recorded 33.03% and 18.21%, respectively. Furthermore, comparability test also indicates significant increases at $P < 0.01$. This result demonstrates that *Fadama* III project has helped the beneficiaries to acquire more productive assets to facilitate their economic activities. It is expected that these assets contributes immensely to increase in productivity and consequently increase in income.



Impact of *Fadama* III on Income

The finding of impact survey indicates that FUG/EIG incomes improved significantly more for endline than midline result. *Fadama* III has enhanced the capacity of the beneficiaries to realize significant increases in income. The endline survey examines the overall impact of *Fadama* III on income, which combines all sources of income from various enterprises (crops, livestock, non-farm activities, etc.). Table 2 shows average income at baseline for male beneficiaries was ₦49,701.32 and female beneficiaries was ₦21,059.46, average income at midline for male beneficiaries was ₦67,199.20 and female beneficiaries was ₦39,801.40 while the average income at endline for male beneficiaries was ₦83,766.01 and female beneficiaries was ₦54,809.00. The result further shows that there income of beneficiaries increased by 51.21% (baseline-midline) and 95.84% (baseline-midline) meaning that *Fadama* project III has superseded it target of 40% of 75% of all beneficiaries. The findings have attributed the income increases to participation in the *Fadama* III project with considerable confidence. This means that *Fadama* III project has succeeded in achieving its income goal within its period of operation, and subsequently improved wellbeing among the beneficiaries. Oluyombo (2010) observes that income is an important contributor to the improvement of rural wellbeing, and also, that nonwage income source is the major contributor to welfare increases in the rural areas than the wage income.

Table 2: Percentage Change in Income

Income	Baseline (A)	Midline (B)	Endline (C)	$\% \Delta = \frac{B - A}{A} \times 100$	$\% \Delta = \frac{C - B}{B} \times 100$
Male	49,701.32	67,199.20	83,766.01	35.21%	24.65%
Female	21,059.46	39,801.40	54,809.00	0.89%	37.71%
Total	70,760.78	107,000.60	138,575.01	51.21%	95.84%

Impact of *Fadama* III on Agricultural Productivity

Agricultural productivity includes both crop and livestock productivity. Crop productivity was analyzed using profit per hectare. The profit per hectare is a good index of crop productivity since farmers plant many crops in one plot and this makes isolating yield on per crop basis very difficult and sometimes even misleading. On the other hand, we also examined the impact of *Fadama* III on livestock by analyzing the profit farmers obtain from livestock production and segregated by gender. Figure 2 shows percentage change in both crop and livestock production segregated by gender as a result of *Fadama* III project. These results are suprising since agricultural production generally contribute to share of household income for *Fadama* III beneficiaries at midline and endline evaluation. The most significant impact of *Fadama* III on crop productivity durring endline survey is among male beneficiaries 99% and female beneficiairies was 83%. For livestock production, the impact of *Fadama* III is significant for male beneficiaries 41% and female beneficiaries was 38%. Meaning that crop sub-sector recording a better performance This result is not suprising since crops contribute the largest share of household income durring midline and endline evaluation. The overall result indicated that there was a substantial increase in the productivities of both the crop and

livestock sub-sectors which increase male and female household income by 61% and 33%, respectively.

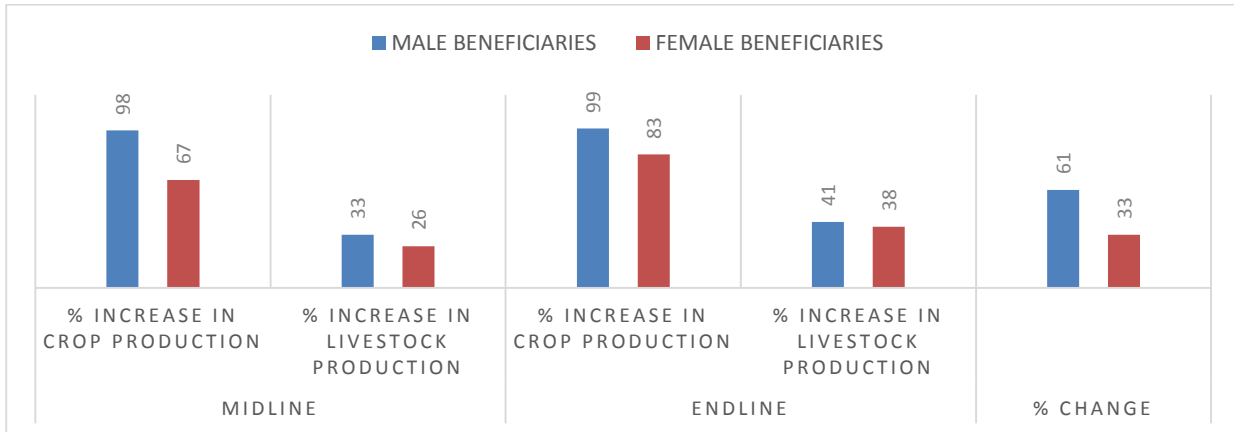


Figure 2: Shows percentage change in both crop and livestock production segregated by gender

Impact of *Fadama III* on Advisory Services

The result in Figure 3 shows a greater access to advisory services for *Fadama III* beneficiaries at the time of endline than in baseline and midline evaluation periods. The increase in access to agricultural extension services at endline actually increased more than the corresponding increase baseline. For instance, *Fadama III* beneficiaries' access to extension advisory services contributed to productivity and income by 10% at baseline, 24% at midline survey compared to 38% increase contribution in the endline survey. However the use and demand for proven technologies by farmers has increased as a result of participation. The adoption of new technologies has increased among the *Fadama III* beneficiaries at endline compared to beneficiaries at baseline and midline. Nigeria has used unified extension system as promulgated by donors and projects (Abdullahi, 2012). As it strives to reform its extension system toward more pluralistic system, the government need to harmonize the existing approaches and seek to use those that are complementary rather than conflicting (Idrisa *et al.*, 2012) Furthermore, *Fadama III* target on access to agricultural extension services in the states to increase of 20% of returns to enterprises supported by demand-driven advisory service. Hence it does not directly state the target in terms of access to agricultural extension services. However, increasing access to agricultural extension services will increase agricultural productivity.

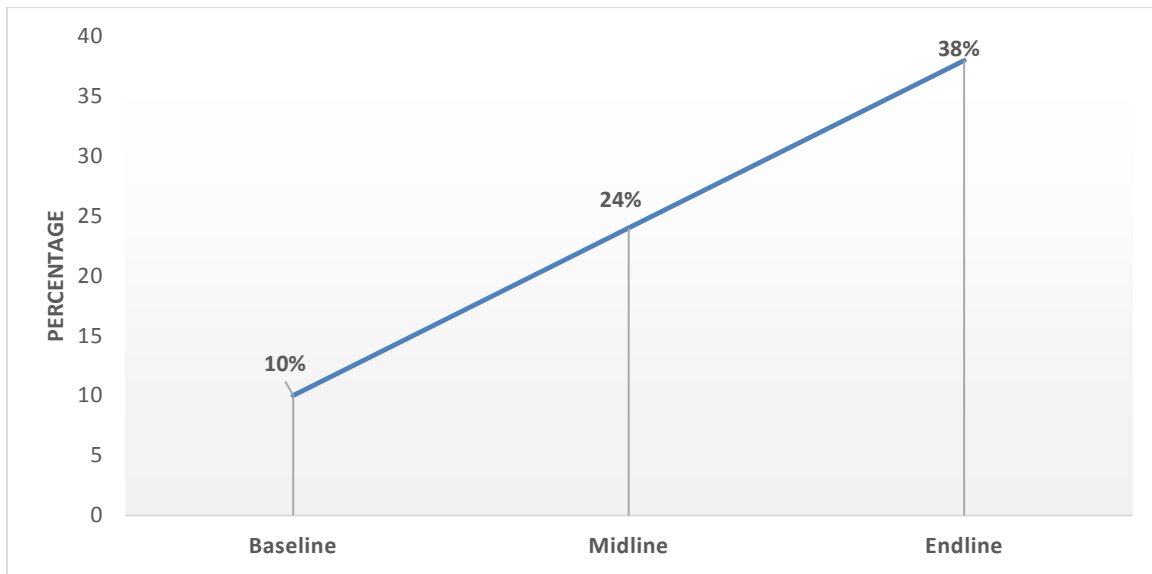


Figure 3: Percentage change in access to agricultural extension services

CONCLUSION AND RECOMMENDATIONS

The survey has evaluated the impact of *Fadama* III beneficiaries in Gombe State. This was to assess the level success made in terms of meeting set objectives of the project. Therefore, it can be concluded that *Fadama* III project impacted positively on productive assets at endline recorded 50.18% increase in productive assets. The result further shows that income of beneficiaries increased by 95.84% (baseline-endline) and *Fadama* III beneficiaries’ access to extension advisory services contributed to agricultural productivity and income by 58%. The overall result indicated that both the crop and livestock sub-sectors increase male and female household income by 61% and 33%, respectively.

Based on the results, the study recommends that both the intermediate and ultimate target of the project have been adequately met. The outcome is generally encouraging as most of outcomes have surpassed both the endline result and set targets. This goes further to suggest that *Fadama* III has positively and directly impacted the lives of benefitting communities and; through spillover effects improved the lives of non-benefitting communities. From the foregoing results, it can be drawn that *Fadama* III project has really achieved its goal of increasing the incomes of the beneficiaries in the first five years of its operation. Local counterpart funding should not only be improved but be made available in time to ensure improved capital base of the respondents. Project coordinating authority should assist the respondents to secure low cost source of production inputs so as to improve their revenue generating capability. These results have implication on planning poverty reduction efforts in low-income countries. More farmers should be encouraged by agricultural extension agents to participate in the *Fadama* III project, as this would increase their income and productivity. The study is therefore suggesting the sustenance and expansion of the *Fadama* III project because of its positive impact on the welfare of the beneficiaries through greater support from donor, local, state, and federal governments of Nigeria.



REFERENCES

- Abdullahi, A. (2012). Comparative Economic Analysis of Rice Production by Adopters and Non-Adopters of Improved Varieties among Farmer in Paikoro Local Government Area of Niger State. *Nigerian Journal of Basic and Applied Scienc*, **20**(2): 146-151.
- Akinlade, R. J. (2012). Impact of Fadama II Project on Poverty Reduction of Rural Households in Nigeria. *International Journal of Agricultural Science and Research*, **2**(2): 18-38.
- Barca, V., Brook, S., Holland, J., Otulana, M. and Pozarny, P. (2015). *Qualitative research and analyses of the economic impacts of cash transfer programmes in Sub-Saharan Africa*. Synthesis Report, FAO.
- Folayan, J. A (2013). Socio- Economic Analysis of Fadama Farmers in Akure South Local Government Area of Ondo State, Nigeria. *American Journal of Humanities and Social Sciences*, **1**(1): 10-17.
- Gombe State Agricultural Development Programme (2015). *GSADP at a glance*. A pamphlet Prepared by P.M.E Sub-programme.
- Gray, C. D., and Kinnear R. P. (2011). *IBM SPSS Statistics 19 Made Simple*. Psychology Press, 27, Church Road, Hove, East Sussex, UK.
- Idrisa, Y. L., Ogunbameru, B. O. and Madukwe, M. C. (2012). Logit and Tobit Analyses of the Determinants of Likelihood of Adoption and Extent of Adoption of Improved Soybean Seed in Borno State, Nigeria. *Greener Journal of Agricultural Sciences*, **2**(2): 037-045.
- National Population Commission [NPC] (2006). *Federal Republic of Nigeria Official Gazette* 94(24).
- Oluyombo, O. O. (2010). Assessing the Impact of Savings and Credit Cooperatives among Monthly Income Earners. *Journal of Research in National Development*, **8**(2): 407-415.
- Simonyan, J. B. and Omolehin, R. A. (2012). Analysis of the Impact of Fadama Project on Beneficiary Farmers Income in Kaduna State: A Double Difference Method Approach. *International Journal of Economics and Management Sciences*, **1**(11)1-8.