Food Insecurity and Nutrition Status of Farm Households in Northwestern Nigeria

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Abstract   Conquering malnutrition, which is one of the greatest challenges facing the world today requires developing appropriate food security policies. There is a need to continuously assess the state of food insecurity and malnutrition among farm households, this is pivotal in drafting timely polices especially in regions where the populaces are predisposed to malnutrition due to high social inequity, poverty and conflict. This study investigated the food insecurity and nutritional status of farm households in Northwestern Nigeria, using a randomly selected sample of 302 households. Nutrition status of respondents and children between 12 and 59 months were determined. Household dietary diversity and food insecurity data were collected using 24-hours dietary and household food insecurity access scale. Result revealed that a large percentage of households experienced food insecurity with moderate hunger and low diet diversity. Stunting was the most prevalent form of malnutrition among children. Food insecurity was inversely and significantly associated to income and formal education. Also, nutritional status, household diet diversity, stunting and wasting correlated to food insecurity. Agricultural extension agents should embark on food literacy among women. Diversity in production and consumption of staple nutritious crops should be promoted.

Keywords: *food insecurity, diet diversity, farm household, malnutrition*

Cite This Article: Thomas Kehinde and Eforuoku Favour, "Food Insecurity and Nutrition Status of Farm Households in Northwestern Nigeria." *Journal of Food Security*, vol. 8, no. 3 (2020): 98-104. doi: 10.12691/jfs-8-3-3.

1. Introduction

For the third year in a row, there has been a rise in world hunger [1]. The number of undernourished people increased from 804 million in 2016, to 821 million in 2017, while 151 million and 50 million children under five continue to be threatened by stunted growth and wasting respectively [1,2]. These nutritional deficiencies are most predominant in Africa, with over 222.7 million people estimated to be undernourished [3]. Nigeria like most African countries is challenged with high level of food insecurity despite her involvement in agriculture and its contribution to GDP [4,5]. Currently, it is estimated that 7.1 million people in Nigeria face acute food insecurity [6]. Food security is a complex phenomenon and with an integration of three core dimensions i.e. food availability, accessibility and utilization [7,8]. Food security aims at ensuring that all people, at all times, have both physical and economic access to sufficient, safe and nutritious food to meet their dietary needs required to make them live an active and healthy life. Physical access to food relates to issues of food supply or food availability. Economic access to food is concerned with capacity to purchase or acquire food, while sustainability of access to food deals with food supply and demand issues that determine the ability of a

household to enjoy a sustained access to food over time [8].

Food security at the household level is the ability of a household to meet the dietary needs of its members either through own production or through purchases. Household food security influences the nutritional status of its members [9]. Nutritional status is best measured by anthropometric indices, which have become practical tools for evaluating the cumulative effect of access to food, health, education and environmental health conditions particularly in developing countries. Therefore, the nutritional status is a potent indicator of nutrition security and wellbeing of an individual and reflects the nutritional and poverty situation of a household, especially, the nutritional status of children under the age of five, because children are most vulnerable to malnutrition.

Northern Nigeria is known for intense involvement in agriculture, the region produces nutrient rich crops such as beans, groundnut, millet, sorghum, soybean, a large variety of vegetables as well as livestock and its bye product [10]. However, a high percentage of people and specifically, farming households in the region remain deprived, poor, malnourished, diseased, and stunted with the highest levels found in the Northwestern States of Nigeria [11,12,13].

The state of food insecurity and malnutrition is widely documented in developed nations and are frequently

assessed. However, there are limited studies among farm households in low income countries such as Nigeria where this is more complex because of several factors, such as social inequity, poverty and food production. Furthermore, the prevalence of food insecurity and nutritional status is constantly changing. For example, food insecurity and malnutrition in Nigeria have been exacerbated by effects of climate change and conflict in Northern Nigeria which has led to significant reductions in food production and availability [14,15]. Hence the need for empirical evidence to quantify the current status, which will provide data to describe the present state of food insecurity and nutritional status in Nigeria and guide appropriate intervention to ameliorate hunger and malnutrition. The study assessed the state of household food insecurity, dietary diversity of households, nutritional status of households as well as the relationship between food insecurity and nutritional indices of households in Northwestern, Nigeria.

2. Methodology

2.1. Study Area

The study was conducted in Northwestern Nigeria. This zone was chosen due to the highest rate of malnutrition present [16,17]. The Northwestern region was formed from parts of the old Northern region, it lies within latitude 7.43° E and 11.73° E of the equator, and longitude of 10.52° N and 11.73° N of the Greenwich Meridian. The area covers a land mass of approximately 98,050 km^2 and comprise seven states which are: Sokoto, Zamfara, Kebbi, Kaduna, Kano, Katsina and Jigawa. The zone is basically a tropical climate; rainy season starts from April and ends in October, while the dry season starts in October and ends in March. The annual rainfall is between 500 mm and 750 mm; the temperature fluctuations are between 23°C- 41°C, the vegetative cover in the zone is Guinea, Sudan and Sahel Savannah. Agriculture is the main source of livelihood of the inhabitants of the zone. The important agricultural crops in the zone include millet, sorghum, maize, rice, cowpeas, groundnuts, cotton, soybean, potatoes, fruits and vegetables. Animal husbandry such as cattle, sheep, and goats is also a common practice.

2.2. Population of the Study and Sampling

The population of this study comprised of all farming households in Northwestern Nigeria. Respondents were selected by multistage sampling. Kaduna and Jigawa states were purposively selected among the seven states in Northwestern, Nigeria due to their high involvement in agriculture. Fifty percent of the Agricultural Development Programme (ADP) zones. in each state were randomly selected these were: Maigana and Samaru zones from Kaduna State and Birni Kudu and Hadejia zones from Jigawa State. Maigana and Samaru zones have eight and seven blocks, respectively, while Birni-kudu and Hadejia have seven and eight blocks, respectively. Two (25%) of the blocks in each zone were selected using simple random sampling technique. These were Kaya and

Danayamaka from Maigana zone; Kachia and Jema'a from Samaru zone; Yan kunama and Rawuya from Birni-kudu zone; and Siyari and Cokami from Hadejia zone. An average of eight cells is in each block; one (10%) cell was randomly selected from the selected blocks. A sample size of 302 households was used. At the household the female responsible for cooking (food preparation) was interviewed using the following inclusion criteria: those who gave consent to participate in the study; household members were healthy and not on medication within the last one week and have been resident in that community for the past twelve months.

2.3. Data Collection

The questionnaire used to collect data was finalized after pre-testing on 30 households with similar background to the study sample. Socioeconomic, diet diversity and food insecurity information were gathered at household level, while nutritional status was measured for key respondent and children not more than 5 years. The questionnaires were administered by enumerators using face-to-face interviews in Hausa language, vernacular or English, depending on the literacy level of respondents. The study did not require ethnical clearance because it raised no significant ethical issues and was considered 'low risk' by the supervisory committee. However, respondent's participation was voluntary and gave consent, while data collected remained anonymous and confidential.

2.4. Household food Insecurity Assessment

Household food insecurity was measured using the Household Food Insecurity Assess Scale (HFIAS). It measures the degree of food insecurity (uncertainty and worry, inadequate quality, insufficient quantity and social unacceptability of food access) of the household over a 30-day period. The response to HFIAS items was scored as: 'No = 0', 'Rarely=1', 'Sometimes=2' and 'Often=3'. Given the possible maximum and minimum composite scores of 27 and 0, quartiles (25%) of the composite score was used as benchmark to categorize households into four types of food insecurity levels: (1) food secure (0.0-6.74); (2) food insecure without hunger (6.75-13.49); (3) food insecure with moderate hunger (13.50-20.24); and (4) food insecure with severe hunger (20.25-27.0) [18].

2.5. Dietary Diversity

Dietary diversity was measured using the 24-hour dietary recall method and was based on the number of food groups consumed over the immediate past 24 hours. The dietary diversity score for households was derived using the FAO guidelines for measuring household dietary diversity [3]. The dietary diversity score of one (1) was awarded to each food group consumed over the reference period and zero (0) for non-consumption. The sums score for each food group was calculated for the dietary diversity score of each household. The possible maximum and minimum scores were 12 and 1, respectively. The household diet diversity was classified into low (1-6) and high (7-12).

2.6. Nutritional Status Assessment

Weight and height were measured for key respondents and children between 12 and 59 months in each household using standard equipment and followed standard guidelines. Body weight was measured using a calibrated electronic floor scale (Seca, UK); accurate to the nearest 0.1kg. Height was measured to the nearest 0.1cm using an upright plastic portable stadio (Invicta, England). Body Mass Index (weight/height^2) was calculated for respondents. Data from anthropometric measurements were analysed using [19], standard of reference. The indicators of nutritional status used were weight for height, weight for age, and height for age Z-scores, which were generated using the WHO standard population on WHO Anthro software version 3.2.2 and exported to SPSS. Estimates were based on the WHO Growth Standards using the standard indicators and cut off points (e.g., for stunting-proportion of children with height-for-age below -2 standard deviations (SD); underweight-proportion of children with weight-for-age below -2 SD; wasting-proportion of children with weight-for height below -2 SD; and overweight-proportion of children with weight-for-height above +2 SD).

2.7. Data and Statistical Analysis

The quantitative data collected were analysed using Statistical Package for Social Science (SPSS). Descriptive statistics carried out included; frequencies, percentage, mean and standard deviation. Pearson Product Moment Correlation (PPMC) was used to test for significant correlation between food insecurity and malnutrition.

3. Results

3.1. Socioeconomic Characteristics of Respondents

Table 1 reveals that the overall mean age of respondents was 37 years. Furthermore, the distribution reveals that over half (54.6%) were between 21 and 40 years, 16.2% were less than 20 years, while 6.1% and 8.9% were 51-60 years and above 60 years, respectively. The mean number of years of formal education was 3 with over half (58.6%) of respondents having no formal education, 26. 2% had primary education while 14.2% had secondary education. The average household size was 7 persons, over half (57.3%) of respondents had household sizes between 6 and 10 persons, 33.8% had between 1 and 5 persons, while 7.3% had household size between 11 and 15 persons. The mean income of respondents was \$15 monthly, almost half (48.2%) had no monthly income, while 47.0% earned less or equal to \$20 monthly. Furthermore, income (χ^2= 44.99; p=0.00) and formal education (χ^2= 28.72; p=0.01) were significantly associated to household food insecurity (Table 1). Hence an increase in income and formal education of household head would affect with food insecurity. However, age (χ^2= 17.06; p=0.32) and household size (χ^2=7.25; p=0.61) were not associated with household food insecurity.

Table 1. Distribution of respondents by socioeconomic characteristics and chi-square association to household food insecurity

Variables	Categories	Frequency (n=302)	Percentage	χ^2-value
	Less than equal to 20	49	16.2	
	21-30	97	32.1	
	31-40	68	22.5	17.06
Age (years)	41-50	43	14.2	
	51-60	18	6.1	
	Above 60	27	8.9	
	Mean age	37 years		
	No formal education	177	58.6	
	Primary education	79	26.2	28.72*
Formal education	Secondary education	43	14.2	
	Tertiary education	3	1.0	
	Mean	3 years		
	1-5	102	33.8	
	6-10	173	57.3	
Household size (persons)	11-15	22	7.3	7.25
	Above 15	5	1.7	
	Mean	7 persons		
	No income	146	48.2	
	≤20	142	47.0	44.99*
Monthly income (USD)	21-50	4	1.4	
	51-80	5	1.7	
	Above 80	5	1.7	
	Mean	\$15		

*= p≤0.05, 1USD=N360.

Table 2. Distribution of respondents by household food insecurity

Food insecurity	Never		Rarely		Sometimes		Often		Mean	SD
	F	(%)	F	(%)	F	(%)	F	(%)	$\bar{x}$	
How often did you worry that your household would not have enough food?	10	3.3	23	7.6	142	47.0	127	42.1	2.27	0.74
How often were you or any household member not able to eat the kinds of food you preferred because of lack of resources?	4	1.3	33	10.9	170	56.3	95	31.5	2.17	0.67
How often did you or any household member have to eat limited variety of food due to lack?	10	3.3	66	21.9	138	45.7	88	29.1	2.01	0.80
How often did you or any household member have to eat some foods that you really did not want to eat for a lack of resources to obtain other types of food?	10	3.3	83	27.5	150	49.7	59	19.5	1.85	0.76
How often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	8	2.7	73	24.2	178	58.9	43	14.2	1.84	0.68
How often did you or any other household member have to eat fewer meals in a day because there was not enough food	17	5.6	76	25.2	180	59.6	29	9.6	1.73	0.71
How often was there ever no food of any kind to eat in your household because of lack of resources to get food?	53	17.6	136	45.0	93	30.8	20	6.6	1.26	0.82
How often did you or any household member go to sleep at night hungry because there was not enough food?	144	47.7	123	40.7	33	10.9	2	0.7	0.64	0.69
How often did you or any household member go a whole day and night without eating anything because there was not enough food	187	61.9	96	31.8	19	6.3	0	0	0.44	0.61

Adopted from Household Food Insecurity Access Scale (HFIAS) Measurement Tool.

3.2. Household Food Insecurity

The household food insecurity result using the Household Food Insecurity Access Scale (HFIAS), is presented in Table 2. It reveals that the most severe aspect of household food insecurity among respondents related to food unavailability, with 47.0% sometimes and 42.1%, often worried of their households not having enough food all year round. Over half (56.3%) of the respondents sometimes experienced food insecurity in terms of not being able to eat the kinds of foods preferred because of a lack of resources. Likewise, 45.7% of respondents sometimes experienced food insecurity in terms of eating a limited variety of foods due to lack. The least aspect of food insecurity experienced was, any household member going a whole day and night without eating anything because there was not enough food.

3.3. Categorisation of Respondents by Level of Food Insecurity

Household food insecurity level which was categorised using USDA core Food Security Module is presented in Table 3. It reveals that prevalence of households that were food secure, food insecure without hunger, food insecure with moderate hunger and food insecure with severe hunger were 3.3%, 32.5%, 63.2% and 1.0%, respectively. Collectively, the majority (96.7%) of households was considered as food insecure, while only 3.3% of the households were food secured.

Table 3. Categorization of respondents based on level of food insecurity

Level of household food insecurity	Number of households	Percentage of households
Food secure	10	3.3
Food insecure without hunger	98	32.5
Food insecure with moderate hunger	191	63.2
Food insecure with severe hunger	3	1.0

3.4. Household Diet Diversity

Household dietary diversity is the number of unique foods consumed by household members over a given period. It has been validated to be a useful approach for measuring household food access [20]. Household diet diversity is measured using the Household Diversity Score (HDDS), which is calculated as the number of different food groups consumed, rather than the number of different foods consumed.

The result in Table 4 shows the diet diversity of the households on the previous day of the survey. It reveals that the majority (98.7%, 92.4% and 85.1%) of households consumed cereals, green leafy vegetables and oil respectively. Less than 50% of households had consumed root and tubers, vegetables/fruit, sea food, sugar or honey, meat, milk and egg. The Table further reveals that the mean of diet diversity was 5.14±1.26. A fairly large percentage (68.5%) of respondents had low dietary diversity, while 31.5% had high diet diversity.

Table 4. Household diet diversity of respondents

Food group	F	%
Cereals (rice, millets, maize, wheat)	289	98.7
Green leafy vegetables (pumpkin, spinach, lettuce)	279	92.4
Food made from oil (palm oil, vegetable oil)	257	85.1
Legumes/Pulses (beans, g/nut, soybean)	197	65.2
Species, alcoholic and non-alcoholic beverages	99	32.8
Roots and tubers (yam, cassava, potatoes and their products)	87	28.8
Vegetables/ Fruits (carrots, papaya, citrus, mango, cucumber)	66	21.9
Sea food (fish and fish products)	24	7.9
Sugar or honey	22	7.3
Meat (beef, chicken, kidney)	13	4.3
Milk and milk products (milk, cheese, yoghurt)	11	3.6
Egg	1	0.3
Dietary diversity category		
Low (1.0-6.0)	207	68.5
High (above 6.0-12.0)	95	31.5
mean		5.14±1.26

3.5. Nutritional Status of Respondents

Over half (56.3%) of the respondents measured had normal weights, 12.6% were underweight, while 19.5% and 11.6% were overweight and obese respectively, as reported in Table 5 below.

Table 5. Distribution of respondents by nutritional status

Nutritional indices	Frequency	Percentage
Normal	170	56.3
Underweight	38	12.6
Overweight	59	19.5
Obese	35	11.6

3.6. Nutritional Status of Children

The prevalence of stunting (low height-for-age), wasting (low weight-for-height) and underweight (low weight-for age) of children in the study area as shown in Figure 1. It reveals that 61.3% of the children were stunted, i.e. they fell below minus two standard deviations (- 2SD) from the median of the reference population for the height- for- age index, this prevalence is high, according to World Health Organization classification [21]. In relation to wasting, three percent of male children and 8.5% of female children fell below minus two standard deviations (-2SD) of the reference population for the weight-for- height index. This shows that wasting prevalence was higher among female than male children. For underweight, 6.1% and 10.6% of male and female children respectively were underweight; this also falls within the medium prevalence classification by WHO.
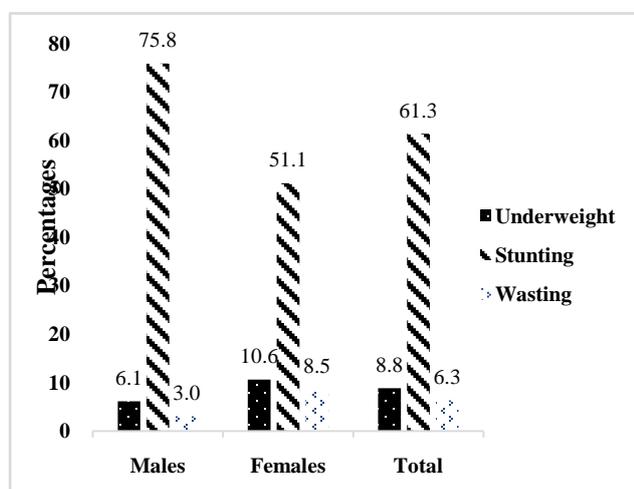

Figure 1. Percentage of malnourished children under five years of age in Northwestern Nigeria

3.7. Correlation Analysis of Food Insecurity to Nutritional Indices

The correlation of food insecurity to other nutritional indices is presented in Table 6. It reveals that nutritional status (r=-0.34; p=0.01) and household diet diversity (r=-0.26; p=0.02), were inversely and significantly related to household food insecurity. Food insecurity was found to be significantly correlated to stunting rate, height for age (r=0.24; p=0.03) and wasting, weight for height (r=-0.27; p=0.02) of children less than five years of age.

Table 6. Correlation of household food insecurity to nutritional indices

Variables	r-value	p-value
Nutritional status	-0.34	0.01
Household diet diversity	-0.26	0.02
Weight for age (underweight)	0.15	0.18
Height for age (stunting)	0.24	0.03
Weight for height (wasting)	-0.27	0.02

Significant @ p≤0.05.

4. Discussion

Food insecurity has been linked with malnutrition and other poor nutritional outcomes. Household food insecurity is a condition of households not having or not being able to acquire enough food to meet the needs of all their members because of insufficient money or other resources for food [22]. Households were mostly food insecure in terms of access to sufficient quantity of food all year round, continuous access to preferred food, and consumption of a variety of foods. This meant that a larger percent of households ate smaller amount of food or missed meals per day when access to food is limited [23]. Food insecurity in terms of availability, is common among farming households because during harvest season they often sell a large chunk of their produce to meet household needs, buy inputs and offset debts. This leaves little food which is usually insufficient for household consumption throughout the year. Also, low variety of food consumed is due to low income to purchase other food items not cultivated. This insufficiency in terms of quantity of food and access to a limited food variety is likely to affect nutritional status negatively. This is because when households are faced with food shortage, the immediate strategy they adopt is to eat less preferred, less expensive and often less nutritious foods which are often below the required dietary need. Hence, food insecurity, often manifests in eating less preferred food, limiting the size portions of the food consumed, and skipping meal within a day [24]. Food insecurity becomes severe when the quantity of food required for household consumption is unavailable, especially during the off- season when food stored were exhausted, and there was not enough money to buy the quantity of food needed. Farming households are often the most affected in terms of severe food insecurity and poverty in Africa, especially the smallholder farming households who depend on agriculture as their primary source of livelihoods [25,26].

The diet diversity results revealed a low diversity of diet status of household. The wide spread consumption of cereal and vegetable could be as a result of high cultivation of cereal crops such as rice, maize, sorghum, millet which are used to make *tuwo (*a dish eaten in the northern part of Nigeria often made from corn flour, rice or other cereals). *Tuwo* is often eaten with soups made from vegetables, some of these vegetable soups are *karikashi, kuka* and okra soup. Low diet diversities result in inadequate nutrients to support proper body functioning and normal growth as well as make them prone to repeated infections. Eating a variety of food within the major food group is often recommended, because no single food group contains all the essential nutrients required by the body [27].

The nutritional status of over half of the respondents were normal, suggesting minimal severity of food insecurity, food insecure with moderate hunger. The income of respondents is significantly associated with food insecurity, the higher the income of households, the more food secured they are. As they will be able to afford nutritious food in the required quantity, thereby also improving the nutrition status. Similarly, higher educational attainment is associated with increased food security as educated persons are more concerned about nutritionally balanced diet, make better decisions to meet the dietary needs and food preferences of their households [28]. Therefore, there is often a positive relationship between dietary diversity and education [29]. Low educational attainment among respondents could be due to less importance attached to formal education, especially for the girl child. In Nigeria and particularly in Northern Nigeria, a girl-child are less likely to attend school as compared to the boy-child [12,30,31]. This educational discrimination negatively impacts the nutritional status of the household and children especially. It observed that children of more educated parents especially more educated women benefit from better feeding practices, receive better prenatal care, and are less likely to be malnourished [32].

In North West Nigeria, stunting has been consistently above 50% in the last decade with children in rural areas been most stunted [15,33]. High stunting of children rate could be attributed to high household food insecurity, especially in terms of access to a variety of preferred food. Thus, households that are food insecure were more likely to have malnourished children. Low intake of sea foods, meat and legumes, which are rich in protein and other micronutrient, are reflected in poor nutritional indices such as stunting. The nutritional status of children is a good indicator of the overall well-being of a society and reflects food security status [34]. This is reflected in the significant relationship between prevalence of stunting, wasting and food insecurity.

The mean household size of seven persons in the study was relatively large when compared to the average Nigerian household size of 4.6 persons in the National Demographic Health Survey [15]. The large household size is likely due to the need for cheap source of farm labour, which can easily be obtained from large family size. However, this negatively correlates with household food security as larger household size suggests higher dependence ratio and means that more food will be required to meet and maintain the dietary needs of the household [35]. Low income of farm households which is often below the minimum poverty level of $1.90 per day [36], translates to food insecurity as low income mean fewer resources to buy food, reduced access to nutritious foods, and fewer options to cope with price shocks and food shortages. As a result, households may be forced to make difficult decisions that often result in inadequate dietary intake and malnutrition [37].

5. Conclusion and Recommendations

Food insecurity, low diet diversity of households and malnutrition in form of stunting of children (less than five years old) were high. Income and educational attainment were associated with food insecurity. The level of stunting, wasting and underweight indicates that malnutrition is still an important major public health problem among children in Northwestern Nigeria. Household food insecurity significantly correlated to wasting and stunting among the target age children investigated in this study. It is therefore recommended that the design of agricultural programmes and policies oriented towards reducing under-nutrition should promote diversity in agricultural production, alongside emphasizing increased production of staple nutritious crops. Also, extension agents should embark on food literacy to increase knowledge on adequate diet intake of farm households.

References

[1] FAO, IFAD, UNICEF, WFP and WHO, "The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition", Rome, FAO 2018.

[2] FAO, IFAD, UNICEF, WFP and WHO, "The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security". Rome, FAO, 2017.

[3] Food and Agriculture Organisation (FAO), International Fund for Agricultural Development (IFAD) and World Food Programme (WFP), "The State of Food Insecurity in the World. The multiple dimensions of food security", Rome, FAO 2013.

[4] Nwajiuba, C, "Nigeria's Food Security Challenges", retrieved from https://ng.boell.org/en/2013/10/14/addressing-nigerian-food-insecurity-and-agricultural-production-changing-climate. 2013.

[5] Babatunde, O. R. "The role of Nigerian agriculture in West African food security: Nigeria strategy support program (NSSP)", International Food Policy Research Institute (IFPRI) Report No. NSSP 11, 2012.

[6] Food and Agricultural Organization-FAO, "Food insecurity strains deepen amid civil conflict and drought", 2017. Retrieved online from http://www.fao.org/news/story/en/item/892734/icode/

[7] Food and Agricultural Organization-FAO, "The state of food insecurity in the world, Economic crisis impacts and lessons learned", 2009. Retrieved online from http://www.fao.org/3/i0876e/i0876e00.html

[8] Low External Input and Sustainable Agriculture-LEISA, "*Low external input and sustainable agriculture magazine*". Women Food Sovereignty, 25: 5-7, 2009.

[9] Ibrahim, H., Uba-Eze, N. R.., Oyewole, S. O. and Onuk, E. G. "Food security among urban households: A case study of Gwagwalada area council of the Federal Capital territory Abuja, Nigeria". *Pak. Journal of Nutrition* 8 (6), 810-813, 2009.

[10] Lawal, N. M, "Food Security and Vulnerability in Drought Prone Northern State of Nigeria: An Assessment of Three Communities in Northwestern Nigeria", *Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists,* Hammamet, Tunisia, September 22-25, 2013.

[11] Central Bank of Nigeria-CBN. Annual Reports and Statements of Accounts for Year ended December 2008-December, 2009. 2010

[12] United Nations Development Programme-UNDP. "Human Development Report, Nigeria 2008 - 2009", UNDP 2010. Retrieved on 28th February 2016.from www.undpreporthdi.ng.org

[13] World Bank. World Development Report: *Agriculture for Development*. Washington, DC. 2008

[14] Hackett, M, Melgar-Quiñonez, H. and Álvarez, M. C. 2009, "Household food insecurity associated with stunting and underweight among preschool children in Antioquia, Colombia", *Pan American Journal of Public Health*, 25(6): 506-510., 2009.

[15] Ajao, K. O., Ojofeitimi, E. O., Adebayo, A. A., Fatusi, A. O. and Afolabi, O. T, **"**Influence of family size, household food security status, and child care practices on the nutritional status of under-five children in Ile-Ife, Nigeria", *African Journal of Reproductive Health*. 14 (4) P. 117-126, 2010.

[16] Nigeria Demographic and Health Survey-NDHS, "Nigeria Demographic and Health Survey for Nigeria", Calverton, Md., United States: National Population Commission and ORC/Macro. 2013.

[17] Akinyele, O. I, "International Food Policy Research Institute (IFPRI), Ensuring food security and nutrition security in Nigeria: An assessment of the challenges, information needs and analytical capacity', *Nigeria strategy support program (NSSP). Background Paper* NSSP 007.Issue 03, 2009.

[18] Bickel G., Nord M., Price C., Hamilton W., and Cook J, "Measuring food security in the United States: Guide to measuring food security Washington, DC: U.S", *Dept. of Agriculture, Food and Nutrition Service*: 1-76. 2000

[19] World Health Organisation-WHO Multicentre Growth Reference Study Group. WHO Child Growth Standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development. Geneva: WHO, 2006.

[20] United States Agency for International Development-USAID. (2007). Preliminary Livelihoods Zoning: Northern Nigeria. A special report by the famine early warning systems network. A special report by the famine early warning systems network Pp1-49.

[21] De Onis, M. "World Health Organization reference curves," *The ECOG's eBook on Child and Adolescent Obesity*, 2015, Retrieved from http://ebook.ecog-obesity.eu

[22] United States Agency for International Development-USAID, "Food security in the U.S.: key Statistics and graphs". *United States Department of Agriculture Economic Research Service*, 2012. http://www.ers.usda.gov/topics/food-nutrition-assistance/food-securityin-the-us/key-statistics-graphics.aspx. Accessed December 16, 2016.

[23] Regassa, N., "Small holder farmers coping strategies to household food insecurity and hunger in Southern Ethiopia". *Ethiopian Journal of Environmental Studies and Management,* 4 (1): 39-48, 2011.

[24] Kuwornu, J. K.M., Suleyman, D. M., Amegashie D. P. K., "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, 2013.

[25] Cruz, L., "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. 2010

[26] Valdés, A., Foster, W., Anríquez, G., Azzarri, C., Covarrubias, K., Davis, B., Di Giuseppe, S., Essam, T., Hertz, T., Paula de la, A., O. Quiñones, E., Stamoulis, K., Winters, P., Zezza, A, "A Profile of the Rural Poor". *A Background Paper for IFAD Rural Poverty* Report, 2010. IFAD. Rome. http://www.ifad.org/rural/rpr2010/background/2.pdf.

[27] Torheim, L. E., Quattara, F., Diarra, M. M., Thiam, F.M., Barikno, I. and Hatloy, A. "Nutrient Adequacy and dietary diversity in rural Mali". *European Journal of Clinical Nutrition* 58: 594-604, 2004.

[28] Moon, W., Wojciech J. F., Larry R.B., Anna V.R., Pavlina P., Jordan J. and Manjeet S. C. "Demand for food variety in an emerging market economy". *Applied Economics* 34(5): 573-581, 2002.

[29] Parappurathu S., Kumar, A., Bantilan, M. C. S. and Joshi, P. K. "Food consumption patterns and dietary diversity in eastern India: Evidence from village level studies (VLS)". *Food Security,* 7(5): 1031-1042, 2015.

[30] United Nations Educational, Scientific and Cultural Organization-UNESCO. "Institute for Statistics, "Global Education Digest": Comparing Education Statistics across the World, 2011. Accessed via http://www.uis.unesco.org/Education/Documents/ged-2011en.pdf. On 12th April, 2016.

[31] National Bureau of Statistics-NBS. "Statistical Report on Women and Men in Nigeria, report 2013. Retrieved from www.nbs.gov.ng.

[32] Cuesta, J. "Education and Food Security: One Success, Two Warnings and Three Paradoxes: Special Focus: The Role of Education to Achieve Sustainable Development", *Wise* 2015. *Accessed from https://www.wise-qatar.org/education-food-security-success-warnings-paradoxes-jose-cuesta/* on July 24th 2020.

[33] Nigeria Demographic and Health Survey (NDHS) 2011: Nigeria Demographic and Health Survey 2010 (DHS) EdData profile 1990, 2003, 2008 and 2010: Education data for decision-making. Washington, DC: National Population Commission and RTI International.

[34] Naila, B. A., Mohammad, H. R., Zulfiqar, A. B., and Salma, H. B. "Gender and household food insecurity, and stunting in Pakistan children". *Food and Nutrition Bulletin*, vol. 27, (2), Pp. 114-127, 2006.

[35] Thomas, K. A, and Oladeji, J. O. Knowledge, Attitude and Practice of child nutrition among women in southwest, Nigeria. Ibadan Journal of Agricultural Research. 9(1): 190-199, 2013.

[36] *Hickel, J.* "Could you live on $1.90 a day? That's the international poverty line. *The Guardian, 2015.* ISSN 0261-3077. Accessed from www.guardian.com. On 10th January 2017.

[37] Wight, V., Kaushal, N., Waldfogel, J. and Garfinkel, I, "Understanding the Link between Poverty and Food Insecurity among Children: Does the Definition of Poverty Matter?" *Journal of Child Poverty,* 20(1): 1-20, 2014.