ANALYSIS OF FOOD SECURITY STATUS OF SMALLHOLDER FARM HOUSEHOLDSIN ORU EAST LGA OF IMO STATE, NIGERIA.

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ABSTRACT
This study analysed food security status of smallholder farming households in Oru East Local Government Area of Imo state, Nigeria. Semi-structured questionnaire was used to collect primary data from 80 smallholder farm households selected through multi-stage sampling procedure. The data were analyzed using descriptive statistics, food security indices and a probit regression model. The result shows that the mean age of 44 years, with 33.75% and 36.5% of them having access to credit and extension services respectively. The mean farm size, household size, annual farm income and annual non-farm income of the households were 0.72 hectares, 7 persons, ₦196,200.00 and ₦114,070.01 respectively. A food security line with food insecurity incidence of 57% and food insecurity gap of 0.3910.Allowing children to eat first and eating less expensive food and limited proportionof meal size were the major coping strategies adopted against food insecurity. The probit regression model showed that 5.0% alpha level of probability age, extension access and membership of association and at 10.0% alpha level of probability farm income, credit access and non-farm income of household head were respectively significant and are major determinants of food security status. Improving wage earning capacity and exploring income diversification opportunities by smallholder farm households are crucial in enhancing households' food security status. Farm households should intensify combination of enterprises and off-farm activities that could generate more income for the households and also help to improve their asset base.
Keywords: Farm off-households, Food security, smallholder

INTRODUCTION
Food is the basic need and necessity of life that must be satisfied before any other developmental issue. Inadequate nutrition is considered as measure of poverty in many societies or synonymous to poverty (Datt *et al*., 2000). Achievement of food security for all remains a huge challenge for several developing countries including Nigeria. Out of the estimated 1 billion under nourished people in the world about 200 million reside in sub-Saharan Africa FAO (2017) reported that more than 7.1 million people are facing extreme food insecurity and in need of urgent lifesaving and livelihood protection.

Food security and insecurity are terms used to describe whether or not households have access to sufficient quality and quantity of food. The terms emerged following the 1974 world food conference and shift in food policy debate from food supply to food demand and the emergence of new emphasis on food entitlement, sustainability, vulnerability, risk and access (Maxwell and Slater, 2003).Food security is defined as a situation that exists 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 a healthy and active life (FAO, 1996). Food insecurity is the inability of a household or individuals to meet the required consumption levels in the face of fluctuating production, price and income.

Ironically, farm households especially the smallholder farm households are the most affected in terms of food insecurity and poverty in Africa even though the rest of the population depends on their production for food. Attainment of food security is therefore a core problem confronting most smallholder farm households in Nigeria. According to Cruz (2010) and Valdés *et al*. (2010), majority (more than 70 per cent) of the smallholder farmers in the world are food insecure and depend on marginal land as their primary source of livelihood.

Food insecurity reduction especially among vulnerable farm households such as smallholder farm households remains a fundamental challenge in Nigeria and despite FAO (2004) enlisting Nigeria among countries faced with serious food insecurity problems, the vision of the country to make its household units to have physical and economical access to food on a continuous basis still remains a mirage especially among farm households (Otunaiye and Ibidunni, 2014). The household food insecurity situation in Nigeria appears to be worsening. The percentage of food insecure households was reported to be 18% in 1986 and over 40% in 2008 (Enete and Achike, 2008). Based on the foregoing this study seeks to: i) describe socio-economic characteristics of smallholder farm households in the study area; ii) assess food security status of smallholder farm households in the study area; (iii) identify coping strategies adapted by smallholder farm households in the study area against food insecurity; and (iv) determine factors influencing food security status of smallholder farm households in the study area.

METHODOLOGY
This study was carried out in Oru East Local Government Area (LGA) of Imo State, Nigeria. The LGA has an area of 136km^2 and a population of 111,822 persons (NPC, 2006). It is bounded to the West by Oru West LGA, to the East and South-east

by Njaba and Mbaitolu LGAs respectively, to the North by Orsu LGA and to the South by Oguta LGA. It lies approximately within latitudes 06^0 45′ and 07^0 15′ North of the Equator and longitudes 06^0 50′ and 07^0 25′ East of the Greenwich meridian. The LGA is made up of six communities namely Akatta, Akuma, Amagu, Amiri, Awo Omamma and Omuma.

The population for the study comprised of all smallholder farm households in the study area. Multi-stage random sampling technique was used in selection of study sample. In the first stage, four autonomous communities (namely: Etiti Omuma,Amiri, Amagu and Akatta.) were randomly selected from the six autonomous communities in Oru EastLGA. In the second stage two villages were randomly selected from each of the selected four autonomous communities to give eight villages involved in the study. The list of smallholder farm households in each village was collected with the help of extension agents. This list served as the sampling frame from which the respondents were randomly selected from for the study. Ten small holder farm households were selected randomly from each chosen village and this gave a sample of eighty smallholder farm households involved in the study.

Primary data were collected from respondents through the use of semi-structured questionnaire administered through interview method by the enumerators. The enumerators asked the questions from the questionnaire. The survey was conducted for four months (July to October, 2017) and data were generated on socio economic characteristics of farm households, coping strategies against food insecurity and value of monthly food expenditure and consumption.

Descriptive statistics such as frequencies, percentages and means were used to analyse objectives (i) and (iii). Objective (ii) was achieved using food security index. Objective (iv) was analysed with a probit regression model.

Food security statuswas estimated as the two-thirds of the mean per capita monthly food expenditure of all farm households. The farm households were classified into either food secure or food insecure households based on the food security line. A food insecure household is that whose per capita monthly food expenditure falls below two-thirds of the mean monthly per capita food expenditure while a food secure household is that whose per capita monthly food expenditure is above or is equal to two-thirds of the mean per capita food expenditure (Sulaiman *et al.*, 2015).

The food security index security index which was used to profile the food security status of the farm households was derived from Foster, Greer and Thorbecke (FGT) weighted poverty measure and had been applied to several studies whose main focus was food security (Sulaiman *et al.*, 2015). Otunaiya, and Ibidunni, 2014, and Ojeleye, *et al*(2014)The FGT weighted poverty measure was adopted as used in Sulaiman, *et al.*, (2015). The FGT index is expressed mathematically as:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}\frac{z - Yi}{z}\alpha \geq 0 \ldots \quad (1)$$

Where:

Yi = Per capita household food expenditure (i = 1, 2 .....q);

z = Food security line;

N = Total number of farm households;

q = Number of food insecure farm households;

Pα = Weighted food security index, α ≥0 and it can take values of 0, 1 and 2. When = 0, the FGT index P_0 measures food insecurity incidence. This represents proportion of the farm households that are food insecure i.e. the proportion of farm households that fall below the food security threshold (line). When = 1, the FGT index P_1 measures food insecurity depth of the farm households. This denotes the proportion of food security line that the food insecure farm household require to get out of food insecurity. When = 2, the FGT index P_2 measures the severity of food insecurity status. It measures how far away the food insecure households are from the food security line.

The probit regression model was used to analyse determinants of household food security status (objective iii). The probit regression model is considered appropriate when dependent variable (Y) takes one of only two possible values representing presence or absence; in this investigation, a household was either food secured or food unsecured. The model as used by Gujarati (2003) was thus adopted;

Pi [y=1] = [Fzi] … (2)

Where

$Zi = \beta 0 + \beta_1 X_1 + e$

$Y_i = \beta_1 + \beta_2 X_{2i} + \ldots\ldots\ldots + \beta_k X_{ki} + \mu$

Yi* is unobserved but Yi = 0 if $y_i^* < 0$,1 if $Y_i^* \geq 0$

P (Yi = 1) = P (Yi* ≥0)

P (μ i ≥ $-\beta_1 + \beta_2 X_{2i}$ ……. $-B_k X_{kL}$…(4)

Where i = 1, ……80

Where Y_i = Food security status of smallholder farm households (food secure = 1, food insecure = 0)

β_1-β_{kl} = coefficients value of factors

X_1 = Age of house$X_{1=}$ Age of household head (years)

X_2= Frequency of Extension contact (number of contact)

X_3 = Credit access (1 if yes; 0 if otherwise)

X_4= Level of education (years)

X_5= Farm income from crops and livestock (Naira)

X_6= Farm size (Hect

(1 if member; 0 if otherwise)

X_{10} = Non-farm income (Naira)

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Smallholder Farm Households

Table 1 shows distribution of the smallholder farm households according to socio-economic characteristics. The table shows that mean age of the heads of the farm households was 47 years. This indicates that the heads of smallholder farm households were still active adults capable of withstanding the physical labour and stress associated with farming. This finding is in conformity with Henri-Ukoha *et al.* (2011) who observed that farmers in South-East Nigeria mostly fell within the active age range of 30-50 years with the average age being 44 years. The smallholder farm households had mean farm size of 0.72 hectares. This indicates the small scale nature of farming households in the study area. Farm size is positively associated with the amount of crops grown (Musinguzi, 2000), larger farm sizes boosts agricultural productivity thereby enhancing food security. Table 1 also shows that the smallholder farm households had mean household size of 7 persons. This is good because household members help in works in the farm enterprise, which reduces cost of hired labour and increases farm productivity. according to Sikwela (2008) household size has a serious implication on food security and large households have higher propensity of being food insecure. The smallholder farm households had mean annual farm income and non-farm income of 196,200.00 and 114,070.01 respectively. The incomes households earn have serious implications on their adoption of innovations, welfare and food security status. With respect to credit access and extension access, the table shows that 66.25% and 63.75% of the farm households had no access to credit and extension services respectively. According to Ijioma and Osondu (2015) credit facilitates adoption of agricultural innovations and investment opportunities, leading to increased farm productivity, income and food security level. Without access to credit food insecure farm households may not be able to increase scale of production, boost farm income and reduce food insecurity. Also, Ahmed *et al.* (2015) posits that access to extension service is important in the adoption of modern farm practices that ultimately influences the level of farm output and income earning capacity of households, hence improved food security status.

Table 1: Distribution of the smallholder farm households according to socio-economic characteristics

Variables	**Mean**
Age (years)	44.43
Farm size (Hectares)	0.72
Household size (number of persons)	7.00
Annual farm income (Naira)	196,200.00
Annual non-farm income (Naira)	114,070.01
Credit access	**Percentage**
Yes	33.75
No	66.25
Extension access	**Percentage**
Yes	36.25
No	63.75

Source: Field survey, 2017

Food Security Status of the Smallholder Farm Households

Table 2 shows the food security profile of the smallholder farm households. The table results indicate that the mean household income (farm and off-farm) of the smallholder farm households is ₦25, 855.83 per month.

Thefood security line and food insecurity incidence of the farm households were ₦10407.01 and 0.5672 respectively, implying that 56.72% of the smallholder farm households were food insecure because their household food expenditure fell short of the food security line, or depth respectively. The food insecurity or depth of 0.3910 implies that the food insecure smallholder farm households have household food expenditure shortfall of 39.10% of the food security line, while the value of food insecurity severity of 0.2722 implies that there was 27.22% inequality among the food insecure smallholder farm households in the study area.

Table 2: Food security Profile of the Smallholder Farm Households

Food security indices	Smallholder Farm Households
Mean monthly household farm income	16,350.00
Mean monthly household off-farm income	9505.83
Mean monthly household food expenditure	15317.34
mean monthly household food expenditure	15610.51
Food security line	10407.01
P_0 (Incidence of food insecurity)	0.5672
P_1 (Gap or depth of food insecurity)	0.3910
P_2 (Severity of food insecurity)	0.2722

Source: Field survey, 2017

Coping Strategies adapted by Smallholder Farm Households against Food Insecurity

Table 3 shows the coping strategies of the smallholder farm households against food insecurity. The table indicates that 56.25% of the smallholder farm households often allowed children to eat first. Meanwhile, 52.50%, 50.00% and 47.50% of them respectively ate less expensive food, limited proportion of meal size and skipped meal times as coping strategies against food insecurity. Eating of wild fruits was the least coping strategy adapted by 10.00% of the smallholder farm households against food insecurity. According to United Nations (2002) food insecure households adapt a variety of coping mechanisms against food insecurity.

Table 3: Distribution of the Smallholder Farm Households based on Coping Strategies against Food Insecurity

Coping strategy	*Frequency	Percentage
Allowing children to eat first	45	56.25
Eating less expensive food	42	52.50
Limiting proportion of meal Size	40	50.00
Using savings to buy food	34	42.50
Diversifying income source	34	42.50
Working in exchange for food	18	22.50
Skipping meal times	38	47.50
Consuming seed stored for next season	11	13.75
Sending household members to eat elsewhere	19	23.75
Buying food on credit	24	30.00
Taking home leftover food at social function	10	12.50
Selling of assets	26	32.50
Eating wild fruits	8	10.00

Source: Field survey, 2017;
*Multiple responses recorded

Factors affecting Food Security Status of Smallholder Farm Households

The estimates of the probit regression model which was used to determine the factors that influenced food security status of smallholder farm households in Oru East LGA of Imo State, Nigeria is presented in Table 4. The model posted a log likelihood value of -111.2801, Mcfadden R^2 value of 0.6742 and a goodness of fit LR statistic value of 46.6675 which was statistically significant at 1.0% alpha level.

This finding agrees with *a priori* expectation and is expected because increased farm income means increased access to food. This result is in line with the findings of Arene and Anyaeji (2010) and Abu and Soom (2016) which revealed positive and significant relationship between household income and food security. However, the result contradicts findings by Ojeleye *et al*. (2014) that farm income had a significant negative effect on household food security status

This finding is in line with *a priori* expectation. Access to extension services tends to enhance the chances of a household having access to better crop production techniques, improved inputs, as well as other production incentives that positively affect farm production and thus household food security (Sulaiman *et al.*, 2015). This finding compares favourably with result obtained by Ahmed *et al.* (2015) among farm households in Borno State, Nigeria.

The coefficient (0.2315) of credit access was positive and significant at 10.0% alpha level, implying that the probability of the smallholder farm households being food secure increases with increase in credit access. This finding is in line with *a priori* expectation. Credit is an important means of investment and household heads who have access to

credit can adopt improved technologies and invest in preferred businesses earning more income which results to increased financial capacity and purchasing power of their households, thus increasing their probability of being food secured. This finding is also consistent with the finding of Osei *et al.* (2013) and Ahmed *et al.* (2015) in Ghana and Nigeria respectively.

Farm income had a positive coefficient (0.0086) that was significant at 10.0% alpha level, implying that the probability of the smallholder farm households being food secure increases with rising farm income. This finding is in agreement with *a priori* expectation and is expected because increased farm income means increased access to food. This result is in line with the findings of Arene and Anyaeji (2010) and Abu and Soom (2016) which revealed positive and significant relationship between household income and food security. However, the result contradicts findings by Ojeleye *et al.* (2014) that farm income had a significant negative effect on household food security status.

Membership of farmers association had a positive coefficient (0.1045) and was significant at 5.0% alpha level. The positive sign of the coefficient suggests that membership to farmers' association increased smallholder farm households' probability of being food secured. This result agrees with *a priori* expectation. According to Babatunde *et al.* (2007) access to cooperative loans by a farmer depends on membership to the such accessed credit are expected to increase household's income, food production and food consumption. This result is consistent with findings of Babatunde *et al.* (2007); Arene and Anyaeji (2010); Kuwornu *et al.* (2012); and Ahmed *et al.* (2015) which revealed positive and significant relationship between membership to association and households' food security status.

Non-farm income had a positive coefficient (0.7979) and was significant at 10.0% alpha level. This implies that the variable exerted a direct effect on food security status of the male smallholder farm households. This result agrees with *a priori* expectation. According to Osei *et al.* (2013) off-farm income enables farmers to modernize their production by giving them opportunity to reduce the risks of food shortage during periods of unexpected crop failures. Income from these off-farm activities can also be invested in agriculture to increase production and food availability at the household level. Also, household heads with higher non-farm income are better disposed economically to buy food (Ojeleye *et al.,* 2014). This result compares favourably with finding of Ojeleye *et al.* (2014) that non-farm income positively influenced farm household's food security status.

Table 4: Binary Probit Regression Estimates of Factors affecting Food Security inSmallholder Farm Households

Variables	Estimated coefficients	Standard errors	Z-statistic	Prob.
Constant	12.1453**	5.8368	2.0808	0.0375
Age	-0.1798**	0.0710	-2.5337	0.0113
Extension access	0.3753**	0.1861	2.0168	0.0437
Credit access	0.2315*	0.1279	1.8103	0.0610
Level of education	0.3388	0.2318	1.4614	0.1439
Farm income	0.0086*	0.0047	1.8112	0.0701
Farm size	0.2789	0.3015	0.9251	0.3549
Household size	-0.0355	0.1490	-0.2381	0.8118
Household asset endowment	-0.0956	0.0685	-1.3952	0.1630
Membership of farmers association	0.1045**	0.0429	2.4334	0.0212
Non-farm income	0.7979*	0.4248	1.8785	0.0603
Log likelihood	-111.2801			
LR statistic	46.6675			
Prob (LR statistic)	0.0000			
McFadden R^2	0.6742			

Source: Field Survey, 2017.

***, **, * Significant at 1.0%, 5.0% and 10.0% alpha levels respectively.

CONCLUSION AND RECOMMENDATION

It is evident that food insecurity is prevalent among small holder farming households in the area. Factors such as age, credit access, extension access, farm income, membership of association and non-farm income of household heads were the major determinants of food insecurity among smallholder farm households in the study area.

Based on results of the study the following recommendations suffice:

The poverty alleviation programme of the state government should focus on how to boost non-farm income of smallholder farm households by training the household heads on off-farm businesses such as carpentry, tailoring, bricklaying, hairdressing and petty trading so as to boost income and subsequently enhance food security.

Both the State and Local Government should give production credits to farming households in the LGA at minimum interest rate.

Improving wage earning capacity and exploring income diversification opportunities by smallholder farm households are crucial in enhancing households' food security status. Farm households should intensify combination of enterprises and off-farm activities that could generate more income for the households and also help to improve their asset base.

REFERENCES

Abu, G. A. and Soom, A (2016). Analysis of Factors affecting Food Security in Rural and Urban Farming Households of Benue State, Nigeria. *International Journal of Food and Agricultural Economics*, 4 (1): 55-68

Agboola, P.O (2004). Economic Analysis of Household food Insecurity and Coping Strategies in Osun state, Nigeria. Unpublished PhD thesis, Department of Agricultural Economics, University of Ibadan, Oyo State, Nigeria.

Ahmed F. F., Eugene, C. E. and 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.

Arene, C. J. and Anyaeji, J. (2010). Determinants of Food Security among Households in Nsukka Metropolis of Enugu State, Nigeria. Pakistan Journal of Social Sciences, 30(1): 9-16.

Babatunde, R.O., Omotesho, O.A. and Sholotan, O.S. (2007). Factors influencing food security of Rural Farming Households in North Central Nigeria. Agricultural Journal,2 (3): 351-357.

Cruz, L. (2010). Responsible Governance of Land Tenure. An Essential Factor for the Realization of the Right to Food. Land Tenure Working Group Discussion Paper 15, FAO. Rome.

Datt, G., K. Simler, S. Mukherjee, and Dava, G. (2000). Determinants of Poverty in Mozambique 199697 (FCND Discussion Paper. No.78). International Food Policy Research Institute: Washington, DC.

Enete,A.A., and Achike, A.I. (2008). Urban agriculture and urban food insecurity/poverty in Nigeria. The case of south-east Nigeria. Outlook on agriculture, 37 (2): 131-134.

Food and Agricultural Organization (FAO), (1996). Report of the World Food Summit. Rome, Italy.

Food and Agricultural Organization (FAO), (2009). The state of food insecurity in the World. Food and Agriculture Organization, Rome.

Food and Agricultural Organization (FAO), (2017). Food security and nutrition situation in Sahel and West Africa. Retrieved from https://reliefweb.int/report/nigeria/food-security-and-nutrition-situation-sahel-and-west-africa-current-march-may-2017. Accessed on 14th June 2017.

Food and Agricultural Organization (FAO).(2004): The State of food insecurity in the world: monitoring progress toward the world food submit and millennium Development Goals and Agricultural Organization of the United Nation (FAO), Rome.

Gujarati, D.N. (2003). Basic Econometrics. Tata McGraw-Hill Edition, New York.

Henri-Ukoha, A., Orebiyi, J. S., Ohajianya, D.O. and Ibekwe, U. C. (2011). The Level of Food Security/Insecurity by Gender in Selected Land Tenure Systems among Cassava-Based Farmers in Abia State, South East Nigeria: A Comparative Analysis. International Journal of Agricultural and Food Science, 1(4): 66-74

Ijioma, J. C. and Osondu, C. K. (2015).Agricultural Credit Sources and Determinants of Credit Acquisition by Farmers in Idemili Local Government Area of Anambra State. Journal of Agricultural Science and Technology B, 5 (1): 34-43.

Kuwornu, J. K.M., Suleyman, D. M. and Amegashie, D. P.K. (2012). Analysis of Food Security Status of Farming Households in the Forest Belt of the Central Region of Ghana. Russian Journal of Agricultural and Socio-Economic Sciences, 1(13): 26-42.

Maharjan, K.L. and Chhetri, A.K. (2006). Household Food Security in Rural Areas of Nepal: Relationship between socio-economic characteristics and food security status. Paper Presented at the International Association of Agricultural Economists' Conference, Gold Coast, Australia, August 12-26.

Maxwell, S. and Slater, R. (2003): Food Policy: Old and New Development. Policy Review, 21(5–6): 531–53.

Musinguzi, J (2000). Factors affecting Dairy Production in Ugganda: A case study of Mbarara Milk Shield, M.Sc Thesis, Department of AEC, Makerere University.

National Population Commission (NPC), (2006). The population census of the Federal Republic of Nigeria analytical report at the National Population Commission. Abuja.

Ojeleye O.A., Saleh M.K. and Oyewole S.O. (2014). Non-Farm Income and Food Security Status of Small Scale Farming Households in Nigeria. Research Journal of Agriculture and Forestry Sciences, 2(12): 1-7.

Olabisi, A. F. and Olawamiwa, R. A. (2014). Gender Dimensions of Food Security Status of Households in Oyo State, Nigeria. Global Journal of Human-Social Science, 14 (1): 6-16.

Osei M. J., Aidoo, R. and Tuffour, T. (2013). Determinants of Household Food Security in the Sekyere-Afram Plains District of Ghana. Global Advanced Research Journal of Agricultural Science, 2(1): 34-40.

Otunaiya, A. O. and Ibidunni, O. S. (2014).Determinants of Food Security among Rural Farming Households in Ogun State, Nigeria.Journal of Sustainable Development in Africa, 16 (6): 33-43.

Sikwela MM (2008). Determinants of Household Food security in the semi-arid areas of Zimbabwe: A case study of irrigation and non-irrigation farmers in Lupane and Hwange Districts. Thesis for the degree of Master of Science in Agriculture. Department of Agricultural Economics and Extension.University of Fort Hare, Republic of South Africa.

Sulaiman A. Y., Olubunmi, L. B. and Olanike E. F. (2015). Effect of Urban Household Farming on Food Security Status in Ibadan Metropolis, Oyo State, Nigeria. Journal of Agricultural Sciences, 60 (1): 61-75.

United Nations Integrated Regional Information Network (2002): Food crises Aggravates spread of HIV.

Valdés, A. Foster, W., Anríquez, G., Azzarri, C., Covarrubias, K., Davis, B., DiGiuseppe, S., Essam, T., Hertz, T, Paula de la, A., O, Quiñones, E., Stamoulis, K., Winters, P., Zezza, A., (2010). A Profile of the Rural Poor.A Background Paper for IFAD Rural Poverty Report. IFAD. Rome. http://www.ifad.org/rural/rpr2010/background/2.pdf. Assessed 10th November, 2017.