Lapai Journal of Economics; Volume 4, No.1; 2020
Print ISSN: 2659-028X
Online ISSN: 2659-0271
Published by Department of Economics, IBB University Lapai, Niger State, Nigeria

Measuring Household Food Security based on Expenditure Surveys: Empirical Evidence from Gombe State, Nigeria.

Abubakar Muhammad Saidu[1] & Haruna Usman Modibbo[1]

[1]*Department of Economics, Faculty of Arts & Social Sciences, Gombe State University*

Correspondence Email: abuyasmeen2009@gmail.com

Abstract
Food security is one of the targets of the Millennium Development Goals (MDGs) and it is widely considered a useful measure for evaluating the progress of a country in terms of wellbeing. Despite various concern by governments all over the world on ensuring that every household can at least provide three square meals per day, food insecurity continues to be a major development problem across the globe, undermining people's health, productivity, and often their very survival. Worldwide, approximately 840 million people are undernourished or chronically food insecure, and as many as 2.8 million children and 300,000 women die needlessly every year because of malnutrition in developing countries. Evidence suggests that Nigerians food production is increasing at less than 2.0% while population growth rate is estimated to be 2.5% per annum. The suggested theoretical disparity indicates that low rate of food production and high rate of population growth will generate high rate of food demand, thereby causing food Demand-Supply gap which can give rise to food insecurity. Thus, the study analysed household food security in Gombe State Nigeria using household expenditure and consumption surveys containing objective (quantitative) data. A total of 400 households were selected using multi-stage sampling and simple descriptive statistics and multivariate regression (probit model) were used. The study revealed that on average, less than 50 percent of the households could afford to consume the minimum dietary requirement of2400kcal. Furthermore, the findings also showed that at least 27 percent of the household live below one Dollar (1$), 54 percent are fairly living on a dollar while only 19 percent live above one dollar. A number of factors such as assets, income, and occupation level of education indicators are correlated with perceptions of greater food adequacy.

Keywords: Food Security, Households, Expenditure, Consumption, Productivity
JEL Classification: Q18, H31, D12, C31

1. Introduction

Nigeria is one of the largest economies in Africa, but it is also a fragile economy confronted by internal conflicts, threatened by climate change, and thus experiencing serious food insecurity with a large population at risk of famine and hunger (Julie & Emmy, 2019). Food security is one of the targets of the Millennium Development Goals and is widely considered a useful measure for evaluating the progress of a country in terms of wellbeing

(Vasco, 2007). Despite, various concern by governments all over the world on ensuring that every household can at least provide three square meals for their family, food insecurity continues to be a major developmental problem across the globe, undermining people's health, productivity, and often their very survival (Smith & Subandoro, 2007). Global hunger is severe, as nearly 30 per cent of the world's population is currently suffering from one or other forms of malnutrition, including inadequate caloric consumption, protein deficiency, poor dietary quality, and inadequate concentrations of protein and micronutrients (Basudeb, Acharya. & Davis, 2007). Worldwide, approximately 840 million people are undernourished or chronically food insecure, and as many as 2.8 million children and 300,000 women die needlessly every year because of malnutrition in developing countries (Basudeb *et al*., 2007).

The situation is particularly worrying in Sub-Saharan Africa and South Asia. For instance there is a high level of malnutrition among children in rural Nigeria and the figures differ with geopolitical zones, with about 56 percent reported in a rural area of South West and 84.3 percent in three rural communities in the northern part of Nigeria (Isaac, 2009). However, these distributions differ across States in Nigeria. For instance Gombe State has prevalence rate of 8.1% severely malnourished children, and the continuing degree of malnutrition with stunting affecting 41 per cent of the children under five; 14 per cent are wasted, 23 per cent are under weight, 13.7 per cent of new born are born with birth weight below 2500 grams (UNICEF, 2018). This outcome along with high level of poverty and falling output of agriculture suggest that hunger has a direct effect on poverty and good nutrition which is an investment in human capital that raises output as well as the returns on investments in education and health care. While lack of sustained economic growth is an important determinant of hunger, the persistence of hunger also feeds back to limit economic growth.

Basudeb, Brinda and Meenakshi (2007), provide empirical evidences which point to the negative impact of hunger and .malnutrition on labour productivity, health, and education, which ultimately leads to lower levels of overall economic growth. Hunger is thus as much a cause as an effect of poverty. These studies suggest that hunger has a direct effect on poverty and good nutrition is an investment in human capital that raises output as well as returns on investments in education and health care. Taken together, these findings provide powerful evidence that public spending in reducing hunger is an investment with high returns and should constitute a top priority for developing countries.

Usually, a dichotomy exists between quantitative methods and qualitative techniques for the measurement of poverty and food insecurity. However, recently, focused has been on the quantitative approach- measuring food security using household expenditures. To that effect, an increasing number of quantitative surveys now collect data on household expenditures to analyses the extent of food security. Even though much research works have been done on this alternative indicators in underdeveloped countries and Nigeria in particular, relatively less progress has been made in terms quantitative measures of food security that use representative household surveys.

Most examples of validation are contained in the literature, as can be found in Babatunde, Omotesho and Sholotan (2007), Ayantoye, Yusuf, Omonona and Amao (2011), Simeon

Nanama and Karim Soul (2007), Omotesho et al (2006), Fakayode, Rahji, Oni andAdeyemi (2009), Omonona, Titus and Adetokunbo (2007) and Omotesho and Muhammad (2010). Babatunde, Omotesho and Sholotan (2007), employed calorie-intake approach and investigated the socio-' economic characteristics and determinants of the food security status of rural farming ' households in Kwara State of Nigeria. Ayantoye, Yusuf, Omonona and Amao (2011) adopted the food energy intake used by Greer and Thorbecke (1986).

More so, Simeon Nanama and Karim Soul (2007) used Africare's measurement, Month of Adequate Household Food Provisioning (MAHFP). The FANTA/Cornell questionnaire consisted of 11 simple questions that assessed if and how households experience food insecurity and the strategies they adopt to combat it. Omotesho et al (2006) provide empirical evidence of food insecurity among rural households in Kwara State Nigeria; the study constructed food security index using daily per capita calorie consumption. Fakayode, Rahji, Oni and Adeyemi (2009), employed the basic food module developed by United State Department of Agriculture; Omonona, Titus and Adetokunbo (2007), constructed food security index and Omotesho and Muhammad (2010), Employed food Security mdex and the Linear Goal Programming (LGP) Model.

From the above, what is missing in particular is study that focuses on the measures of food security at household level with particular emphasis on expenditures. Against that backdrop, the paper analysed household food security in Nigeria using household expenditure surveys (i.e. expenditures on basic food items consumed by households), and also conducted an empirical analysis of their food security status as well as their consumption pattern. The paper is organised as follows. The next section reviews the concept of food security; section three briefly describes the methodology & datasets. Section four presents the model of the study while section five presents the empirical results. The final section provides a discussion of the results and concludes.

2. The Concept of Food Security

The most widely used definition of food security is that given by FAO (1992), as a state of affairs where all people at all times have access to safe and nutritious food to maintain a health and active life. Food security as a concept is mostly broken down into four different components i.e. availability, access, utilisation, and vulnerability; each capturing different, but overlapping, dimensions of the phenomenon (Mauro et al, 2007). Food availability is when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, commercial imports or food assistance. Secondly, Food access is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends upon income available to the household, on the distribution of income within the household and on the price of food. For persons living in urban areas, food access hinges primarily on the household's ability to purchase food. Most urban poor neither have large food stores, nor do they have access to areas for own food production. The urban poor often pay more for food purchases than do wealthier urban counterparts, as they are obliged to buy small quantities of food daily because they do not have the resources or living conditions which permit them to purchase and store large quantities of food at home. Food utilisation is the proper biological use of food, requiring a diet providing

sufficient energy and essential nutrients, potable water, and Illness and disease can lead to loss of appetite and poor absorption of the nutrients ingested.

Child caring practices are another important component of food security for children as they are reliant on parents and other caretakers to provide safe and nutritious food of adequate quantity and quality. Environmental contamination is a large factor contributing to poor food utilisation. The safety of food in the urban environment is a subject of concern. Street foods are often prepared under unhygienic conditions, and can contribute to outbreaks of food- borne illness. The health status of any group will be influenced by access to services, including primary health care and education, as well as potable water, sanitation systems and general environmental conditions. Another concept is increasingly becoming accepted namely, "Vulnerability" (the risks that can disrupt anyone of the first three factors). There are therefore, four major elements of food security. They are food availability, food access, food utilisation and not losing such access. Availability, access and utilisation are hierarchical in nature. Food availability is necessary but not sufficient for food accessibility and access is necessary but not sufficient for utilisation. In a larger sense, two broad groups of factors determine food security. These are supply side factors and demand side factors. The supply-side factors are those that determine food supply of food availability. In other words, they are determinants of physical access to food at national, household and intra-household levels. The demand side factors on the other hand are factors that determine the degree of access of countries, households and individuals to available food. They are, in other words, determinants of economic access to food or determinants of entitlement to available food.

3. Methodology

The study was conducted in Gombe State, Nigeria. The State is located between latitude $9^0$30' and $12^0$30' and longitudes 8°45' and 11°45'E of the Greenwich Meridian. It lies within the Northeast region of Nigeria and occupies a total land area of about 18,768 Km^2 and a density of 125.4/km2 (324.7/sq. mi). The State has eleven Local Government Areas. They are: Akko, Balanga, Billiri, Dukku, Funakaye, Gombe, Kaltungo, Kwami, Nafada, Shongom and Yamaltu/Deba. It has 3 Senatorial districts and 6 Federal constituencies. The State had, by 2019, an estimated population of 3,472,223 people and populated mainly by Fulani people. Other tribes include Hausa, Tangale, Waja, Cham, Bolewa, Tera, Kare-Kare and other minor tribes. Farming is the major economic activity of people of Gombe State. The State also has an estimated total GDP (PPP) of $2.50 billion, and a percapita income of $ 1,036.

A cross-sectional data set was generated from the State using questionnaire instrument. Following Israel (2009), given the total population size of 3,472,223 and precision level of 0.05 (5%), the sample size was determined:

$$n = \frac{N}{1+N(e)^2} \quad n = \frac{3,472,223}{1+3,472,223(0.05)^2} \Rightarrow n \approx 400 \qquad \ldots 1$$

Therefore, a total of 400 households were selected through multi-stage sampling procedure from the State. At first stage, three (3) Local Governments were purposively selected, (one from each of the Senatorial Districts in the State). They are Dukku Local Government Area, Akko Local Government Area and Balanga Local Government Area. This is because of

varied cultural, religious and farming practices among the regions. Then ten (10) geo-political wards from these Local Government Areas were selected. They include Waziri South, Zange, Jamari Wurotale, Tukulma, Pindiga, Tumu, Kalshingi, Talasse/Gelengu, Bambam and Kindiyo. Thirdly, fourty (40) households from each of the ten wards were randomly selected. Hence, these households were interviewed with the aid of written structured questionnaire.

Model Specification

To examine the relationship across the determinants of food security, the study used multivariate regressions and determined socioeconomic variables that are correlated with perceptions of subjective food adequacy. The study modeled the relation as a Probit, because the dependent variable is binary and shows whether a household is food secure or not. Thus:

$$P(y=1|x)=G(\beta_0+\beta_1X_1+.....\beta_xX_x)=G(\beta_0+X\beta) \quad \text{.....2}$$

Where *G* is a function taking on values strictly between zero and one: 0 <*G (z)* <1, for all real numbers *z*. This ensures that the estimated response probabilities are strictly between zero and one. Therefore, food secured household is 1 and food insecured household is 0

Y = Indicates food security status of household

X = Isavector of household characteristics

P = Isthe probability distribution function of the standard normal distribution

In the model, *G* is the standard normal cumulative distribution function (cdf), which is expressed as an integral:

$$G(z)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\beta_0+\beta_i} e^{-z^2/2}\,dz \quad \text{.....3}$$

The choice of G ensures that (equation 1) is strictly between zero and one for all values of the parameters. Therefore, a positive coefficient of a given explanatory variable can be interpreted as being associated with a higher probability of food adequacy. Thus,

Food security =f(ageh, hhsz, occu, relg, educ, geog, gend, asst, inco) 4

More formally, the full model would be expressed as

$$CAQ=\alpha+\beta_1ageh+\beta_2hhsz+\beta_3occp+\beta_4reli+\beta_5educ+\beta_6geog+\beta_7gend+\beta_8asst+\beta_9incm+\varepsilon \quad \text{.....5}$$

Where:

CAQ = food consumption adequacy;
ageh = refers to the age of the household head
hhsz = refers to the size of the household
occp = refers to occupation of the household head,
reli = refers to the religion of the head of the household;
educ = refers to educational qualification of the household head;
goeg = refers to a geographical location of the household
gend = refers to sex of the household head;
asst = refers to a household asset, including both agricultural and nonagricultural

assets

incm = refers to the income of the household.

4. Results

Descriptive Statistics of the Respondents

The simple descriptive analysis presented in table 1 suggests that a small percentage of households are headed by females- 10 percent; thus large proportion of households is headed by males 90 percent. And these females are widowed. Also, the percentage of households living in rural areas is higher than urban areas, with 70 percent and 30 percent, respectively. In terms of their economic activities; farming constitutes the largest workforce with 63 percent, while civil service and trading constitute 27 percent and 10 percent respectively. As far as their ages are concerned, it was found that 62 percent are within the working class, thus only 38 percent are 60 years and above (aged). The decomposition also showed that over 70 percent of the household have large families. The finding of lower income in the households-47percent, sit well with the finding of farming in rural areas, the middle income earners account for 34 percent, while only 19 percent are fairly high income earners. In terms other income generating assets, farmlands account for 35 percent, shops/housing 15 percent, animals 20 percent and others 20 percent.

Table 1: Socio-Economic Characteristics of the Households Heads (HH)

Variable	Frequencies	Percentage	Cumulative Percentage
Gender			
Male	358	90	90
Female	42	10	100
Occupation			
Civil Servant	109	27	27
Farming	129	63	90
Trading/Commerce	40	10	100
Level of Education			
Primary Certificate	169	42	42
Senior School Certificate	129	32	74
NCE/Diploma	68	17	91
Degree/HND	24	6	97
M.Sc./PhD	10	3	100
Religion			
Islam	283	71	71
Christianity	92	23	94
Others	25	6	100
Number of Children			
1 – 7	117	29	29
8 & above	283	71	100
Location			
Rural	280	70	70
Urban	120	30	100

Variable	Frequencies	Percentage	Cumulative Percentage
Age (years)			
18 – 45	161	40	40
46 – 60	88	22	62
60 and above	151	38	100
Monthly Income			
₦20000 - ₦25000	186	47	47
₦25001- ₦30000	136	34	81
₦30001 and above	78	19	100
Assets			
Farmlands	140	35	35
Shops/Houses	61	15	50
Animals	119	30	80
Others	80	20	100

Source: Authors' Computation.

Per Kilocalorie Food Security Analysis

Table 2 contains the food expenditure and intake converted into kilocalories and monetary units.

Based on households' food expenditure and consumption in table 2; Food Security (FS) is assigned to each household, (for the sake of simplicity, we used the sample of small household, i.e. n = 7) this assignment is done as follows. In the case of own production, 47 percent of the households acquire an average of 50kilograms of different foods in a month. This is equivalent to an average of 200000kcal per month. Thus the daily consumption for a household would be obtained as (200000÷30) = 6667kilocalories/household. Thus, the daily household percapita food consumption would be 6667÷7 = 952kcal. For the other 36 percent, the daily percapita food consumption is 2392kcal However, the remaining 17 percent has a daily percapita food consumption of 3342kcal. Similar results would be obtained in the case of quantities bought. Thus 23percent of the households have a daily percapita food consumption of 47kcal. Also, 64percent of the households have a daily percapita food consumption of 1010kcal.Then 13 percent of the households have a daily percapita food consumption of 2390kcal. Thus, 87 percent of the households supplement not more than l010kcal from the market.

For the quantities received from other people, 44% of the households have a daily percapita calorie consumption of 60kcal, 8% have a daily percapita calorie consumption of 152kcal, 9% have a daily percapita calorie consumption of 248kcal and 29% do not receive any kind of food from other people or governments. Based on these results, we found that on average less than 50% of the households could afford to consume the minimum dietary requirement of 2400kcal. Hence, more than 50% of the households are food insecure in terms of percapita calorie consumption. However, if we relax the assumption of small household size, and carry out the analysis on a large family size the situation of food insecurity has a well-established tendency of appreciating.

Table 2: Food Expenditure/Intake breakdown

Variables	Freq.	Percent	*C.f.	Mean Food Expenditure/Intake
Eaten from own production				
0-100kg	186	47	47	200000kcal
101–150kg	145	36	83	502500kcal
151kgandabove	69	17	100	702000kcal
Money spent if bought it				
₦15000-₦20000	94	24	24	₦17500
₦20001-₦25000	233	58	82	₦22500
₦25001andabove	73	18	100	₦27500
Quantities bought				
0-5kg		23	23	10000kcal
6–100kg		64	87	212000kcal
101kgandabove		13	100	502000kcal
Money Spent				
₦5000-₦10000		30	30	₦7500
₦10001-₦15000		50	80	₦12500
₦15001 and above		20	100	₦17500
Quantities received from other people				
0– 5kg	174	44	44	12500kcal
6- 10kg	73	18	62	32000kcal
11kg&above	37	9	71	52000kcal
None	116	29		-

Source: Authors' Computation.

Note: cumulative frequency. ***Notes:*** *all quantities were converted into grams and into kilocalories. The minimum daily percapita dietary requirement is 2400kcal. The nutritional label for carbohydrates, proteins and vitamins is found to be 4kihcalories/gram (kcal/g).*

Extending the analysis to the monetary aspect, we could obtain the following results. 24% of the households have a daily percapita expenditure of ₦83; 58% have a daily percapita expenditure of ₦107; while 18% have a daily percapita expenditure of ₦l31. On the other hand, the supplementary expenditure (monetary value of quantities bought) is as follows: 30% of the households have a daily percapita expenditure of ₦36; 50% have a daily percapita expenditure of ₦60; while 20% have a daily percapita expenditure of ₦83. Therefore, the mean percapita expenditure may be aggregated as in Table 3.

Table 3: Overall Mean Aggregate Expenditure

Aggregate Percapita Expenditure	Percentages
₦119	27
₦167	54
₦214	19
Total	100

Source: Authors' Computation.

This findings showed that at least 27% of the household live below one Dollar (1$), 54% are fairy living on a dollar while only 19% live above one dollar.

Probit Analysis of the Model

Table 4 below shows the results of the estimate obtained for the Probit model presented in Equation 4.

Table4: Probit of perception of food adequacy (Calorie Consumption)

	Calorie Consumption		
	Coefficient	Robust z – statistics	Prob. statistics
Constant	-0.284	-0.385	(0.6999)
GenderoftheHH	0.293	1.874	(0.0609)
OccupationoftheHH	0.027	0.207	(0.8362)
Levelof Education	0.470	5.671	(0.0000)
Religion	-0.289	-1.507	(0.1319)
Familysize	0.190	1.013	(0.3109)
Location	0.0145	-1.107	(0.2681)
AgeoftheHH	-0.641	-3-288	(0.0010)
Assets	0.297	-2.255	(0.0106)
Monthlyincome	0.607	-2.366	(0.0180)
	Observations = 400 Log likelihood = -150.7 McFadden R^2 = 0.45		

Source: Authors' Computation using STATA Econometric Software.

Once we add the full specification of the model, the McFadden R^2 of 0.45 shows that the independent variables explain a larger part (45 per cent) of the variation in food perception adequacy. An important part of the model is the role of the different types of variables in explaining perceptions of food adequacy. Thus gender of the household Head, occupation, education, size, location asset and income have a positive impact on food security and therefore are highly correlated to food adequacy. This suggests that the higher the level of education, asset and income, the more food security a household is in Gombe State. Also, in addition, those in urban areas have higher food security than those in the rural areas and the fact that income parameter in higher suggest that poverty has a significant impact of household food insecurity. However, age and religion have a negative impact on food security.

5. Discussion and Conclusions

The finding of the study revealed that on average, less than 50% of the households could afford to consume the minimum dietary requirement of 2400kcal. The findings also showed that at least 27% of the household live below one Dollar (1$), 54 percent are fairy living on a dollar while only 19% live above one dollar. The estimated model indicates that the independent variables explain a larger part (45 per cent) of the variation in food adequacy perception. A number of factors such as assets, income, and occupation level of education, gender, family size indicators are correlated with perceptions of greater food adequacy.

However, differences in Religion, Age of Household Head, do not appear to influence Perceptions of food adequacy significantly.

References

Aku, P.S. (2012) Agriculture, Population Explosion and implication for Nigerian Economy; unpublished conference paper; Ahmadu Bello University, Zaria.

Alamgir, M. & Arora, P. (1991). Providing Food Security for All, International Fund for Agricultural Development, New York University Press, USA.

Amiti, M., (1982). Food Security and Shortage Policies; 'Proceedings of the workshop on Food Policy Research Priorities, held in Nairobi 14-17 June, 1982.

Ayantoye, K., Yusuf, S. A., Omonona, B. T. & Amao, J. O. (2011). Food Insecurity Dynamics and its Correlates among Rural Households in South Western Nigeria. *International Journal of Agricultural Economics and Rural Development*. 4 (1) 43-55

Babatunde, R. O., Omotesho, O. A. & Sholotan, O. S. (2007) Socio Economic Characteristics of Food Security Status of Farming Household in Kwara State, North Central Nigeria *Pakistan Journal of Nutrition* 6(1): 49-58.

Ballenger, N. & Mabbs-Zeno, C. (1990). Targeting Food Security and Food Aid Issues at the GATT," National Centre for Food and Agricultural Policy, Discussion Paper series no FAP90-07, April.

Bapma, S. L., (1990). Food Security through the PDS: the Indian experience" in D.S. Tyagi and V.S. Vyas, (eds) Increasing Access to Food: The Asian Experience: Sage Publications, New Delhi and London.

Barraclough, S., & Urting, P. (1987). Food Security Trends and Prospects in Latin America," Working Paper no 99, Helen Kellog Institute for International Studies, University of Notre Dame, USA.

Basudeb, G., Shabd, S. A., & Benjamin, D. (2007). *Food Security Indicators, Measurement, and the Impact of Trade Openness*. Oxford University Press.

Benson, C., Clay, E.J. &Green,R.H. (1986) *Food security in Sub-Saharan Africa*, IDS, University of Sussex, Brighton

Bickel, (2000). Guide to Measuring Household Food Security, Revised 2000. U.S. Department of Agriculture, Food and Nutrition Service, Alexandria VA. March

Chishom, A.H., & Tyers, R. (eds) (11982) "Introduction and overview," Food Security: Theory, Policy, and Perspectives from Asia and the Pacific Rim, Lexington Books, Massachusetts.

Emmanuel, O. E. (2008). Macroeconomic Environment and Agricultural Sector Growth in Nigeria. *World journal of Agricultural sciences* 4(6): 781- 786

FAO, (1992) "Agricultural policies, protectionism and trade: selected working papers, 1985 -198.7," FAO Economic and Social Development Paper No 75, FAO, Rome.

Fakayode, S.B., Rahji, M.A.Y, Oni, O.A. & Adeyemi, M.O., (2009). An Assessment of Food Security Situations of Farm Households in Nigeria: A USDA Approach. Medwell Journals, of Social Sciences 4 (1): 24 - 29.

Gina, K. (2003). Food Security in the context of urban sub-Saharan Africa. Food Agricultural Organisation.

Gujarati, D. N. & Porter, D. C. (2009) "Basic Econometrics, .Fifth Edition. McGraw – Hill Companies.

Isaac, A. (2009) Ensuring Food and Nutrition in Rural Areas: An Assessment of the Challenges, Information Need and Analytical Capacity. International Food Policy Research Institute (IFPRI)

Israel, D. G. (2009) "Determining Sample Size". University of Florida, USA

Julie, H. & Emmy S. (2019) Risk and Resilence: Advancing Food and Nutrition Security in Nigeria through Feed the Future. Center for Strategic and International Studies, Washington DC 20036.

Kennes, W. (1990) "The European Community and Food Security," IDS Bulletin, Vol 21 No. 3,Institute of Development Studies, Brighton.

Kracht, U., (1981) "Food Security for People in the 1980s, "Paper Prepared for Discussion at the North - South Food Roundtable Meeting, Washington.

Manyong, V. M. A., Ikpi, J.K. Olayemi, S. A. Yusuf, B. T. Omonona, V. Okoruwa, & Idachaba, F. S. (2005). Agriculture in Nigeria: Identifying Opportunities for Increased Commercialization and Investment ITTA, Ibadan, Nigeria. 159p

Mauro, M., Benjamin, D., Calogero, C., & Kathleen, B. (2007). *Measuring Food Security Using ~T Respondents' Perception of Food Consumption Adequacy.* Oxford University Press.

Maxwell, S., J. Swift and Buchanan, S. M. (1990). Is Food Security Targeting Possible in Sub-Saharan Africa? Evidence from North Sudan," IDS Bulletin, Vol 21 No. 3, Institute of Development Studies, University of Sussex.

Mellor, J., (1988). Global food balances and food security," World Development, Vol 16 no 9, pp 997-1011.

Nanama, S. & Karim S. (2007). Brief: Comparison of two Methods for Measuring Household Food Security and Vulnerability: Evidence form Zondoma Food Security Initiative Burkina Faso Africare food security reviews Washington DC, Africare/Headquarters.

National Population Commission (2012) Bulletin.

Obayelu, A. E. (2010). Classification of Households into Food Security Status in the Northcentral Nigeria: An Application of Rasch Measurement Model. ARPN *Journal of Agricultural and Biological Science.* 3:26-41.

Omotesho, O. A., Adewumi M. O., Muhammad L. A. & Ayinde O. E (2006) Determinants of Food Security Among The Rural Farming Households in Kwara State, Nigeria. *African Journal of General Agriculture.* 2(1).

Omotesho, O. A. & Muhammad-Lawal, A. (2010). Optimal Food Plan for Rural Households' Food Security in Kwara State, Nigeria: The Goal Programming Approach. *Journal of Agricultural Biotechnology and Sustainable Development,* 2(1) ,7-14.

Orewa, S.I. & Lyangbe, C. O. (2009). The Food Insecurity Profile among the Rural and Low Income Urban Dwellers in Nigeria. *American-Eurasian Journal of Scientific Research* 4 (4): 302-307.

Reutlingen, S., (1977). Food insecurity: Magnitude and Remedies, World Bank Staff Working Paper no 267, World Bank, Washington DC.

Risikat, O. & Dauda, S. (2010). Women's Status, Household Food Security and Coping Strategies in Nigeria: A Survey Based Analysis. *Pakistan Journal of Social Sciences.* Volume: 7 No.: 262-268

Robert, P. (2010) *Food Politics; What Everyone Needs To Know*? Oxford University Press.

Smith, L. C., & AH S. (2007). Measuring Food Security Using Household Expenditure Surveys. Food Security in Practice Technical Guide Series Washington, B.C.: International Food Policy Research Institute.

Stryker, J. D., (1978). Food Security, Self-sufficiency, and Economic Growth in the Sahelian Countries of West Africa" Prepared for USAID from Food Research Institute, Stanford university.

UNICEF (2018). National Nutrition and Health Survey in Nigeria.

Sumiter, S. B. (2002). Food Insecurity, Poverty and Agriculture: A Concept Paper, The Food and Agriculture Organisation: ESA Working Paper No. 02-15

Vasco, M. (2007). *Food Security in Vietnam during the 1990s: The Empirical Evidence*, Oxford University Press.