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Food Insecurity Status of Rural Households during the Post-planting Season in Nigeria

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Abstract
About two-thirds of rural households in Nigeria are engaged in crop and livestock production as their main source of livelihood. These households are especially vulnerable to chronic food shortages owing to adverse weather and the unavailability of enough food from home production, especially during the post-planting season. This study attempts a proper empirical identification of the food insecure and the reasons for their insecurity, through a profile of food insecurity indices and an investigation of the factors influencing their status during the post-planting season in rural Nigeria. We construct food insecurity indices and specify a probabilistic model, employing the post-planting visit data of the first wave of the General Household Survey-Panel (2010). Results showed that almost half (49.4 percent) of rural households in the country were food insecure during the post-planting period. Identified key rural food insecurity determinants include: gender of household head, tertiary education of household head, access to both formal and informal credit and remittances, household size, dependency ratio and living in the North-Central, North-East, South-East and South-West Geopolitical zones of the country. Since food availability remained below the required levels for large parts of the rural populace during this season, identified food insecure households should be targeted for safety nets.

Keywords: rural households, food insecurity, post-planting season, Nigeria

1. Introduction

The international community has long been concerned about eradication of hunger and undernourishment especially of vulnerable groups. This led to its inclusion as one of the two targets of the first Millennium Development Goal (MDG). The target is a reduction by half, the amount of people who suffer from acute

starvation and who earn less than $1 per day by the year 2015 (FAO, 2006). Despite the global resolution to curb the food insecurity menace, the recent report on world food insecurity highlighted that the number of people suffering from hunger has increased every year since 1996. Also, about 925 million people worldwide still suffer from chronic hunger, in which 235 million hunger sufferers are from sub-Sahara Africa (FAO, 2010). This brings to the fore, the fact that the right to food is still one of the most often violated right in the world today (Clover, 2003). Consequently, global food insecurity, coupled with the sharp increases in world food prices, the financial crisis and the economic depression, is a concept that can no longer be ignored. Thus, it was again a topic of discussion at the World Food Summit (FAO, 2010).

Hunger on a global scale however, remains serious. For instance, among the world's regions, South Asia and sub-Saharan Africa continue to have the highest levels of hunger. In Nigeria, a Global Hunger Index (GHI) rank of 40 among 79 countries in 2012, together with rising food prices, malnutrition and deaths as a result of wide-spread poverty is an indication of the prevalence of food insecurity in the country. It is also a sign of extreme suffering for millions of poor people (Global Hunger Index Report, 2012). Although, successive governments have made efforts to achieve food security in the country through the setting up of a number of agricultural development institutions, and special programmes and projects which include: the National Agricultural Development Fund, NADF (2002); National Special Programme on Food Security, NSPFS (2002); National Food Crisis Response program [NFCRP], Food Security Thematic Group [FSTG] in 2009 among others, an overwhelmingly large proportion of Nigerians are still food insecure. The country now faces the challenge of meeting the basic food needs of its population. For instance, between 1990 and 2001, there was an increase in the share of food imports in Nigeria's budget from 9 percent to 19 percent. It reached its peak in 1995 at 55 percent. Similarly, relative to total imports, the share of food imports increased from about 8 percent to 22 percent over the same period (Okolo, 2004). Recently, food imports were estimated at US$3.99 billion a year, which amounts to about 8

per cent of total foreign exchange disbursement (CBN, 2009). In addition, Nigeria was listed among the 42 countries tagged "low-income food deficit countries"(Okunmadewa, 2003) and available evidence indicates that on almost every indicator such as deficit in per calories intake, export earnings, per capita income and food imports, Nigeria exhibits high levels of food insecurity (Akpan, 2009).

With majority of Nigerians residing in rural areas and about two-thirds engaged in crop and livestock production for their own use and market sales, food and nutrition security is closely tied to agricultural productivity. This is because higher production on one's own farm or from one's livestock improves the food security status of the household and vice versa. However, malnutrition is pervasive in the entire country especially across people of similar age and other categories of individuals in the rural areas. This situation persists despite various approaches addressing the challenge (Isaac, 2009). From the foregoing, it is evident that Nigeria may not be able to achieve the Millennium Development Goals especially those related to hunger and poverty, if the food insecurity situation especially among rural households is not adequately addressed.

The problem of food insecurity especially during the hungry period among rural households in Nigeria is long standing (Obamiro et al., 2005). This is because after harvesting most rural households are food secure as they have enough food from their own production. However, owing to inadequate processing and storage facilities and the fact that these households have other important needs, they usually end up selling their excess produce at low prices during the harvesting period. Most times, they rely on market purchases since they do not have enough to subsist on, the year round. This leads to inconsistent food availability thus contributing to food insecurity during the period.

There is a consensus that in matters pertaining to food insecurity, food insecure households should be properly identified and the reasons for their insecurity investigated. In addition, changes in food security status of households over time should be closely monitored with explanations given for the changes. Thus,

since more than half of Nigeria's population are currently employed in the agricultural sector (Manyong et al., 2005), and with the vast majority of these individuals living in rural areas, an examination of the factors associated with food insecurity status during the post planting season in Nigeria is pertinent if progress is to be made towards achieving the first Millennium Development Goal. Also, an investigation of the factors that influence the food insecurity status among rural households during the post-planting season will provide clear information about what needs to be done to ensure food security among rural households particularly during this season. This can be achieved if proper attention is given to improvements in nutritional status, while all the other necessary conditions, such as adequate health and care, are also properly considered.

This study contributes immeasurably to the literature on food security status of rural households during the post-planting season, since to the best of our knowledge there has been no empirical study on the food insecurity status of rural households in Nigeria that has used national representative data collected specifically during the period. This empirical research which ambitiously assessed the food insecurity status of rural households during the post-planting season in Nigeria therefore fills some of the key research gaps in this area.

2. Data and methodology

2.1 Scope and Data Source

The scope of this study is Nigeria. Nigeria is made up of 36 States and the Federal Capital Territory (FCT), Abuja. It has 774 Local Government Areas (LGAs) and a population of 158.4 Million (World Bank, 2010). Nigeria is located in West Africa on the Gulf of Guinea between Benin and Cameroon and lies between latitudes 4^{o} 1' and 13^{o} 9' N and longitudes 2^{o} 2' and 14^{o} 30' E. It has an area of 923,768 square kilometers and shares borders with Cameroon in the East, Chad in the Northeast, Niger in the North, and Benin in the West. Nigeria's climate is arid in the North, tropical in the center, and Equatorial in the South. Mean maximum temperatures are 30^{o} C–32^{o} C in the South and 33^{o} C–35^{o} C in the North. High humidity is characteristic from February to November in the South and from June

to September in the North while low humidity coincides with the dry season. Annual rainfall decreases Northward and rainfall ranges from about 2,000 millimeters in the coastal zone (averaging more than 3,550 millimeters in the Niger Delta) to 500–750 millimeters in the North (Federal Research Division, 2008).

Secondary data used in this study was the post-planting visit data of the first wave of the General Household Survey-Panel collected by National Bureau of Statistics (NBS) in conjunction with the World Bank between August and October, 2010. This is the first General Household Survey-Panel (GHS-Panel) to be carried out by the NBS. This data was collected in response to the needs of the country, given the dependence of a high percentage of households on agricultural activities in the country. The GHS-Panel was carried out in two visits to the Panel households (post-planting visit in August-October 2010 and post-harvest visit in February-April 2011) (NBS, 2012).

The sample design was a 2-stage stratified sampling. The first stage involved the selection of Enumeration Areas (EAs) based on probability proportional to size (PPS) of the total EAs in each state and Federal Capital Tertiary and the total households listed in those EAs. A total of 500 EAs were selected using this method. The second stage was a systematic random selection of ten (10) households from each EA to make up a total number of 5000 households consisting of 3370 rural households and 1630 urban households. The final number of households interviewed was 4,986 because of a non-response rate of 0.3 percent. However, due to incomplete information from some households, only 3306 rural households were used for this study. These 3306 households therefore constituted the sample size for this study.

2.2 Methodology

Descriptive statistics was used to examine the socio-economic characteristics of the rural households in Nigeria and to profile the food insecurity status of the respondents by selected socio-economic variables. The descriptive tools used include means, frequencies and percentages. The need for such analysis is predicated on the fact that a households' food security status is largely a function of social and economic characteristics. Households' expenditure on food which has found wider application in several empirical studies (Foster et. al., 1984; FAO, 2003; Bamou and Mkouonga, 2008; Omonona And Agoi, 2007) was used to estimate the food security line for rural households in Nigeria. Hence, the food security line was estimated as the two-thirds of the mean-per capita monthly expenditure of all households. Households were then classified into their food security status as food insecure and food secure 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.

Adopting the method of estimation of the Foster, Greer and Thorbecke poverty index, the food security index was estimated as:

$$F_{\alpha}=\frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^{\alpha}$$

Where:

F_{α}= Food security index

z = food security line (2/3 mean per-capita food expenditure)

q = number of households below the food security line

n = total number of households in the population

yi = per capita food expenditure in increasing order for all households

α = is the aversion parameter that takes values of zero, one or two.

Setting α equal to zero, F_o is the head count index measuring the incidence of food insecurity. That is, the proportion of food insecure people from the total population.

Setting α equal to one, F_1 is the food insecurity gap, measuring the depth of food insecurity. That is, on the average, how far the food insecure are from the food security line.

Setting α equal to two, F_2 is the severity of food insecurity among households. That is, the depth of food insecurity and inequality among the poor.

A Probit model was employed in determining the factors influencing the food insecurity status of households in rural Nigeria during the post-planting season. The food security status of households which is bivariate, taking the value of 1 for food insecure households and 0 for food secure households was used as the dependent variable. The model assumes that there is a latent, unobserved continuous variable Y^* that determines the value of Y and includes believable error term distribution as well as realistic probabilities (Oni et al., 2011).The model is specified as follows:

$$Y^* = X'\beta + \varepsilon,$$

Where

$\varepsilon \sim N(0, 1)$. Then Y can be observed as an indicator for whether this latent variable is positive:

Y = (Food insecure=1, Food secure=0)

X = Vector of explanatory variables;

ß = Coefficients

ε_i = Random error

The explanatory variables included in the model are:

X_1=Gender (D=1 if male; 0 otherwise)

X_2=Marital status (D=1 if married; 0 otherwise),

X_3=Age of household head (Years)

X_4=Primary education of household head (D=1, if Yes; 0 otherwise),

X_5=Secondary education of household head (D=1, if Yes; 0 otherwise),

X_6=Tertiary education of household head (D=1, if Yes; 0 otherwise),

X_7=Household size (Number),

X_8=Occupation (D=1, if farming; 0 otherwise),

X_9=Expenditure on non-food items (₦)

X_{10}=Access to informal credit (D=1, if Yes; 0 otherwise),

X_{11}=Access to formal credit (D=1, if Yes; 0 otherwise),

X_{12}=Access to remittances (D=1, if Yes; 0 otherwise),

X_{13}=Dependency ratio

X_{14}=North-Central (D=1, if Yes; 0 otherwise),

X_{15}=North-East (D=1, if Yes; 0 otherwise),

X_{16}=North-West (D=1, if Yes; 0 otherwise),

X_{17}=South-East (D=1, if Yes; 0 otherwise),

X_{18}=South-West (D=1, if Yes; 0 otherwise),

3. Household Distribution

3.1 Socio-economic Characteristics of the Households

Table 1 presents the distribution of rural households by selected socio-economic characteristics. The household characteristics examined include age, household size, gender, educational status, occupation status, marital status and geographical location of the households. Most of the rural household heads were between ages 35 and 54 years with only a few above 75 years of age. The mean age of household heads stood at 49.9 years, implying that majority of the respondents were in their active working age. Over three-quarters of household heads were literate with one form of education or the other while about one-third had no formal education. Also, majority of the household heads were male, married and had an average household size of 6 members. Further, as expected, more than four-fifths of the respondents were engaged in farming as their primary occupation.

Table 1: Distribution of Households by Socio-Economic and Location Characteristics

Variables	Frequency	Percentage
Age		
≤34	515	16
35-54	1,540	46
55-74	990	30
≥75	261	8
Gender		
Male	2876	87
Female	430	13
Marital status		
Married	2711	82
Single	595	18
Educational status of household head		
No-formal education	1322	40
Primary	1124	34
Secondary	562	17
Tertiary	298	9
Occupational status of household head		
Farming	2810	85
Non farming	496	15
Zones		
North-Central	562	17
North-East	661	20
North-West	727	22
South-East	595	18
South-South	529	16
South-West	232	7
Total	3306	100

Source: Authors Computation, 2012

3.2 Food Insecurity Profile

The food insecurity profile of rural households in Nigeria during the post planting season is presented in Table 2. The food insecurity line defined as two-thirds of the mean per capita food expenditure of the total households stood at ₦3236.53. This implies that a household whose per-capita expenditure was below N3236.53 was classified as food insecure while a household whose per-capita expenditure equaled or was above this amount was classified as food secure. The degree of food insecurity in rural Nigeria was assessed using the three food insecurity indices: incidence of food insecurity (F_0), depth of food insecurity (F_1), and severity of food insecurity (F_2), following the Foster, Greer and Thorbecke poverty measure. The head count index of food insecurity showed that almost half (49.4%) of the rural households were food insecure, while the food insecurity depth which measures the extent by which food insecure households were below the food insecurity line was 0.18. This implies that on the average, a food insecure household will require ₦582.58 to exit food insecurity. The food insecurity status of households was further disaggregated by zone, gender, age, marital status, occupational status, educational status and household size as follows:

The disaggregation by zone revealed that rural households in the North-East (56 percent), North-Central (48 percent) and North-West (47 percent) had the highest incidences of food poverty in Nigeria. This is an indication that these households were unable to meet their expected food expenditure. The food expenditure gap of 0.21, 0.17 and 0.17 for these rural households imply that the food insecure households on the average will require about ₦673.20, ₦59.92 and ₦550.21 respectively to exit food insecurity. Conversely, households in the South-South zone had the lowest incidence of food insecurity (29%). This finding corroborates the findings of Ashagidigbi (2012) in which South-South zone had the least incidence of food insecurity. The severity of food poverty revealed a higher level of inequality in food expenditure distribution among households residing in North-East zone followed by household living in North-Central zone. However, across the six geopolitical zones, households in the South-South zone recorded the lowest disparity in food expenditure distribution.

Table 2: Food Insecurity Profile by selected Socio-economic Variables

Zones	**Incidence(F_0)**	**Depth(F_1)**	**Severity(F_2)**
North Central	0.48	0.17	0.09
North East	0.56	0.21	0.10
North West	0.47	0.17	0.08
South East	0.42	0.14	0.07
South South	0.29	0.09	0.04
South West	0.36	0.13	0.07
Gender			
Male	0.46	0.17	0.08
Female	0.33	0.11	0.05
Marital status			
Single	0.27	0.09	0.04
Married	0.48	0.17	0.09
Educational level			
Non formal education	0.49	0.19	0.10
Primary education	0.45	0.15	0.07
Secondary education	0.39	0.14	0.07
Tertiary education	0.30	0.08	0.03
Occupational status			
Non farming	0.28	0.10	0.05
Farming	0.47	0.17	0.08
Age			
≤34	0.36	0.12	0.06
35-54	0.49	0.18	0.09
55-74	0.44	0.15	0.07
≥75	0.38	0.16	0.07
Household size			
≤5	0.27	0.09	0.04
6-10	0.57	0.21	0.10
11-15	0.69	0.28	0.14
≥16	0.73	0.40	0.28

Source: Authors Computation, 2012

With respect to gender, the result showed that male-headed households had a higher incidence (0.46) of food insecurity when compared with their female counterparts (0.33). The food insecurity depth and severity indices further buttress this fact. While a male headed household on the average requires N1485.57 to exit food insecurity, a female headed household on the other hand would require ₦1077.76. The food severity index also reveals a higher level of inequality in food expenditure distribution among male-headed households than female-headed households.

The distribution by marital status revealed that household with married heads were more food insecure than those with single heads. This could be attributed to the fact that married household heads are likely to have larger household sizes when compared to single household heads. The food insecurity depth of 0.17 means that married household heads on the average would require ₦559.92 to get to the level of food insecurity line while single household heads would require only ₦291.29 to get to the same level. The food severity index of 0.08 also reveals a higher level of inequality in food expenditure distribution among male headed households than female headed households in the study area.

The educational status profile showed that households whose heads had no formal education had the highest food insecurity incidence and depth of 0.49 and 0.19 respectively and will require ₦605.23 on the average to be food secure. However, households whose heads had tertiary education had the lowest incidence (0.30) and depth of food insecurity (0.08). The food severity index also revealed the highest and lowest level of inequality in food expenditure distribution among households whose heads had no formal education and tertiary education respectively. This result agrees with the findings of Riber and Hamrick (2003) in which household heads with tertiary education were the most food secure.

The disaggregation by household size, revealed a positive relationship between household size and food insecurity. In other words, household food insecurity increased as household size increased. While households with less than or equal to five members had the lowest incidence (0.27), depth (0.09) and severity

of food insecurity (0.04), households with greater than or equal to sixteen members had the highest incidence (0.73), depth (0.40) and severity of food insecurity (0.28) respectively followed by households with between 11 and 15 members. The impact of large family size is such that it reduces the per-capita food expenditure of the family thereby aggravating food insecurity in that household. This result is in line with the findings of Babatunde et al., (2007) and Omonona and Agoi (2007) which revealed that the incidence of food insecurity increased with increase in household size.

Highlights of the occupational distribution showed a higher incidence of food insecurity among households heads primarily engaged in agriculture than those engaged in non-farming activities. This implies that farming households were more food insecure than non-farming households. This is expected, as agriculture in the rural areas of Nigeria is largely characterized by low capital involvement, use of crude implements, poor infrastructural and storage facilities and human drudgery. This circumstance ultimately leads to lower average earnings and inability to meet the food requirements of the family. The food insecurity gap and severity indices followed the same pattern.

Contrary to *a priori* expectations, households whose heads were between ages 35 and 54 had the highest incidence, depth and severity of food insecurity. Household heads within this age group are in their economic active age and are consequently expected to be more food secure than those in other age groups. However a likely reason for the high incidence of food insecurity incidence within this age group is that these households are large sized with a high dependency ratio. On the other hand, households whose heads were aged 75 years and above had the lowest food insecurity indices. This could be as a result of the fact that these households are small sized and depend mainly on remittances for their upkeep.

4. Determinants of Household Food Insecurity during the Post-planting Season

Table 3 presents the Probit regression results of the determinants of rural household food insecurity during the post-planting season in Nigeria. The Chi-square value of 715.20 which was significant at 1% is an indication that the model is well fitted. The result shows that while marital status, household size, dependency ratio, living in both North-Central, North-Eastern, South-East and South-West zones had significant positive effects on household food insecurity status, gender, tertiary education, expenditure on non-food items, access to both formal and informal credit and remittances had negative effects on rural households' food insecurity status during the post-planting season in Nigeria. The marginal effects result of the regression is reported as follows:

The gender of household head had a negative and significant effect (-0.164) on household food insecurity status. This implies that households headed by females have a lower probability of being food insecure by -0.164. This could be attributed to the fact that female headed households usually have smaller household sizes and consequently lower dependency ratio when compared with their male counterparts. This result supports earlier findings in this study that male headed households have a higher incidence (0.46) of food insecurity when compared with their female counterparts (0.33).

With respect to marital status, the positive relationship with household food insecurity status indicates that the probability of household food insecurity increases with married household heads. Specifically, married household heads increased the probability of being food insecure by 0.150. This finding is in line with the findings of Olayemi (1998).

Household size and dependency ratio had positive and significant effects on household food security status. In other words, increase in household size and dependency ratio would lead to a decrease in the food security status of a household.

Specifically, a member increase in household size and an additional non-working member to the household increased the probability of household food insecurity by 0.037 and 0.292 respectively. The result is in line with the findings of Olayemi (1998) and Obamiro et al., (2003) in which larger household sizes increased the probability of moving into food insecurity.

Occupation of household head was significant but positive implying that household heads engaged in farming increases the probability of household food insecurity by 0.095. This could be attributed to the fact that agriculture which is characterized by seasonal variations in production as well as longer production cycles leads to irregular income and consequently a high probability of being food insecure. This is in agreement with Ayantoye et al., (2011) that household heads engaged in farming activities increases the probability of being food insecure.

Tertiary education had a negative and significant influence on household food insecurity status. This suggests that households whose heads have tertiary education have a lower probability of being food insecure. Specifically, the probability of being food insecure reduced by -0.107 for households whose heads had tertiary education. This result is in consonance with Ayantoye et al., (2011), Oni et al., (2011), Amaza et al., (2006) and Riber and Hamrick (2003).

Similarly, expenditure on non-food items had a negative effect on household food insecurity implying that a naira increase in household expenditure on non-food items reduced the probability of household to be food insecure. This result is in consonance with the findings of Olarinde and Kuponiyi (2005) in which households that spent more on non-food items were less likely to be food insecure.

Table 3: Factors Influencing Food Insecurity Status of Rural Households during Post-planting Season

Variables	Marginal effect	Z-value
Gender	-0.164	-3.28***
Marital status	0.150	3.42***
Age	-0.896e-03	-1.37
Primary	-0.028	-1.27
Secondary	-0.045	-1.55
Tertiary	-0.107	-2.84**
Household size	0.037	7.86***
Occupation	0.095	3.48***
Expenditure on non food items	-0.472e-04	-8.40***
Access to informal credit	-0.086	-3.88***
Access to formal credit	-0.109	-1.93*
Remittance	-0.198	-1.93*
Dependency ratio	0.292	5.75***
North-Central	0.118	3.41***
North-East	0.114	3.28***
North-West	0.037	1.09
South-East	0.152	4.48***
South-West	0.141	3.21***

Source: Authors Computation, 2012 ***significant at 1%, ** significant at 5%, *significant at 10%.

Number of obs = 3306

LR chi2(18) = 715.20

Prob> chi2 = 0.0000

Log likelihood = -1908.9518

Pseudo R^2 = 0.1578

Also, access to credit (formal and informal) had negative effects on household food insecurity status. This indicates that households with access to credit have a lower probability of being food insecure. The significant effect of informal access to credit facilities in lifting households out of food poverty could be due to the ease of

obtaining and use of such funds in meeting consumption expenditures such as food, medical, school fees, and social emergencies. This result corroborates the finding of Ayantoye et al., (2011) in which access to credit increased the probability of a household to be never food insecure.

Access to remittances had a negative effect on household food security status implying that households with access to remittances have a lower probability of being food insecure. This could be attributed to the fact that remittances contribute to household income of those that have access to it. This would lead to increased per capita income, increased per capita food expenditure and consequently improved food security status of the household. Further, living in North-Central, North-Eastern, South-Eastern and South-Western zones had positive and significant effects on household food insecurity status. This connotes that households residing in these zones are more likely to be food insecure relative to households in the South-South zone. Specifically, households residing in the North-Central, North-Eastern, South-Eastern and South-Western zones increased the probability of being food insecure by 0.118, 0.114, 0.152 and 0.141 percent respectively relative to the South-South zone. This finding corroborates the findings of Ashagidigbi (2012) in which households residing in the North-Eastern zone had a high probability of being food insecure.

Conclusion and Policy Recommendations

This study, which empirically assessed the food security status of rural households during the post-planting season in Nigeria, showed that almost half of rural households in the country were food insecure during this period. The study also identified key rural food poverty determinants as gender, tertiary education, expenditure on non-food item, access to both formal and informal credit and remittances, marital status, household size, dependency ratio, living in North-Central, North-Eastern, South-Eastern and South-Western zone. Therefore, efforts at reducing food insecurity during the post-planting season should be targeted

towards households with these characteristics and households living in the identified zones.

Based on the findings of the study, the following recommendations geared towards ensuring food security during this period are made:

- Identified food insecure households should be targeted for safety nets which could be in form of subsidized food prices during the post-planting period, as well as improved access to credit facilities especially in the rural North-Central, North-Eastern, South-Eastern and South-Western zones.
- There should be intensification of enlightenment campaigns and programs on birth control measures and on the benefits of small household size.

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