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Comparative analysis of food security status of male and female headed farming households in Imo State, Nigeria

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ABSTRACT: This study analyzed the food security status of male and female headed farming households in Imo State, Nigeria. Specifically, the study compared the quantity of food produced and the factors influencing the food security status of the respondents. Primary data used for the study were collected from sixty-four (64) respondents in the study area. Data were analyzed using descriptive statistics, z test and logistic regression model. Results showed that the female headed households produced more food than male headed households; however, male headed households were significantly more food secured (Zcal = 2.878). Key variables that positively influenced the food security status of male headed households were age ($p<0.01$), farm size ($p<0.05$), household size ($p<0.05$), educational level ($p<0.1$), farming income and total depreciation of capital assets including farm implements ($p<0.05$). Farming experience ($p<0.05$), age ($p<0.01$) farm size ($p<0.05$), extension contacts ($p<0.01$), and membership of farmers cooperatives ($p<0.10$) were the key variables that positively influenced the food security status of female headed households. The study recommended the review of existing land policies so as to give farmers easier access to land for food production. Also, agricultural extension services should be revived and made more proactive and effectively service oriented.

Keywords: Farming, female, food insecurity, Imo State, household head, male.

INTRODUCTION

The agricultural sector in Nigeria has over time remained the hub of the economy and the sector remains the predominant economic activity in most of the zones in the country (Adebayo et al., 2016). The country also has abundant land, human and natural resources which give it an advantage in agriculture. Agricultural production in Nigeria is typically labour intensive, with more than 90 percent of the population being small scale farmers who cultivate less than two hectares and utilize unpaid labour as a major source of farm labour supply (Arikpo et al., 2009). The rich natural resources, climatic conditions, geographical landscape and rich biodiversity of flora and fauna in Nigeria have not been effectively and efficiently harnessed to be able to ensure sustainable food supply which undoubtedly has led to food insecurity entirely in the country.

Agriculture is the most important sector of the economy from the standpoint of rural employment, sufficiency in food and fibre, and export earning prior to the discovery of oil (Nchuchuwe and Adejuwon, 2012). The most dominant farming system is the rural, traditional and mostly private farming systems. It is also noticed that both the rural/traditional and private farming systems are characterized by small scale, poor subsistence and semi-subsistence farmers. Farmers cultivate small land holdings which are often in fragmented plots. Changes in physical conditions, including erratic rainfall, marginal soil fertility, and non-conducive policy environment are exerting immense pressure on the sector and diminish its capacity to cater for the rapidly growing population and cope with unexpected shock. Hence, farmers have been obliged to diversify their livelihood with secondary incomes outside the agricultural sector.

Gender has often been misunderstood as being about

the promotion of women only, but rather focuses on the relationship between men and women, their roles, access to and control over resources, division of labour and needs (Mohammed et al., 2013). Gender can be described as a socio-economic parameter that is useful in analyzing the roles, responsibilities, opportunities and constrains of both men and women along different ethnic, religion and ecological lines. The term ''gender'' can also be viewed to economic, social and cultural attributes and opportunities associated with being a male or female.

The population of Nigeria is about 200 million people (UNECA 2012). Men constitute about 50.4 percent and women 49.6 percent (NPC, 2017). Both sexes are responsible for producing the nation's food. Males and females most time clearly delineated roles in the production of food. Despite the contribution of both sexes in food production, and unlike their male counterparts, women's role in promoting agricultural productivity and food security continues to be inadequately recognized and under-valued. It is often argued that women's lower level of human and physical capital results in lower productivity or inability to respond to economic incentives. An evaluation of male-female productivity differences should ideally be based on estimates of total factors of production, in which an index of output is divided by an index of inputs, aggregated over all types of outputs and inputs, respectively.

The single most important factor affecting women's situation is the gender gap in command over property (Agarwal, 2010). All these when put together tend to affect the food security of female households' head negatively in that their food security status tend to be reduced when compared with that of males households' head.

The World Food Summit of 1996 defined food security at the individual, household, national, regional and global levels when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life (FAO, 2004). Food security includes at a minimum the ready availability of nutritionally adequate and safe foods in socially acceptable ways that is without resorting to emergency food supplies, scavenging, stealing or other coping strategies (Suresh et al., 2014).

Food security is a situation where people have access to sufficient, stable and safe food to meet their dietary needs for an active and healthy life (Kumba, 2015). According to Food and Agricultural Organization of the United Nations, the average minimum daily energy requirement is about 1800 kilocalories (7500 kj) per person (FAO, 2014). A huge proportion of the population in developing countries can hardly afford to meet this dietary requirement. This especially so among smallholder arable crop farmers even when ironically, they are the ones who produce a larger proportion (about 80%) of the food consumed in a country like Nigeria (Liverage, 2010). Food security has therefore remained a problem in different countries of the world and the case of Nigeria is not likely to be different. However, the need to increase food crop output in Nigeria to enhance the country's food security requires that the gender role in food security be examined with a view to pointing out gender characteristics that can increase food security. In view of the foregoing, this study addresses the following objectives to:

1. describe the socio-economic characteristics of smallholder farming households' heads by gender;
2. estimate the quantity of food produced by farming households according gender;
3. verify by comparism the magnitude of household's food security by gender in the area; and
4. identify determinants of household food security by gender

MATERIALS AND METHOD

The study was carried out in Imo State South-east, Nigeria. The capital of the State is Owerri which is also the largest city in the State. The State is bordered to the East by Abia State, in the West by River Niger and Delta State, to the North by Anambra State and to the South by Rivers State. The State lies between latitude 4°45^{1}N and 7°15^{1}N and longitude 6°50^{1}E and 7°25^{1}E. Imo State has an area of about 5,100 sq km. The population of the State is put at 3.93 million people comprising of 1.98 males and 1.95 females (National Population Commission, 2006).

Imo State is situated within the humid tropics ecological zone with the rain forest being the major vegetation belt. About 80 percent of the people are involved in Agriculture (Imo ADP, 2010). They produce food crops like cassava, cocoyam, yam, maize, melon, vegetables and tree crops, and livestock such as poultry, sheep, goat, and rabbits at subsistence levels. A small percentage of the population also engages in commercial agriculture.

Sampling technique

Multistage sampling techniques were used to select the respondents for the study. First, two agricultural zones were selected from the three agricultural zones in the State for the study. Second, one Local Government Area (LGA) was selected from each agricultural zone, giving a total of two LGAs for the study. Next, four communities were selected from each Local Government Area giving a total of eight communities for the study. Two villages were then randomly selected from each community giving a total of sixteen villages for the study. Lastly, proportionate sampling was used to select sixty-four (64) respondents

comprising of twenty-nine (29) female headed households and thirty-five (35) male headed households from a list of farming households in the selected communities study.

Analytical technique

Descriptive statistics were used to achieve objectives i and ii which were to describe the socioeconomic characteristics of smallholder farming household heads according to gender and to estimate the quantity of food produced by farming households by gender. Objective iii which is to verify by comparism the magnitude of household food security in the area according to gender was achieved using the food security index following Babatunde et al. (2007) similarly, the Z-test was used to compare the food security status of male and female headed households. The food security model is specified as follow:

$Zi = Y_i/R$ ……eqn. 1

Where: Zi = food security status of ith household, Yi = daily per capita calories intake of the ith household and R = Recommended daily per capita calories intake.

The model for the Z test as specified by Ibeagwa (2012) is given as:

$$\text{Z-test} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \text{……eqn. 2}$$

Where $\bar{x}_1$ = mean food security index of male headed households, $\bar{x}_2$ = mean food security index of female headed households, S^2_1 = variance of the food security index of male headed households, S^2_2 = variance of the food security index of female headed households, n_1 = number of male headed households and n_2 = number of female headed households.

Decision rule:
Reject the null hypothesis, Ho, if Zcal > Ztab.
Accept the alternate hypothesis, H_1, if otherwise.

Objective 4 which is to estimate the factors influencing food security was achieved using the Logistics regression model. The model is stated as follows:

$$P = E\left(yi = \frac{1}{x_{ij}}\right) = \frac{1}{1 + e^{-2i}} \; equation\ 1 = \frac{1}{1 + e^{-(\propto + \varepsilon_j B_j x_{ij} + e_j}} \text{…….. eqn. 3}$$

Where Z_i = the food security index as obtained in objective iii above. Households with food security index of less than 0.5 were considered food insecured while households with food security index of greater than or equal to 0.5 were considered food secured.

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12})$ ……..eqn. 4

Where: Y = probability of household being food secured as computed in objective iii, (Y_i = 1 when Zi ≥ 0.5; Y_i = 0 when Z_i< 0.5), X_1 = Age (years), X_2 = Gender (Male =1, female =0), X_3 = Level of education (years spent in school), X_4 = Farming experience (years), X_5 = Household size (number of persons), X_6= Farm size (ha), X_7= Number of extension visits, X_8 = Marital status (Dummy married 1, others =0), X_9 = Membership of social organizations (Number of farmer's cooperative societies), X_{10} = Depreciated value of household farm implements (Naira), X_{11} = Non-farm income (Naira), X_{12} = Farm income (Naira) and e= error term.

RESULTS AND DISCUSSION

Socioeconomic characteristics of the respondents

The result of the analysis of socioeconomic characteristics of the respondents is presented on Table 1. The results show that 60% of males and 51% of females were between 40 to 59 years. This result is an indication that most of the respondents were still in the active age bracket and will be able to carry out those farming activities and other economic activities that will enhance their food security. The average age was 54 years for males and 55 years for females. The mean age reinforces the premise that most of the respondents were still very active. This result agrees with the findings of Ojeleye et al. (2014) and Ahmed et al. (2015) whose works on non-farm income and food security status of small scale farming households in Nigeria reported that the farmers were still very active and productive.

The result also revealed that 62.86% of the males and 55.1% of females were married. The implication of this result is that majority of the respondents in the study area were married. Thus, even though they will have additional responsibilities to perform to their spouses and their households, the married person may also receive help from his spouse and household members on the farm and this may tend to make him/her produce more food and thereby become more food secured. This in line with the findings of Adebayo (2012) who noted that majority of the households' respondents in Oyo State were married.

Majority of the males headed households (51.43%) had household size of between 5 to 6 persons. Also, 68% females and 76% of all respondents have household sizes of between 3 to 6 persons. The average household size of both male and female headed farming households was 4 persons. This result is an indication that the respondents have moderate household sizes. It may imply that the household heads may have family labour to help on their farms. This will lead to increased output even at a reduced

Table1. Socioeconomic characteristics of farming households

Variable	Male		Female	
	Frequency	Percentage	Frequency	Percentage
Age	10	28. 57	2	6.90
30-39	9	25.71	13	44.83
40-49	12	34.29	6	20.69
50-59	3	8.57	7	24.14
60-69	1	2.86	1	3.45
70-79	35	100	29	100
Mean	16		20	
Marital status				
Single	4	11.43	1	3.45
Married	22	62.86	12	41.38
Widowed	9	25.71	16	55.17
Total	35	100	29	100
Household size				
1-2	5	14.29	7	24.14
3-4	11	31.43	11	37.93
5-6	18	51.43	9	31.03
7-8	1	2.86	1	3.45
9-10	0	-	1	3.45
Total	35	100	29	100
Mean	4		4	
Years spent in school				
0	7	20.00	4	13.79
1 - 6	15	42.86	14	48.28
7 – 12	8	22.86	6	20.69
13 – 18	5	14.29	5	17.24
Total	35	100	29	100
Mean	8		8	
Farm experience				
1-9 years	10	28. 57	2	6.90
10-19 years	9	25.71	13	44.83
21-29 years	12	34.29	6	20.69
30-39 years	3	8.57	7	24.14
40-49 years	1	2.86	1	3.45
Total	35	100	29	100
Mean	16		20	
Membership of social organizations				
Non-Members	26	74.29	24	82.76
Members	9	25.71	5	17.24
Total	35	100	29	100

Source: Field survey, 2017.

labour cost and enhance food security in the household. This finding disagrees with the report of Mohammed et al. (2013) who stated that the average household size of smallholder farmers in Kaduna state was 7 persons.

Also, majority of male household heads (66%) and female household heads (69%) spent between 1 to 12 years in school. This is an indication that the respondents are literate. High literacy level may be an advantage to

them since they will be able to adopt modern technologies, acquire useful information and access important inputs like credit which could enhance their farm output and improve their household food security status. The mean number of years spent in school for both male headed households and female household heads was found to be 8 years. This is contrary to the findings of Babatunde et al. (2007) who noted that majority of the households in Kwara state had no formal education with a percentage of about 47.9%.

The result on Table 1 also shows that majority of the male and female headed households (about 60% and 64% respectively) have farming experience of between 10 to 29 years. This is an indication that most of the respondents had been into farming for more than a decade. The wealth of experience gathered by these farmers would serve as reservoir of knowledge from which they would draw when making crucial decisions about their farming activities. An experienced farmer would be in better position to take informed decisions concerning production activities especially concerning land preparation and cultivation as well as pest and disease control on the farm such that it would lead to better output and enhanced food security for the household. This result differs from that of Ojeleye et al. (2014) who reported that the mean farming experience of farmers in Kaduna state, Nigeria was 23 years.

Majority of the household heads (about 74% of males, about 83% of females) in the area did not belong to any social or cooperative society. This implies that the farmers may not obtain benefits that membership of such organizations confers on a farmer. Such benefits as collective bargaining, economies of scale and access to grants and improved inputs from government and other developmental partners may elude these farmers. The implication of this also is that their food output and food security status may be adversely affected. This result agrees with that of Babatunde et al. (2007) who noted that majority of the respondents (93.6%) in Kwara state do not belong to any cooperative society.

Quantity of food consumed

The quantity of food consumed by farming households sampled according to gender was analyzed and presented in Table 2. The result in Table 2 shows that majority of males and females (about 77% and 83% respectively) had weekly per capita food intake of not more than 3,999,999 Kcal. The mean weekly per capita food intake for male and female headed households was 3,085,123.314 and 3,185,648.69 Kcal respectively, implying a weekly average per capita food intake of 105,280.11 and 91,018 Kcal for female and male farming households respectively. When considered in the light of the FAO (2011) recommended daily per capita food intake of 2260 Kcal (note that the FAO recommended is a per capita but these values are for the entire households and for the whole week), this result is an indication that the food output of the respondents is quite low. It may also be an indication that these farming households may be facing food security challenges. The result however indicates that females produce slightly more quantity of food than males. This result agrees with the finding of Ukeje (2004) who noted that females in rural farming communities are more involved in food production hence tend to produce more food than male headed households.

Household food security in the area

The magnitude of household food security in the area was analyzed as presented in Table 3. The food security index (the ratio of per capita household food intake to the recommended FAO (2011) food intake) was used as a proxy for food security status of the households. The indices ranged from 0-1. A bench mark of 0.5 (the mid-point) was used to classify respondents into being food secure or food insecure. The result in Table 3 indicates that the proportion of male headed households who were food insecured was slightly greater than the females. The implication of this finding is that efforts aimed at stemming food insecurity among rural farming households have not yielded the required results. It may also be a sign of declining productivity and declining food output in the study area in particular and the nation in general. This finding agrees with that of Adebayo (2012) who stated that majority of the farmers (54.3%) studied in Oyo state were food insecure.

Comparison of food security status of the male headed households and the female headed households in the Study Area

Z- test was used to compare the food security status of male and female headed farming households in the study area. The result of the Z-test (Table 4) showed that there is significant difference in the food security status of male headed households and the female headed households. Male headed households appear to have a higher level of food security than the female headed households. This seemingly contradictory result may be explained by the fact that female headed households are usually larger and thus there are more mouths to feed. This result reveals how though female produce more food; they still tend to be vulnerable to the scourge of food insecurity. This finding underscores the importance of giving females more access to productive assets and cheaper inputs so as to help boost their food output.

Determinants of household food security by gender

The results of logit regression for the determinants of food security by gender among farming households in the study

Table 2. The per capita food intake by farming households by gender.

Quantity of food consumed. (Kcal)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
0 - 1,999,999	13	37.14	18	62.07
2,000,000 - 3,999,999	14	40.00	6	20.68
4,000,000 - 5,999,999	4	11.43	2	6.90
6,000,000 - 7,999,999	4	11.43	1	3.45
>8,000,000	0	-	2	6.90
Total	35	100	29	100
Mean	3,085,123.314		3,185,648.69	

Source: Field Survey 2017.

Table 3. Magnitude of household food security in study area.

Parameters	Males		Female	
	Frequency	Percentage	Frequency	Percentage
Food insecure	18	51.43	15	51.72
Food secure	17	48.57	14	48.28
Total	35	100	29	100

Source: Field survey, 2017.

Table 4. Result of z -test comparing the food security status of male and female farming households in the study area.

Gender	Mean of food security status indices	Z-value
Male	1.258	2.878***
Female	1.117	

area is presented in Table 5. This method was adopted in line with the study of Anyanwu (2010). The results showed that for the male headed households, the estimated coefficients for the likelihood ratio chi-square was significant at ($p<0.01$) for the households with chi-square values of 19.28. The model accounted for 40% of the variation in food security status of male household heads in the study area ($R^2 = 0.4034$).

The coefficient of age of the male headed households was significant at one percent level and negatively related to the food security status indicating that the older the households head, the higher the likelihood of his household being food insecure. This implies that old age may translate into low or reduced productive activities on the farm which in turn may affect household livelihood improvement strategies and food security. This result agrees with the findings of Abdullahi et al. (2013) who reported that most of the farmers in North Western Nigeria had a negative correlation with age in respect to food security and so tend to be food insecure as the household heads gets older.

The coefficient for the number of years spent in school (educational status) of the household heads was found to be positive and significant at 10% level. This implies that the more educated the male head of the households, the more likelihood of his household being food secured. This result is in agreement with the findings of Fawehinmi and Adeniyi (2014) who worked on gender dimension of food security status of households in Oyo and who also noted that households with more formal education are more food secured compared with households having a head with none or few years of formal education.

The coefficient of household size of the male household heads was negative and at five percent significance level. This implies that as the household size of the respondents increases, the probability of the household being food insecure increases that is, larger households are more likely to be food insecure than smaller households. This may be attributed to the presence of more non-productive or large number of dependent members of the household like children and the elderly who are unproductive and yet take a big proportion of household income in terms of clothing, medical bills, food, school fees. This result agrees with that of Anyanwu (2012) who reported the same relationship between household size and poverty which is synonymous with food insecurity.

The coefficient of farm size was positive and significant at five percent level of probability. This implies that as farm

Table 5. Determinants of household food security status among farming households in the study area.

Explanatory Variables	Males		Females	
	Coefficient	Z-value	Coefficient	Z-value
Age	-0.0195***	-5.86	-0.00621***	-2.81
Educational level	0.848*	1.72	0.113	0.59
Farm Experience	0.138	1.64	0.216**	2.06
Household size	-1.127**	-2.40	0.272	0.49
Farm Size	4.669**	2.07	0.0849**	2.75
Extension Visits	-0.397	-0.34	0.0000284***	3.46
Marital status	0.499	0.48	0.985	0.56
Membership of social organizations	-1.498	-0.85	4.243*	1.73
Total depreciation	0.000121**	2.03	-0.0000162	-0.64
Farm income	0.0697*	1.97	5.20e-06	0.57
Non-farming Income	2.79e-06	0.77	-1.28e-06	-0.25
Constant	0.558	0.15	0.588	0.11
Number of Observations	35	29		
LR Chi2 (11)	19.28	19.36		
Prob > Chi2	0.0562	0.055		
Pseudo R^2	0.4034	0.4852		
Log likelihood	-14.259656	-10.268087		

Source: Field Survey, 2017. Asterisk*** =significant at 1%, **=significant at 5%, * significant at 10%.

size increases, the probability of the household being food secure also increases. This may be attributed to the larger output that cultivating a larger area of land portends. This result agrees and is consistent with that of Adebayo (2012) who in his work on farmers in Osun State reported that farm size had a positive effect on household food security.

The coefficient of depreciation of capita assets including farm implements was positive and significant at 5% level of significance. This implies that households who own productive and improved assets are more likely to be food secured than those households without access to modern and improved assets. It also means that these assets could be pledged as collateral and used to access loans which could in turn be invested into productive activities on the farm. This result is in agreement with the findings of Fawehinmi and Adeniyi (2014) who worked on gender dimensions of food security status of households in Oyo State and found that asset ownership had a positive effect on household food security.

The coefficient of farm income was positive and was significant at 10%. This implies that the higher the farm income, the higher the probability of the household being more food secured. This also implies that households that engage in large scale productive farming stand higher chance of being food secured than households which do not. This may be as a result of bountiful farming output by households which they feed and make extra income for their use too.

The result also shows that for the female headed households, the estimated coefficients for the likelihood ratio chi-square was significant at ($p<0.01$) for the households with chi-square values of 19.36. The model accounted R^2 (0.4852) for 49% of the variation in food security status of female household heads in the study area.

The coefficient of age of the head of household was negative and significant at 1% level of significance. This implies that the probability of the female headed household being food secure decreases with increase in age. The large number of aging females involved in agricultural production make this finding a poignant pointer to the fact that there is a grave impending food security crises looming if proactive steps are not taken to forestall it. This result agrees with the findings of Babatunde et al. (2007) who reported that age had a negative significant relationship on the food security status of farming households in Kwara State.

The coefficient of farming experience was positive and significant at 5% level of significance. The implication of this finding is that the probability of the household being food secured increases with increase in years of farming experience of the household head. This may be attributed to the farmers relying on his experience and skills gathered over time to improve on her productive activities on the farm.

The coefficient of farm size was positive and significant at five percent level of significance. This implies that the larger the farm size, the higher the probability of the household being food secured. This may be attributed to higher yield as a result of bringing more land under cultivation. This result is in agreement with the findings of Ojeleye et al. (2014) who reported significant positive relationship between farm size and food security of farmers in Kaduna State.

The coefficient of extension visits was significant and had a positive effect on household food security. This implies that increase in the number of extension visits will also increase the likelihood of the household being food secure. This could be as a result of the improved breeds and technologies brought by extension agents during their visits. This result underscores the importance of a proactive, responsive and need oriented extension service in the fight to ensure food security in the nation. This finding is in agreement with that of Bala (2016) who reported that extension visits increased the likelihood of the women ginger farmers in Kaduna State to become food secured.

The coefficient of membership of farmer cooperatives was positive and significant at 10% level of probability. This implies that the probability of the household being food secured increases with the membership of farmer cooperatives. This may be due to the advantages confers on members which include easier and cheaper access to inputs, credit and grants from government and other stakeholders as well as economies of scale in procuring inputs and sale of output. This result agrees with that of Fawehinmi and Adeniyi (2014) who in his work on gender dimension and food security status of households in Oyo State reported that membership of cooperative societies increased the chances of being food secured.

Conclusion and recommendation

The study analyzed and compared the food security status of male and female farming households in Imo State, Nigeria. The study revealed that though female headed households produced more food, the male headed households were more food secured. Also, the per capita food output of farming households in the area is low and may be an indication that the households face food security challenges. Level of education, farm size, income and total depreciation of assets are key variables that influenced positively the probability of male headed households being food secured. Farming experience, farm size, extension contacts and membership of social organizations are key variables that influence positively the probability of food security among female headed households. Based on these findings the study recommends the following:

1. Efforts should be made by stakeholders to bring more land into food production so as to make farmers have to land for food production. The reclamation of degraded and marginal lands could be a boost to food production.
2. Good educational facilities should be provided by government and other stakeholders in the rural areas to give farming families access to quality and affordable education. This will boost literacy and enhance agricultural productivity.
3. The extension services should be revived and made more proactive and service oriented. There is need for increase in the number of trained extension agents to make the service more effective.
4. Farmers should be encouraged to form farmer cooperative societies and thrift and credit societies. The members of these organizations should also be trained so as to make them more effective.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

REFERENCES

Abdullahi, M., Hassan, A. H., & Ayanlere, A. F. (2015). Determinants of Food Security Status Among Rural Farm Households in North-western Nigeria. *Journal on Investment and Development,* 2(1),41-53.

Adebayo, O. O. (2012). Effects of family size on household food security in Osun State, Nigeria. *Asian Journal of Agriculture and Rural Development*, 2(2) 136-141.

Adebayo, O., Olagunju, K., & Ogundipe, A. (2016). Impact of agricultural innovation on improved livelihood and productivity outcomes among smallholder farmers in Rural Nigeria. *Available at SSRN 2847537*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2847537.

Agarwal, B. (2010). A field of one's own. Gender and land rights in South Asia Cambridge: Cambridge University Press.

Ahmed, F. F., Eugene, C. E. & Abah, P. O. (2015). Analysis of food security among farming households in Borno State, Nigeria. *Journal of Agricultural Economics, Environment and Social Sciences,* 1(1), 130-141.

Anyanwu, J. C. (2010). Poverty in Nigeria: A gendered analysis. *African Statistical Journal*, 11(11), 38-61.

Arikpo, J. D., Adinya, I. B., Anga, O. A. O., Agbogo, A. E., Ahong, E. A., Nyienakuna, M. G., Eze, A. N., Anyanorah, N. C., & Ogar, E. N. (2009). Econometric analysis of variables affecting platation mono-cropping system in central Cross Rivers state, Nigeria. *Journal of Agriculture Forestry and Social Science,* 7(2), 75-87.

Babatunde, R. O., Omotesho, O. A., & Sholotan, O. S. (2007). Factors influencing food security status of rural farming households in North Central Nigeria. *Agricultural Journal*, 2(3), 351-357.

Babu, S., Gajanan, S. N., & Sanyal, P. (2014). *Food security, poverty and nutrition policy analysis: statistical methods and applications*. Academic Press.

Bala, F. K. (2016). Analysis of women ginger production as a means for achieving farm household food security in Kaduna State, Nigeria. A dissertation submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, in partial fulfilment of the requirements for the award of Master of Science Degree in Agricultural Economics.

Fawehinmi, O. A., & Adeniyi, O. R. (2014). Gender dimensions of food security status of households in Oyo, State. *Nigeria Global Journal of Human-Social Science: H Interdisciplinary*, 14(1), 7p.

Food and Agricultural Organization (FAO) (1996). The state of food insecurity in the world. Food and Agricultural Organization, Rome.

Food and Agricultural Organization (FAO) (2004). Food insecurity and vulnerability in Nepal: Profiles of seven vulnerable groups. ESA Working paper Rome, p. 22.

Food and Agricultural Organization (FAO) (2011). Calorie supply per capita, crop equivalent.

Food and Agricultural Organization (FAO) (2014). Committee on world food insecurity in the world. Food and Agricultural Organization, Rome.

Ibeagwa, O.B. (2012). Effect of the Second National Fadama Project on the income and welfare of farming households in Imo State, Nigeria. A MSc. Project, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Nigeria

Imo Agricultural Development Programme (Imo ADP) (2010). Annual bulletin.

Liversage, H. (2010). Responding to 'land grabbing'and promoting responsible investment in agriculture. *IFAD Occasional Paper 2*.

Kumba, J. K. (2015). The Role of household characteristics in determining food security in Kisii Central Sub-county, Kenya. *Research on Humanities and Social Sciences*, 5(7), 186-193.

Mohammed, A. B., Ayanlere, A. F., Omotesho, A. O., & Lawal, A. M. (2013). Optimal farm plan and food security situation among agropastoralist households in Giwa area of Kaduna state, Nigeria. *Journal of Agricultural and Biological Science*, 8(5), 431-436.

National Population Commission (NPC) (2006). National population census report. Abuja. Retrieved from www.npc.gov.ng.

National Population Commission (NPC) (2017). Country report, National Population Commission Abua. Retrieved from www.npc.gov.ng.

Nchuchuwe, F. F., & Adejuwon, K. D. (2012). The challenges of agriculture and rural development in Africa: The case of Nigeria. *International Journal of Academic Research in Progressive Education and Development,* 1(3), 45-61.

Ojeleye, O. A, Saleh, M. K., & Oyewole, S. O. (2014). Non-farm income and food security status of small scale farming households in Kaduna state, Nigeria. *Research Journal of Agriculture and Forestry Sciences*, 2(12), 1-7.

Ukeje, E, (2004). Modernising small holder agriculture to ensure food security and gender empowerment Issues and policy. Retrieved August, 2008 from https://agris.fao.org/agris-search/search.do?recordID=GB2013201098.