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Analysis of food insecurity status and its determinants among farming households in Ogbomoso agricultural zone of Oyo state, Nigeria

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Abstract: The aim of the study was to analyse the food insecurity status of farming households in Oyo State, Nigeria. The study made used of primary data which were randomly collected from 120 farming households with the aid of structured questionnaire, the study analysed the food insecurity status of farming households and its determinants in the study area. Additionally, various coping strategies employed against food insecurity status by the respondents in the study area were also identified. The analytical technique employed included descriptive statistics, Foster Greer and Thorbecke (1984) and Logit regression model. The study showed that the mean age was 48.55. It revealed that majority of the respondents were male with a percentage of 87.5%. It was shown that majority of the respondents were married 83.33%, 62.50% were Christians, with mean household size of 7. It was also discovered that 48.33% of the respondents were food secured while 51.67% were food insecure. With food insecurity line of ₦16755.06 the head count ratio of food insecurity incidence (α_0) was 0.4001, depth (α_1) was 0.0871and severity (α_2) was 0.0327. The significant variables affecting food insecurity status included household size at 1% level, and Farming experience at 10% level, Level of education at 1% level and number of remittances received at 1% level. The study showed that majority of the respondents in the study area shift to less preferred food as their coping strategy in the study area with the percentage of 46.66%.
Keywords: Determinants, poverty status, coping strategies, farming households, Nigeria

INTRODUCTION

Food insecurity is a substantial problem in nearly every advanced capitalist nation, with sizable portions of residents in many affluent countries struggling to eat healthily every day (Laborde *et al.,* 2021). Twenty percent of U.S. households classified as food insecure had midrange or high incomes, according to responses to the 1995-97 Current Population Survey (Nord and Brent 2002). During the last two decades hunger has reemerged as an important social issue in the United States. As a result, efforts were initiated to adequately define hunger and food insecurity (i.e., limited or uncertain access to nutritionally adequate and safe foods) and to develop appropriate indicators for their measurement (Hanson and Connor, 2014). Four grades of the severity of food insecurity among the households resulted: food secure and occasionally, moderately and extremely food insecure (Frongillo *et al.,* 2003).

Food insecurity is a salient health issue comprised of four dimensions – food access, availability, utilization, and stability over time (Ashby *et al.,* 2016). Accumulating evidence suggests that food insecurity in US colleges and universities is higher than in US households, making this a new public health priority (Nazmi *et al.,* 2018). Food insecurity, which has been recognized as an important determinant of health, is estimated to have affected almost one in ten Canadian households in 2004. Analyses of indicators of household food insecurity on several recent population health surveys have shed light on markers of vulnerability and the public health implications of this problem (Kirkpatrick and Tarasuk, 2008). The global economic policy drivers of food insecurity have been widely acknowledged and debated in the literature, and in policymaking forums.

Action on economic policy reform in support of food security, however, has been only weak and selective in practice. Since the 2007 to 2008 food crisis and in the context of an ongoing precarious global food security situation, global food security initiatives have been situated squarely within the existing global economic regulatory framework. These initiatives include most prominently measures to increase food production and to share information on markets and investments in World Hunger and the Global Economy: Strong Linkages, Weak Action ways that encourage them to operate smoothly and responsibly (Clapp, 2014).

The recurring storm of poverty and food insecurity in the sub-Sahara Africa has continually posed major challenge to the global community. This signals an alarming threat to the region's ability to fully achieve the desired sustainable development (Oyebanjo *et al.,* 2013). Existing evidence on the association between food insecurity and childhood obesity is mixed. In addition, literature from developing countries in general and Ethiopia in particular on the nexus and impact of household and child food insecurity on childhood obesity in the context of urbanization remains limited (Biadgilign *et al.,* 2021). Food insecurity is one of the determinant factors of malnutrition in developing countries. (Betebo *et al.,*2017).

Food insecurity is not having sufficient quantities of good-quality foods—is inversely related to physical and mental health and directly related to poor dietary intake (Bawadi *et al.,* 2012) Addressing the challenges of global food security will benefit from the simultaneous incorporation of nutritional priorities that contribute to the good health of populations (Shetty 2009).

Although household income, income per capita, income of fathers and income of mothers were found to be risk factors for food insecurity and nutritional status of children to differ significantly according to food security level in other studies, this study did not find similar results. This may be due to factors such as the differences in culture, religion and geographic location of this study compared to the previous studies (Sharif and Merlin, 2001). Measures of socio-economic status (SES) were compared with a measure of physical well-being, mid-upper arm circumference (MUAC), in the food insecure regions of Ethiopia. Income, housing conditions and education had the greatest correlation to MUAC, and significant differences in these measures were observed between malnourished and adequately nourished individuals. Findings indicate that in rural Ethiopia, income, education and housing quality may be better indicators of SES than wealth and measures encompassing home and landownership (Doocy and Burnham, 2006).

Agriculture is an important tool for reducing the effects of household food insecurity, unemployment and poverty which are major problems in urban areas in Nigeria. Food insecurity continues to worsen in some urban areas of the country and many households resorted into urban farming as a means of coping (Yusuf *et al.,* 2015). 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 (Adepoju and Adejare, 2013). In general, the food insecure households were characterized by households living below poverty line and had larger household size, more children, school- going children and non-working (Shariff and Lin, 2004).The new global and African food security agenda is overwhelmingly production's and rural in its orientation, and is based on the premise that food insecurity is primarily a rural problem requiring a massive increase in smallholder production (Crush and Frayne, 2011).

Food insecurity has been associated with diverse developmental consequences for U.S. children primarily from cross-sectional studies. We used longitudinal data to investigate how food insecurity over time related to changes in reading and mathematics test performance, weight and BMI, and social skills in children (Jyoti etal.,2005). Even though food insecurity is experienced in different degrees, and in many forms and periods, most studies have often classified food insecurity as mild/very low, moderate/low and severe. This study reveals that food insecurity is a rural and productivity problem and not a poverty issue (or inadequate credit).

It is essential therefore, to have the analysis of food insecurity done in the household level to understand the actual demand for food and thus its effect on the food security situation on households. Specifically, the study analysed the food insecurity status as well as its determinants with their coping strategies in the study area.

METHODOLOGY

The study was conducted in Ogbomoso, Oyo State. Ogbomoso is one of the largest towns in the state. Ogbomoso comprises five local government areas namely Surulere, Ogo-Oluwa, Orire, Ogbomoso north and Ogbomoso south. Ogbomoso town is geographically located on latitude 8.10N and longitude 3.290E. The population was approximately 166,034 as of 2006 census, an area of 23km^2 with about 45% civil servant who as well engaged in farming, and the other 55% are into full time farming (both crops and animal production) and different trading activities.

Primary data collected through a well-structured questionnaire were used for the study. Multistage random sample technique was used in the selection of the respondents. In all, 120 registered farming households were used for data analysis. Descriptive statistics, Foster Greer and Theorbecke (FGT) 1984 food insecurity index and Logit regression model were used to analyze the data. Descriptive statistics such as Tables, mean, frequencies, percentage, and cumulative frequencies Foster, Greer and Thorbecke (FGT) 1984 Food insecurity index.

Using the method of estimation of the Foster, Greer and Theorbeke poverty index (1984), the food insecurity index was estimated as:

$\mathbf{F\alpha\ (y,z)\ =1/n\ \sum^{q}_{i=1}(Z\text{-}yi)^{\alpha}/z}$, Where, F_α= Food security index; Z= Food security line for the respondents in the study area; Q= Number of farmers below the food security line; N= Total number of farmers in the population; Y_i= per capita food expenditure in increasing order for all farmers; α= is the aversion parameter that takes values of Zero, one and two.

Logit model was used to estimate the determinant of food insecurity among farmers in the study area.

$P_{i=}\sum (Y+1|xi) = 1|\ 1+ e^{-(\alpha+\beta\times i)}$; $P_I = 1|1\text{-}e\text{-}zt$

Where, $Z_i = \beta_1 X_1\ \beta_2 X_2 + \ldots\ldots\ldots + \beta_n X_n$

F_I is the cumulative logistic distribution function. In order to obtain the value of Z_I, the likelihood of obtaining the sample need to be form by introducing the dichotomous response variables (Y_i) such that;

Y_i = 1 if food secure and 0 if food insecure

X_i = independent variables; 1,2,3…..13; α_i and β_i are the hypothesized independent variables that were used;

X_1 = gender, X_2 = age (years); X_3 = religion, X_4 = Marital status of household head (1single; 2 if married, 3 if divorced, 4 if separated and 5 if

widow(er)); X_5 = Family size in number, X_6 = dependency ratio, X_7= cooperative society, X_8 = contact with extension agent, X_9 = secondary occupation; X_{10} = farm size, X_{11}= farming experience, X_{12} = educational level, X_{13} = amount of remittances received. The CSUI employed to assess the extent of use of the coping strategies by farming households in analyzing the extent of the use of any of the coping strategies by farming household, a coping strategy index (CSI) was developed by ranking. The extent of use of coping strategies was expressed using a four-point scale with the following order, 1,2, and 3 for Never, Always and Sometimes respectively. CSUI = $N_1X_3 + N_2X_2 + N_3X_1$. Where; CSUI = Coping strategies use index. N1 = Number of households that never uses a-particular CSI. N2 = Number of households using a particular CSI always. N3 = Number of households that sometimes used a particular CSI.

RESULTS AND DISCUSSION

Socioeconomic characteristics of respondents

The socio-economic characteristics of the respondents consist of Gender, age, household size, religion, marital status. Table1; revealed that 87.5% of the respondents were male while, 12.5%of the respondents were female. The implication is that there were more male farmers in the study area than female. This finding corroborated with the work of Fanifosi and Amao (2016) titled socioeconomic analysis of nexus between food insecurity and poverty status of farming households in Osun State, Nigeria. Which showed that majority of the farming households were male headed with 80.59%. The table revealed that 7.50% of the respondents falls between the ages of 30 or less.12.50%of the respondents were between the ages of 31-40, 36.67%were between 41-50, 33.3%were between the ages of 51-60 and 10.00% were above 60.The implication is that majority of the respondent were between ages of 41-50with 36.67%.The mean age of the respondents was 48.55. This finding corroborated with the work of Kelly *et al*, (2018) Titled Analysis of food security among cocoa producing households in Ghana which revealed the average age of farmers in the study area to be 48years. The table also showed that 75 respondents (62.50%) were Christians .41 respondents with percentage of 34.17% were Muslim and 4 which has the percentage of 3.33% were traditional in the study area. This implies that there were more Christians in the study area. This finding was corroborated by the work of Yekinni *et al*, (2015) titled coping strategies to food insecurity among rural household in Ido local government area of Oyo state where the majority of the respondent were Christians with 55.0%. The table further revealed that 15.00% of the respondents were single, 83.33% of the respondents were married, 0.83% of the respondents were divorced, and 0.83% of the respondents were separated. The implication is that majority of the respondents in the study area were married with 83.33%.

Table 1: Distribution of respondents based on socioeconomic characteristics

Gender	Frequency	Percentage	C%
Male	105	87.5	87.5
Female	15	12.5	100
Age			
< 30	9	7.50	7.50
31-40	15	12.50	20.00
41-50	44	36.67	56.67
51-60	40	33.33	90.00
Above 60	12	10.00	100
Mean	48.55		
Religion			
Christianity	75	62.50	62.50
Islam	41	34.17	96.67
Traditional	4	3.33	100
Marital Status			
Single	18	15.00	15.00
Married	100	83.33	98.33
Divorced	1	0.83	99.17
Separated	1	0.83	100
Household size			
< 5	42	35.00	25.00
6-10	77	64.17	99.17
Above 10	1	0.83	100
Mean	5.94		
Total	120	100	

Source: Field survey, 2021.

This finding corroborated with the work of Yekinni *et al* (2015) titled coping strategies of food insecurity among rural household in Ido local government area of Oyo state, where majority of the respondents were married with 75%. And finally from table, it was revealed that 35.00% of the respondents households were <=5, 64.17% of the household size were between 6-10, 0.83% were above 10. The mean of the household size is 5.94. This implies that majority of the household were 6-10. This result corroborated with the work of Fanifosi and Amao (2016) in Nigeria where the mean is 7.

Food security status of the respondents in the study area using FGT food insecurity index.

Table 2 showed the two broad issues in the measurement of food security, there are establishment of a food insecurity line. The total annual expenditure for all the households in the study area was N4,888,000. The mean annual expenditure of the respondents in the study area was N40,733.33k per annum. The total per capita expenditure was N3,015,911.306k the mean per capita expenditure was N25,132.59 per annum.it is necessary to get the food insecurity line to determine the number of food insecure people i.e. those below the food insecurity line. The food insecurity line is computed as 2/3 of per capita income mean. (2/3of N 25,132.59k) which give N16,755.06k. Therefore an household spending less than the amount obtained above annually on consumption is described as being food insecure relative to other household, while any other household spending exactly the stipulated amount or higher than it on annual consumption connotes that the respondent is food secured. However, with food insecurity line of N16755.06k the head count of food insecurity incidence (a_0) was 0.40000001. This indicates that 40% of the respondents in the study area were below the food insecurity line. The food insecurity depth or gap ($_{al}$) for the respondents in the study area was 0.08714280. However, this value indicated that only 8.71%were below food insecurity line and therefore require more improvement in spending to reach food insecurity line. The food insecurity severity (a_2) was 3.28%for the farming household. This low value indicated that food insecurity was less severe in the study area. Table 2 revealed that 40% of the respondents fell below the food insecurity line. This implied that food insecurity was less persuasive and not deeper and that the income of household must be raised by 8.71% to move out of food insecurity line while 3.28%showed that food insecurity was less severe among the respondents in the study area This findings corroborated with the work of Dare *et al* (2013) where the overall incidence of food insecurity and depth were 58.8% and 19.5% respectively.

Table 2: Distribution of Respondents using FGT food insecurity index

Food Security	Respondents Index	Percentage (%)
α = 0	0.40	40
α = 1	0.08	8
α = 2	0.03	3

Source: Field survey, 2021

Food insecurity status of respondents in the study area

Households were profiled into food secured and food insecure groups based on their per capita expenditure. Per capita expenditure is the division of household total expenditure by the household size. Food insecurity line defined as two-third of the mean per capita expenditure of the total respondents. Therefore, households whose per capita expenditure falls below the food insecurity line were designated food insecure while household whose per capita expenditure equals or above the food insecurity line were food secured. The food insecurity line is equal to #16755.06k. Respondents whose per capita expenditure falls below #16755.06k is food insecure while respondents whose per capita expenditure is equal or above #16755.06k is food secured.

Table 15 showed the distribution of respondents based on food security status in which 48.33% were food secure and 51.67 were food insecure. By implication majority of the respondents in the study area were food insecure. This result contradicted with the work of Ifeoma and Agwu (2014) where 74.2% of respondents were food secured while 25.8% were food insecure.

Table 3: Summary of food security and food insecurity

Food insecurity status	Frequency	Percentage (%)	Cumulative (%)
Food secure	58	48.33	48.33
Food insecure	62	51.67	100.0
Total	120	100.0	

Source: Field survey 2021

Analysis of determinants of food insecurity status of the respondents in the study area using Logit Regression model

Table 4 showed the logit regression result for food insecurity level of the respondents. This result gave the probability of the food insecurity level of the respondents Gender, age, religion, marital status, household size, dependency ratio, members of cooperative society, access to extension agent, secondary occupation, farm size, farming experience, level of education and amount of remittances received from both local and international. The table revealed that 5 out of 13 variables that determine the level of food insecurity in the study area were significant. Age had a positive coefficient of 0.2270 and was significant at 5% level and indicates a direct relationship. The implication was that the higher the age the respondents, the higher the level of food insecurity in the study area. X_5 (Household size) had a negative coefficient of -0.7011 and was significant at 1% level and indicates an indirect relationship. The implication was that the probability of food insecurity decreases with increase in household size in the study area. This result corroborated with the work of Aidoo *et al* (2013) titled determinants of household food security in Sekyere-Afram plain district of Ghana where household size had a negative and significant relationship with food security at 1% significant level implying that, the probability of food security decreases with increase in household size. X_{11} (Farming experience) had a positive coefficient of 0.6157 and was significant at 10% level and indicates a direct relationship. The implication is that a year increase in farming of the household would lead to reduction in food insecurity. This is attributable to the fact that as farming experience increases, the farmers make better output through the appropriate combination of factors of production. This subsequently leads to increase in income and welfare of the farmers. This finding corroborated with the work of Adekoya (2009) titled food insecurity and coping strategies among rural household in Oyo State Nigeria in which farming experience is significant at 10%. X_{12} (level of education) had a negative coefficient of -0.6787 and was significant at 1% level and indicates and indirect relationship. The implication was that the lower the level of education, the lower the revenue. An increase in level of education of the respondents will help to increase the efficiency and performance of the farmers which will lead to increase in the amount of output to be realized because when one is literate, the formal education acquired is an added advantage. X_{13} (Amount of remittances) had a positive coefficient of 0.1898 and was statistically significant at 1% level and indicated a direct relationship. The implication is that the higher the amount of remittance, the higher the level of food insecurity. This result contradicted with the work of Adepoju and Adejare (2013) which had a negative effect on household food security status implying that household with access to remittances have a lower probability of being food insecure.

Table 4: Analysis determinants of food insecurity status using logit regression model.

Variable	Coefficient	Standard error	P>|z|
Constant	5.7228	1.9399	0.0032
X_1 Gender	0.8036	0.6819	0.2387
X_2 Age (years)	0.2270	0.3657	0.035**
X_3 Religion	-0.7126	0.4464	0.1104
X_4 marital stat	-0.7388	0.3457	0.8308
X_5 household size	-0.7011	0.2079	0.0007***
X_6 dependency ratio	0.9022	0.2764	0.7442
X_7 cooperative society	-0.2602	1.0257	0.7998
X_8 extension agent	-0.5071	0.6027	0.4001
X_9 sec occupation	-0.4860	0.1112	0.6622
X_{10} farm size	-0.1474	0.1456	0.3144
X_{11} farming exp	0.6157	0.3440	0.0735*
X_{12} education	-0.6787	0.2463	0.0059*
X_{13} amount of remittance	0.1898	0.8932	0.0336**

*Significance at 10%, **Significance at 5% ***Significance at 1%
Source: Field survey 2021

Coping strategy of the respondents in the study area

Table 5 showed that 46.66%of the respondents adopted shifting to less preferred food, 8.33% of the respondents in the study area borrow from relatives, friends or neighbors. 12.5% of the respondents in the study area buy food on credit, 10%of the respondents in the study area send some household members to live with other relatives, 2.5% of the respondents in the study area sold their farm or household assets to buy food, 3.33% of the respondents reduce expenditure of household to buy food and 13.33% of the respondents adopted more than one coping strategy in order to secure food. The implication is that majority of the respondents in the study area shift to less preferred meals as their

coping strategy with 46.66%. This result corroborated with the work of Sisha (2010) titled, household level food insecurity assessment, evidence from panel data, Ethiopia. Where the most frequently used coping strategy is relying on less preferred food with (45.93%).

Table 5: Coping strategies employed against food insecurity by the respondents in the study area

Coping strategy	Frequency	Percentage	C%
Shift to less preferred Food	56	46.66	46.66
Borrow food from relatives, Friends and neighbor	10	8.33	55.00
Buy food on credit	15	12.5	67.50
Reduce number of Daily meals	12	10	77.50
Send some household Member to live with other relatives	4	3.33	80.83
Sales of farm or household Assets to buy food	3	2.5	83.33
Reduce expenditure of hh To buy food	4	3.33	86.66
More than one Coping strategy	16	13.33	100
Total	120	100	

*Multiple Responses
Source: Field survey, 2021

CONCLUSION

The study analyzed the determinants of food insecurity status among farming households in Ogbomoso ADP Zone of Oyo state. It can be concluded from the study that majority of the households in the study area were male headed and married. The result of the analysis indicated that Household size and level of education were significant with a negative coefficient on the food insecurity of households while Gender, farming experience and amount of remittances has positive coefficient. The result of the analysis further shows that advancing g in age, household size, farming experience, level of education and amount of remittances are the factors that determine the food insecurity level among households in the study area. To meet the food needs of the households, respondents engaged in multiple employments and adopted a number of coping strategies. Strategies adopted by the households included shifting to less preferred food, borrow food from, buy food on credit, reduce number of daily meals, send some household members to live with other relatives, sales of farm or household assets to buy food, reduce expenditure of households to buy food, in sum majority of the households adopted multiple coping strategies.

Based on the findings of this study, it was observed that age was significant. Therefore there is need to encourage youths to go into farming in the study area since only a few percentage of the respondents in the study area were below fifty years of age showing most farmers were not youth. It has also been observed that household size was significant with a negative coefficient and inverse relationship which implies that the higher the number of households the lower the level of food insecurity. Farmers should be lectured about family planning so as to improve their food security level. It was also observed that level of education was significant with a negative coefficient and inverse relationship which implies that the higher the level of education the lower the level of food insecurity. Farmers should therefore be encouraged to improve their literacy level so as to enhance their human capacity. There is need for adult literacy class, extension services and other forms of informal education. This is expected to help the rural populace to improve their food security level. It was also revealed that the coping strategies of the respondent in the study area is shifting to less preferred food. It is expected of them to increase their production and diversify into other business so that there will be enough income to purchase food and they will consume balance diet.

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