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Effect of Fadama III program on dry-season vegetable growers in Kwara State, Nigeria

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ABSTRACT

This study assessed the effect of the Fadama III program on dry-season vegetable growers in Kwara State, Nigeria. The study emanated from the need to know how well agricultural programs have achieved their targets. Data collected from 200 beneficiaries selected through a combination of purposive and random sampling techniques were used for the study. The data obtained were analyzed with descriptive statistics, a five-point Likert scale, and a *t* test. The results showed that the beneficiaries were mainly female, married, and relatively old, with farming as their primary occupation. The benefits accrued from the program by the farmers were a knapsack sprayer, training on record keeping, agro-chemicals, fertilizer, improved seeds, a watering can, pest and disease management, conflict resolution, and the construction of a well, borehole, cooling shed and market stall. The mean farm size of the farmers before and after participating in the program was 1.15 and 2.15 ha, respectively, with a corresponding average monthly income of NGN 6,833.75 and NGN 16,137.50, respectively (USD 1 = NGN 165). The study further revealed a positive effect of the program on the farmers' livelihoods. The major problems faced by the farmers were inadequate credit, conflict with herdsmen, land ownership problems, inadequate labor, and poor market linkage. Therefore, the study recommends the provision of credit facilities by relevant stakeholders, putting lasting conflict resolution measures in place, encouraging youths to practice agriculture, and training farmers on market linkage.

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Introduction

With a population of about 177.5 million inhabitants, Nigeria is Africa's most populous country constituting about half of West Africa's population (World Bank, 2014). Agriculture is the largest sector of the country's economy, accounting for about 42 percent of gross domestic product and providing employment to over 60 percent of the labor

force and 90 percent in rural areas (Babatunde & Oyatoye, 2005; First Securities Discount House, 2014; International Fund for Agricultural Development, 2012). Notwithstanding, Nigeria still suffers from poverty and food insufficiency (Food and Agricultural Organization, 2014; Idachaba, 2009; Ojo & Adebayo, 2012; Otu, Eja, Joy, & Emeka, 2011).

Vegetable production is an important source of daily diets and income in Africa (James et al., 2010). Vegetables are leafy plants with edible succulent stem portions, petioles and leaves (Okunlola, 2009). They are the most important food and income-generating plants widely cultivated in Africa. Vegetables are rich in vitamins and

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minerals, which are needed for maintaining good health and the prevention of diseases (Hanif, Iqbal, Iqbal, Hanif, & Rasheed, 2006). Their importance in human nutrition is so high that a balanced diet must contain 250–325 g of vegetables and the average human requirement for vegetable is 285 g per person per day (Nwachukwu & Onyenweaku, 2007). Vegetables can give a high yield per hectare and hence generate high income for farmers to provide their livelihoods (Mohammed, 2002; Sahu, 2004). However, vegetable production, like any other agricultural enterprise, is highly dependent on edaphic and climatic factors, especially rainfall (Okunlola, 2009). Hence, efforts are being made by relevant agencies to ensure the production of vegetables throughout the year, regardless of the season. These efforts involve including strategies on boosting vegetable production in agricultural intervention programs.

In Nigeria, one of the intervention programs aimed at boosting agricultural production and improving farmers' welfare has been Fadama III. The program was a follow-up project to Fadama I and II. There were mixed reports on the impacts of the previous Fadama programs in Nigeria. For instance, Echeme and Nwachukwu (2010) reported that the success level of Fadama II project delivery was 38.4 percent. They attributed the low level to poor project funding, the low level of government support, poor community support, and low capacity building. Conversely, others reported that Fadama II had made a significant impact on the beneficiaries in terms of postharvest handling, agricultural marketing, livestock management practices, crop management practices, financial management advisory services, output, and income levels (Akangbe, Ogunyinka, Ayanda, Achem, & Adisa, 2012; Eze, 2009; Mazza, Ekumankama, & Okezie, 2015; Simonyan & Omolehin, 2012; Umar, Phao, & Khalique, 2012). Fadama III is a World Bank sponsored project aimed at providing all-year round cropping of marketable and high-value crops such as vegetables and other food crops. The project seeks to increase the income of users of land and water resources on a sustainable basis by targeting small scale farmers using the Community Driven Development approach. The activities of the program were conducted in a way that they focused on Fadama User Groups (FUGs) having a common economic interest. Since the inception of Fadama III in 2009, however, little or no effort has been made to investigate the impact of the program on the beneficiaries. This could be a prerequisite toward ensuring that the goals of agricultural development programs are met (Avila & Souza, 2002). Therefore, the aim of this study was to assess the effects of Fadama III on the livelihoods of dry-season vegetable farmers in Kwara State, Nigeria. The specific objectives were: (1) to examine the socio-economic characteristics of dry-season vegetable growers in the study area, (2) to identify the benefits accrued from Fadama III by the farmers, (3) to assess the effect of Fadama III on the income and vegetable production by the farmers, and (4) to identify constraints encountered by the farmers in dry-season vegetable production. It was hypothesized that there should be a significant difference between the farm land put into dry-season vegetable production as well as the income accrued by the farmers before and after participating in the program.

Methodology

The study area was in Kwara State, Nigeria. The state serves as a 'bridge' state between Northern and South-western Nigeria. It shares its boundaries with Ondo, Oyo, Osun, Niger and Kogi states in Nigeria and an international border with the Republic of Benin. Kwara State is made up of 16 Local Government Areas (LGAs) which are categorized into zones A, B, C and D by the state's Agricultural Development Project (ADP). The state has two distinct seasons annually—a dry season and a wet season. It has sizeable expanses of arable land with rich, fertile soils which is good for the cultivation of a wide variety of food crops, including vegetables. The significant vegetable crops commonly grown in the area are fluted pumpkin, amaranthus, and cochorus. The usual dry-season vegetable farming practice is via prominent agricultural ventures in zones C and D of the state. This is usually carried out along the coastal areas of the Asa River and other smaller streams that run across the metropolis.

The population for this study consisted of dry-season vegetable growers who were Fadama III beneficiaries in the state. A four-stage sampling technique was adopted for this study. The first stage involved a purposive selection of zones C and D of the state's ADP based on the concentration of dry-season vegetable growers in the region. Next, two LGAs were randomly selected from each of the selected zones. This was followed by the purposive selection of two FUG vegetable growers. Lastly, a purposive selection of 25 dry-season vegetable growers was made from each of the selected FUGs, giving a total of 200 respondents (Table 1).

The data for the study were collected through the use of a well-structured questionnaire coupled with an interview schedule with the respondents. Data collected include socio-economic and farm characteristics of the respondents, benefits obtained from membership of the Fadama III program, income generated from dry-season vegetable production before and after being members of the program and problems encountered in dry-season vegetable production with regard to their membership in the program.

The main tools used for the analysis were descriptive statistics, a *t* test and a Likert-type scale. Descriptive statistics were used to analyze the socio-economic and farm characteristics of the farmers and the benefits accrued from the program. The *t* test was used to determine whether there was any significant difference between the farm size devoted to vegetable production by the respondents as well

Table 1

Distribution of respondents according to zone, local government area, Fadama User Groups (FUGs) and Fadama III members

Zone	Local government area	Number of FUGs sampled	Number of members sampled from each FUG	Total number of Fadama III members
C	Asa	2	25	50
C	Ilorin South	2	25	50
D	Ifelodun	2	25	50
D	Irepodun	2	25	50
Total		8	100	200

Source: Field survey

as their farm income before and after becoming beneficiaries of the program.

A five-point Likert scale was used to determine the major problems faced by the respondents. The problems were rated from very severe (5) to very mild (1). Thus, any problem whose mean was greater than 3.0 (the mean) was judged to be serious, while any mean less than 3.0 was considered not serious.

Results and Discussion

Socio-Economic Attributes of the Respondents

The relevant socio-economic characteristics of the respondents are presented in [Table 2](#). The majority (76.5%) of the respondents were females. Eighty-eight percent of the farmers were married while just 1.5 percent were single. This suggests that dry-season vegetable farming is a means of catering for the family in the study area. The result also implies that the farm labor required by the married vegetable farmers could be supplied by their households, thereby reducing the cost of production ([Muhammad-Lawal, Omotesho, & Falola, 2009](#)).

About one-third (33%) of the respondents were aged 41–50 years, while 31 percent were aged 51–60 years. Those that were aged 31–40 years accounted for 22 percent and those above age 60 years accounted for 12 percent. The remaining 3 percent were aged 21–30 years. The mean age of the respondents was about 51 years. The implication of

this finding is that most of the farmers were relatively old. At this age, they are less likely to be responsive to vegetable production improvement innovations ([Falola, Ayinde, & Ojehomon, 2013](#)). The small percentage of young vegetable growers (24.5%) could be due to the apathy usually exhibited by youths for agricultural labor ([Falola et al., 2013; Muhammad-Lawal et al., 2009](#)).

Education is generally considered an important variable that could enhance farmers' adoption of new technology ([Agwu, 2004; Omotesho, Falola, Muhammad-Lawal, & Oyeyemi, 2012](#)). About two-thirds (66%) of the farmers had reached the Quranic educational level, while 12 percent, 15 percent, 3 percent, and 5 percent had reached the primary, secondary, tertiary, and adult educational level, respectively. Most of the farm households were literate, from one form of education or the other. About 30 percent had at least primary school education. This situation could have a positive impact on the productivity of the farmers in the area as most of the farmers could possibly read and write.

[Table 2](#) shows that the majority (76.5%) of the farmers had a household size of 6–10 while 23 percent had a household size of 10 and above. The large family size could imply the availability of family labor to the farmers. Other things being equal, a rational farmer would like to exhaust all sources of labor in the household before hiring labor to reduce cost of labor ([Muhammad-Lawal et al., 2009](#)).

The main occupation of the respondents was farming. [Table 2](#) also indicates that the primary source of dry-season vegetable farm land available to the Fadama Project farmers (57.5%) was by inheritance. The other sources of land used by the farmers were lease and purchase and these accounted for 38 percent and 4 percent, respectively.

A greater proportion (64%) of the farmers had over 10 years farming experience. About 16.5 percent of them had 4–6 years farming experience, while 10 percent and 9.5 percent had 1–3 and 7–9 years farming experience, respectively. Overall, the mean farming experience of the farmers was about 10.5 years. These findings imply that most of the respondents had been farming for quite a long period of time. Long farming experience is an advantage for increased farm productivity since it encourages the acquisition of skills over time ([Obinne, 1991](#)).

Benefits Accrued from FADAMA III by the Respondents

[Table 3](#) shows the benefits enjoyed by the respondents by participating in the Fadama III program. The most highly rated benefits enjoyed by the farmers were training on record keeping and the acquisition of knapsack sprayers, as these were reported by 91 percent of the respondents. During the survey, the respondents affirmed that the training they received on record keeping helped them to keep proper records of their farm activities, thus enabling them to know whether they were making profit or running at a loss. The respondents also advised that the training was provided to them free of charge. The farmers reported that the sprayers acquired through their participation in the program enabled them to irrigate their farm during the dry season and apply chemicals to the field at the right time.

Most of the farmers (91%) received fertilizer, agro-chemicals, and improved seeds from the program.

Table 2
Socioeconomic and farm characteristics of the respondents

Variable	Category	Frequency	Percentage
Gender	Male	153	76.5
	Female	47	23.5
Marital status	Single	3	1.5
	Married	176	88.0
	Widowed	20	10.0
	Divorced	1	0.5
Age (years) (Mean = 50.7 years)	21–30	5	2.5
	31–40	44	22.0
	41–50	66	33.0
	51–60	62	31.0
	>60	23	11.5
Highest educational qualification	Adult	9	4.5
	Quranic	132	66
	Primary	24	12
	Secondary	29	14.5
	Tertiary	6	3.0
Household size	1–5	46	23
	6–10	150	75
	>10	4	2
Major occupation	Farming	186	93.0
	Others	14	7.0
Farm Land Source	Inherited	115	57.5
	Purchase	9	4.5
	Leased	76	38.0
Farming experience (years) Mean = 10.49 years	1–3	20	10
	4–6	33	16.5
	7–9	19	9.5
	≥10	128	64

Source: Field survey

Table 3

Fadama III benefits accrued to the respondents

Benefit	Frequency	Percentage	Rank
Well	144	72	8
Market stall	114	57	12
Cooling shed	116	58	10
Borehole	116	58	10
Supply of fertilizer	181	90.5	3
Agro-chemicals	181	90.5	3
Improved seeds	181	90.5	3
Knapsack	182	91	1
Watering Can	177	88.5	6
Training on record keeping	182	91	1
Conflict resolution	121	60.5	9
Maintenance of road	112	56	13
Pest/disease management	145	72.5	7

Note: Multiple responses were allowed

Source: Field survey

Investigations during the survey revealed that these inputs were acquired by the farmers at a subsidized rate of 50 percent. The respondents noted that this measure enabled them to acquire inputs for their production at the right time and in turn boost their production and income generation.

About 88.5 percent of the respondents acquired watering cans from the program. The watering cans enabled the farmers to irrigate their farm during the dry season and to apply chemicals to the field. According to the respondents, they had paid for only 30 percent of the total costs of the watering can and the remaining 70 percent came from program funds.

Of the respondents, 72 percent and 58 percent had benefitted from well and borehole projects, respectively, through the Fadama III program. During interviews with the farmers, it was gathered that the wells and boreholes provided by the program assisted the farmers in supplying adequate water for dry-season vegetable farming. Other notable benefits derived from the program by the respondents were road maintenance (56%), advisory services on pest and disease management (72.5%), and conflict resolution (60.5%).

Effect of Fadama III on Respondents' Farm Income

Table 4 shows the distribution of the respondents by farm size in vegetable production and the monthly income generated before and after participating in the Fadama program. Before the advent of Fadama III, nearly three-fifths (58%) of the farmers were cultivating about 1 ha of land. Only 24 percent of the farmers used about 2–3 ha of land for dry-season vegetable production. Further analysis of the results shows that the mean farmland that was put into vegetable production by the farmers before the advent of Fadama III was 1.15 ha. However, on becoming beneficiaries of the Fadama III program, 10.5 percent of the farmers were able to cultivate more than 3 ha of land for vegetable production. Also, the average farm size cultivated by the farmers increased to 2.15 ha. The results of the *t* test showed that there was a significant difference between the farm size under cultivation for dry-season vegetables before and after the program (Table 5).

Before participating in the Fadama III program, 45 percent of the respondents earned less than NGN 5,000 per

Table 4

Distribution of respondents by farm size and income generation before and after participating in Fadama III

Variable	Category	Before Fadama III	After Fadama III
Farm Size (hectare)	≤1.0	116 (58)	56 (28.0)
	1.01–2.0	36 (18)	48 (24.0)
	2.01–3.0	48 (24)	75 (37.5)
	3.01–4.0	–	14 (7.0)
	>4.0	–	7 (3.5)
Average monthly income (NGN)	<5,000	90 (45.0)	0 (0)
	5,000–10,000	57 (28.5)	23 (11.5)
	10,001–15,000	43 (21.5)	46 (23.0)
	15,001–20,000	5 (2.5)	56 (28.0)
	>20,000	5 (2.5)	75 (37.5)

Note: Numbers in parentheses denote percentages

Source: Field survey

Table 5

Difference between income of respondents before and after Fadama III

Variable	\bar{X}	<i>t</i>	<i>p</i>
Farm size under vegetable cultivation before participating in Fadama III	1.15 ha	2.702	.003
Farm size under vegetable cultivation after participating in Fadama III	2.15 ha		
Income of respondents before participating in Fadama III	NGN 6,833.75	4.167	.041
Income of respondents after participating in Fadama III	NGN 16,137.50		

month from dry-season vegetable farming, while just 2.5 percent of the respondents earned more than NGN 20,000 monthly from their operations. However, after participation in the program, none of the farmers earned less than NGN 5,000 a month while about 37.5 percent of the farmers earned more than NGN 20,000 per month. Further analysis of the figures showed that the average monthly income earned by the farmers before and after participating in Fadama III was NGN 6,833.75 and NGN 16,137.50, respectively, (USD 1 = NGN 165) which were significantly different at the $p < .05$ level of probability (Table 5). These results show that Fadama III had positive effects on the livelihoods of the farmers.

Constraints to Vegetable Production by the Farmers

The problems faced by the farmers in dry-season vegetable production are presented in Table 6. Analysis of the Likert scale showed that the major problems faced by the farmers were inadequate credit, conflict with herds-men, land ownership problems, inadequate labor, and poor market linkage. The non-availability of credit facilities to improve production was ranked as the most important problem with 81 percent of the respondents strongly agreeing that it was a very severe constraint to their production. This problem might be due to lack of collateral by the farmers and the high interest rate charged by the financial institutions (Oruonye & Musa, 2011; Philip, Nkonya, Pender & Oni, 2009). It might also be due to the scarcity of agricultural credit institutions in rural areas, where most of these farmers are located (Adegbite, 2009; Hussein & Ohlmer, 2007; Othieno, 2010).

Table 6

Problems encountered by respondents (n = 200)

Problem	Severity of the problem					\bar{X}
	Very severe	Severe	Neutral	Mild	Very mild	
Inadequate credit	162 (81)	32 (16)	2 (1)	3 (1.5)	1 (0.5)	4.76
Conflict with herdsmen	115 (57.5)	81 (40.5)	3 (1.5)	1 (0.5)	0 (0)	4.55
Land ownership	101 (50.5)	65 (32.5)	30 (15)	1 (0.5)	3 (1.5)	4.30
Inadequate labor	92 (46)	60 (30)	7 (3.5)	33 (16.5)	8 (4)	3.98
Poor market linkage	41 (20.5)	76 (38)	15 (7.5)	49 (24.5)	19 (9.5)	3.36
Poor transportation system	31 (15.5)	34 (17)	5 (2.5)	99 (49.5)	31 (15.5)	2.68
Inadequate training	12 (6)	33 (16.5)	35 (17.5)	90 (45)	30 (15)	2.54

Note: Numbers in parentheses denote percentages

Source: Field survey

Another problem with a substantial effect on improved production by the farmers was conflict between the farmers and the Fulani herdsmen. This was pointed out by most (97.5%) of the respondents as, at least, a severe constraint to their production. According to the respondents, the conflict was a result of the availability of fresh forage/fodder and water in the areas used by the farmers in the dry season. The economic advantages that the farm lands offered over the surrounding areas in this regard often made the herdsmen lead their cattle toward the farm lands and this consequently led to destruction of the farm by the livestock. A similar finding was reported by [Baba and Wando \(1998\)](#) regarding Fadama participants in Niger State, Nigeria.

Land ownership ranked third among the major problems that confronted the farmers in dry-season vegetable production with a mean score of 4.30. This problem resulted from the inability of the farmers to secure adequate farm land for vegetable production and constrained the farmers from increasing their farm size and expanding their vegetable production.

Another major constraint to the activities of the farmers was with regard to some farm operations. This might result from the fact that majority of the farmers were old (see [Table 2](#)). Invariably, this prevented the farmers from increasing the area of land under production. Other problems confronting the farmers were poor market linkage, a poor transportation system, and inadequate training.

Conclusion

It can be deduced from this study that the Fadama III program has had a positive impact on the livelihood of dry-season vegetable farmers in the study area. However, the problems associated with dry-season vegetable farming in the study area have affected the development of the farming system despite the intervention of the program. Therefore, concrete steps have to be taken to overcome the problems identified in order to make dry-season vegetable available over a greater area and at the same time sustain farmers' livelihoods.

There is a need for credit institutions to assist the farmers financially. This will help solve the problem of inadequate credit encountered by the farmers. Also, the government and other stakeholders should adopt proper conflict resolution procedures between the pastoralists and vegetable growers to avoid future problems. In the same vein, efforts

in resolving conflict among the farmers and herdsmen by the program coordinators should be overhauled. In addition, proper measures should be put in place to assist the farmers to solve their land tenure problems. Moreover, there is need for agricultural development agencies to encourage young individuals to participate in agricultural production. This will help minimize the problem of scarcity of labor experienced by the farmers, especially given that agricultural production in Nigeria, like in other developing countries, is usually carried out with human labor, not mechanized equipment. There is also a need to provide the farmers with extension services on market linkage. This will not only assist the farmers with price increases for their produce but also help in reducing the high loss due to the perishable nature of their produce. Measures to improve the transportation system in the study area should be overhauled by the relevant agencies and may include the construction of new roads in the farming communities and the rehabilitation of the existing roads. These measures will encourage transporters to service the farming communities and consequently resolve the problem of poor transportation experienced by the farmers.

References

- Adegbite, D. A. (2009). Repayment performance of beneficiaries of Ogun state agricultural and multipurpose credit agency (OSAMCA) in Ogun state, (2004–2007). *American–Eurasian Journal of Sustainable Agriculture*, 3(1), 117–125.
- Agwu, A. E. (2004). Factors influencing the adoption of improved cowpea technology in Nigeria. *Journal of International Agriculture and Extension Education*, 11(1), 81–84.
- Akangbe, J. A., Ogunyinka, W., Ayanda, I. F., Achem, B., & Adisa, R. S. (2012). An assessment of effects of Fadama II project on livelihood of farmers in Orire local government area of Oyo state, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 8(1), 27–32.
- Avila, A. F. D., & Souza, G. S. (2002). *The importance of impact assessment studies for the Brazilian agricultural research system*. Retrieved from <http://www22.sede.embrapa.br/unidades/uc/sge/ImpactEmbrapa.pdf>.
- Babatunde, R. O., & Oyatoye, E. T. O. (2005). Food security and marketing problems in Nigeria: The case study of maize in Kwara State. In C. Hulsebusch, I. Hauser, A. Deininger, & K. Berker (Eds.), *Proceedings of tropentag* (pp. 475–484).
- Baba, K. M., & Wando, M. A. (1998). Impact of membership of Fadama user association on resource use, crop yield and farm income: A case study from two local government areas of Niger state, Nigeria. *Journal of Basic and Applied Science*, 6, 7–15.
- Echeme, I. I., & Nwachukwu, C. C. (2010). An investigation on the impact of Fadama II project implementation in Imo State. *American Journal of Scientific and Industrial Research*, 1(3), 532–538.
- Eze, C. I. (2009). The impact of the National Fadama II Development Project in alleviating rural poverty and improving agricultural production in Imo State, Nigeria. *Agro-science*, 8(3), 139–144.

- Falola, A., Ayinde, O. E., & Ojehomon, V. E. T. (2013). Economic analysis of rice production among the youths in Kwara State, Nigeria. *Albanian Journal of Agricultural Sciences (AJAS)*, 12(3), 503–510.
- First Securities Discount House (FSDH). (2014). *Nigeria economic outlook: 2013–2017* (pp. 1–14). FSDH Research. Retrieved from http://www.fsdhsecurities.com/Profiles/Current/NIGERIA_ECONOMIC_OUTLOOK_2013-2017.pdf.
- Food and Agricultural Organization (FAO). (2014). *Food insecurity indicators*. Retrieved from <http://www.fao.org/economic/ess/ess-fs/fs-data/en/#.VEulHPnF95I>.
- Hanif, R., Iqbal, Z., Iqbal, M., Hanif, S., & Rasheed, M. (2006). Use of vegetables as nutritional food: Role in human health. *Journal of Agricultural and Biological Science*, 1(1), 18–22.
- Hussein, H. K., & Ohlmer, B. O. (2007). Influence of credit constraints on technical efficiency of farm households in South Eastern Ethiopia. In *Paper presented at the International conference on African development archives*, Kalamazoo, MI.
- Idachaba, F. S. (2009). *The looming food crisis*. Lagos: Newswatch (August 3), Special Colloquium Edition.
- International Fund for Agricultural Development (IFAD). (2012). *Enabling poor rural people to overcome poverty in Nigeria*. Retrieved from <http://www.ifad.org/operations/projects/regions/pa/factsheets/ng.pdf>.
- James, B., Atcha-Ahowe, C., Godonou, I., Baimey, G., Goergen, G., Sikirou, R., et al. (2010). *Integrated pest management in vegetable production: A guide for extension workers in West Africa*. Ibadan, Nigeria: International Institute for Tropical Agriculture.
- Mazza, M., Ekumankama, O. O., & Okezie, C. A. (2015). Effect of second national Fadama development project on farmers productivity in Imo state, Nigeria. *Journal of Natural Sciences Research*, 5(3), 69–74.
- Mohammed, Y. (2002). *Farmers awareness building on integrated pest management (IPM) (Research Report)*. ICIPE/EARO Vegetable IPM Project.
- Muhammad-Lawal, A., Omotesho, O. A., & Falola, A. (2009). Technical efficiency of youth participation in agriculture: A case study of the youth-in- agriculture programme in Ondo state, south Western Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 5(1), 20–26.
- Nwachukwu, I. N., & Onyenweaku, C. E. (2007). Economic efficiency of fadama Telfairia production in Imo state, Nigeria: A translog profit function approach. *Journal of Agricultural Research and Policies*, 24, 87–93.
- Obinne, C. P. O. (1991). Adoption of improved cassava production technologies by small scale farmers in Bendel State. *Journal of Agricultural Science and Technology*, 1(1), 12–15.
- Ojo, E. O., & Adebayo, P. F. (2012). Food security in Nigeria: An overview. *European Journal of Sustainable Development*, 1(2), 199–222.
- Okunlola, A. I. (2009). Factors associated with Fadama production of vegetables by small-scale farmers in Ondo State, Nigeria. *Journal of Food, Agriculture & Environment*, 7(3–4), 551–555.
- Omotesho, O. A., Falola, A., Muhammad-Lawal, A., & Oyeyemi, A. (2012). Comparative analysis of the performances of adopters and non-adopters of Yam Minisett technology in Kwara State, Nigeria. *International Journal of Agriculture and Rural Development*, 15(3), 1335–1341.
- Oruonye, E. D., & Musa, Y. N. (2011). Challenges of small scale farmers access to micro credit (*Bada Kaka*) in Gassol LGA, Taraba State, Nigeria. *Journal of Agricultural Economics and Development*, 1(3), 62–68.
- Othieno, E. A. (2010). *Bank lending, information asymmetry, credit accessibility and performance of farmers: The case of Tororo District* (Unpublished master's thesis). Makerere University Business School, Kampala.
- Otu, J. E., Eja, E. I., Joy, E. A., & Emeka, J. O. (2011). Analysis of poverty indices in underdeveloped countries: Nigeria scenario. *Mediterranean Journal of Social Sciences*, 2(2), 175–183.
- Phillip, D., Nkonya, E., Pender, J., & Oni, O. A. (2009). Constraints to increasing agricultural productivity in Nigeria: A review. In *Nigeria strategy support program (NSSP) background paper no. NSSP 006*.
- Sahu, P. K. (2004). Analysis of vegetable production in India, China and the World. *Journal of Vegetable Crop Production*, 10(1).
- Simonyan, J. B., & Omolehin, R. A. (2012). Analysis of impact of Fadama II project on beneficiary farmers income in Kaduna state: A double difference method approach. *International Journal of Economics and Management Sciences*, 1(11), 1–8.
- Umar, A. M., Phoa, C. L. J., & Khalique, M. (2012). An investigation on the impact of Fadama II Project on the adoption and demand for advisory services in Adamawa State, Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 2(1), 62–71.
- World Bank. (2014). *Countries by population: Nigeria at a glance*. Retrieved from <http://www.worldbank.org/en/country/nigeria>.