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Household Food Insecurity and Its Predictors: Evidence From Gombe Metropolis, Nigeria

Hanehalkı Gıda Güvensizliği ve Öngörücüleri: Nijerya Gombe Metropolü'nden Kanıtlar

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ABSTRACT

Achieving food security, especially at household level, is very fundamental to every country in the world, especially African countries. This study therefore explored the factors determining food insecurity among households in Gombe metropolis, Gombe State of Nigeria. The household data used in this study were collected through administration of copies of questionnaire. While employing summary statistics and logistic regression techniques, we analyzed the data. Although we administered 400 copies of questionnaire; only 381 copies were filled and returned. The descriptive analysis showed about 40 percent of the respondents were food insecure. The logit regression results suggest that household size and income were the important predictors of household food insecurity in Gombe metropolis. As expected, household size positively determines the probability for households to be food insecure whereas income negatively affects the probability. Therefore, the study recommends among others, that the government should create more job opportunities that will enhance the income level of people in order to reduce the magnitude of food insecurity. Secondly, the government should, if possible, introduce and advocate for the importance of family planning to curtail the population size.

MAKALEBİLGİSİ

Anahtar Kelimeler
Gıda Güvensizliği,
Hanehalkı,
Gelir

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ÖZET

Özellikle hane düzeyinde gıda güvenliğinin sağlanması, başta Afrika ülkeleri olmak üzere dünyadaki her ülke için çok önemlidir. Bu çalışmada, Nijerya'nın Gombe Eyaleti, Gombe metropolünde haneler arasında gıda güvensizliğini belirleyen faktörleri belirlemek amacıyla yola çıkılmıştır. Bu çalışmada kullanılan hane verileri anket uygulaması yoluyla toplanmıştır. Verileri analiz etmek için tanımlayıcı istatistikler ve lojistik regresyon tekniği kullanılmıştır. Katılımcılara gönderilen 400 anketten 381'i doldurulmuş ve geri dönmüştür. Tanımlayıcı analiz, katılımcıların yaklaşık yüzde 40'ının gıda konusunda güvensiz olduğunu gösterdi. Lojistik regresyon sonuçları, hanehalkı büyüklüğü ve gelirinin bölgedeki hanehalkı güvensizliğinin önemli yordayıcıları olduğunu göstermektedir. Beklendiği gibi, hane büyüklüğü hane halkının gıda güvencesiz olma olasılığını pozitif olarak belirlerken, gelir olasılığı olumsuz yönde etkiler. Bu nedenle, çalışma diğerleri arasında şunları önermektedir; Hükümet, gıda güvensizliğinin boyutunu azaltmak için insanların gelir düzeyini artıracak daha fazla iş fırsatı yaratmalıdır. İkinci olarak, hükümet, mümkünse, nüfus büyüklüğünü azaltmak için aile planlamasının önemini tanıtmalı ve savunmalıdır.

The number of people suffering from hunger and starvation globally keeps rising especially in African regions. In 2015 for example, the number of undernourished people was 777 million but in 2019 this figure jumped to 811 million. However, over 100 million under-five children experienced stunted growth, as 51 million suffered from wasting and 38 million were overweight (United Nation, 2018). As anticipated, most of the people with nutrition problems live majorly

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in developing countries of Africa and Asia. In addition, hunger is more pronounced in Africa, thereby making the region the headquarters of undernourished people in the world.

In Nigeria, food insecurity is alarming, particularly in the Northeastern and Northwestern zones of the country. It has been found that 2 out of 10 food insecure Nigerians live in Northern Nigeria. This may not be unconnected with the high and persistent poverty that is prevalent in the region as the majority of the people earn less than one dollar per day. Agriculture is synonymous with food production on the globe and as such, it is the mainstay of the Nigerian economy. However, the sector has suffered neglect since the discovery of oil in the country and has failed to contribute significantly toward achieving food security in Nigeria (Olufemi & Bamidele, 2021). Food insecurity in Nigeria may be due to lack of purchasing power (income) to acquire the food especially at household level. In addition, factors such as; weak infrastructural development, high prices of foodstuffs, weak government policies in relation to agriculture, corruption, climate change, poor processing and storage facilities etc all put together lead to low agricultural productivity and subsequently worsen food insecurity in the country.

Furthermore, Nigeria is the country with the largest population in Africa. The country is blessed with resources, that are fundamental to making it properous and progressive vis-a-vis the capacity to cater for basic needs of its populace. Yet, Nigeria is being considered food insecure country. For instance, According to the Global Hunger Index (2020), Nigeria was ranked 98th out of the total of 104 countries in 2019 suffering from a food crisis. On the basis of affordability, availability and quality of food, Nigeria occupies 80th position among 105 countries in the Global Food Security Index (GFSI) of the Economist Intelligence Unit's ranking. GFSI asserts that poor public spending on agricultural research and development is the main reason for the poor rating of Nigeria. The undernourished people in Nigeria hovered above 14 percent of the country's population, which was close to 28 million Nigerians (Food and Agriculture Organisation, FAO, 2019). It is likely that the condition became worst in the light of rising trend of abject food in the country as the majority of the population earns less than one Dollar a day. For instance, National Bureau of Statistics (NBS) (2020) reported that, in 2020 about 40 percent or 83 million Nigerians live in abject nearly half of the total population in the country. In addition, a report by the World Food program (2021) has expressed concern over the increasing hunger in Nigeria and other parts of West and Central African regions. The Cadre Harmonize National Analysis (2020) expressed that Nigeria alone accounts for 42% of the region's total number of acutely food-insecure people. In 29, November, 2021, a report given by United Nation International Children's Emergency Fund (UNICEF) stated that about 74.6% of Gombe residents are poor. It is evident from the above that Nigeria is still food insecure.

Looking at the condition of food insecurity, this study seeks to explore predictors of household food insecurity in Gombe metropolis of Nigeria. The paper is divided into five sections: section one consists of the introduction, section two and three covered literature review and research methodology. Section four is made up of presentation of results and analysis. Finally, section five deals with a summary of the findings and policy recommendations.

1. LITERATURE REVIEW

This section focuses on reviewing relevant conceptual, theoretical and empirical literature so as to develop hypotheses on household food insecurity. The section has 2 subsections: conceptual and empirical reviews.

1.1. Conceptual Review

The concept of food insecurity has been defined differently according to different scholars. For instance, Fawole, Ilbasmis and Ozkan (2015) defined food insecurity as a situation where people lack access to adequately safe, nutritious, and enough food for better health and productivity in a physically and/or economic sustainable manner. This definition stresses the importance of food accessibility and sustainability while overlooking affordability. To World Bank (1986), food insecurity is all about lacking capacity to produce sufficient food and make it accessible to all segments of the society at all times in order for people to live decent and healthy live. According to FAO (1996), food insecurity occurs when people are deprived of physical and economic access healthy and nutritious food that meet all the dietary standards and food preferences for productive and healthy life. In the words of Bickel (2000), food insecurity deals with "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable food in socially acceptable ways". Finally, Shaw (2007) claims that food insecurity exists when people are deprived secure access to adequate quantity of safe and nutrititous food for normal growth and development as well as healthy and productive life style.

Thus, the working definition of food insecurity, here, is a situation where households lack economic and economic access to affordable, nutritious, safe and sufficient food in sustainable manner for healthy and productive living of the households.

1.2. Empirical Review

There is a vast and growing literature exploring the predictors of food insecurity using different techniques of analysis, among others. Households' size is one of the demographic factors determining food insecurity. Some studies (such as Diallo & Toah, 2019 in Mali; Phami et al., 2019 in Laos; Aboaba, Fadiji, & Hussayn, 2020 in Nigeria; Cordero-Ahiman at al., 2020 in Ecuador; Alpizar et al., 2020 in Central America; Diallo et al., 2021 in Mali; Eshetu & Guye, 2021 in Southern Ethiopia; Shahzad et al., 2021 in Pakistan) established that households size positively impact on food insecurity. Their argument is that big households are more probable to be food insecure than small-sized ones. That is, any addition of a member in a household translates into

many people to be fed from the same source. Hence, the household members may lack sufficient food to satisfy themselves. In contrast, a study conducted by Aido, Mensah and Tuffour (2013); in Ghana; Bulawayo, Ndulu and Sichone (2019) in Zambia; Dunga, (2020) in South Africa found that households' size negatively affects food insecurity. The findings appear to be contrary to the expectations as households with more people are more likely to be at risk of food insecurity. Perhaps, the more people in the household the more the contribution of income and food for the entire household especially if they are mostly of working age.

Income of the household is also a widely recognized factor that determines the level of food insecurity. Studies carried out by Dastigiri et. al (2006) in Saudi Arabia; Sisayi and Edriss (2012) in Ethiopia; Aido, Mensah and Tuffour (2013) in Romania; Akarue and Bakporhe, (2013) in Delta State Nigeria; Ndobo (2013) in South Africa; Phami et al. (2019) in Laos; Bulawayo, Ndulu and Sichone (2019) in Zambia; Dunga, (2020) in South Africa; Eshetu and Guye (2021) in Southern Ethiopia; Diallo et al. (2021) in Mali; Ibukun and Adebayo (2021); Babatunde et al. (2021); Butcher (2021) in Australia posit that households' level of income is inversely associated with food insecurity. This implies that the greater the income of the household, the lower the probability of food insecurity. This implies that an increase in income means increasing capacity to afford quality and sufficient food and vice-versa.

Age of the household head remains another determinant of households' food insecurity. Studies such as Bogale and Shimeli (2009) in Eastern Ethiopia; Gebre (2012) in Ethiopia; Sisayi and Edriss (2012) in Ethiopia; Diallo and Toah (2019) in Mali; Dunga (2020) in South Africa; Aboaba, Fadiji, and Hussayn, (2020) in Nigeria; Shahzad et al., (2021) in Pakistan; Diallo et al. (2021) in Mali; Butcher (2021) in Australia, observe that the age is negatively related to household food insecurity. They argue that food insecurity is less likely to prevail in a household with relatively more productive members than in the household with more unproductive members.

Also, Sisayi and Edriss (2012) in Ethiopia; Agidew, and Singh, (2018) in Ethiopia; Olufemi and Bamidele (2021) in Oyo State Nigeria revealed that age of households impact positively on food insecurity. This may be owing to fact that older households have higher chance to be food insecure than younger ones especially if the household head uses his physical energy to earn income. As he is becoming older the ability to produce more diminishes thereby exposing him to food insecurity.

In terms of gender, households headed by men are likely to be more food secure than ones headed by women. Studies (Phami et al., 2019 in Laos; Bulawayo, Ndulu & Sichone, 2019 in Zambia; Shahzad et al., (2021) in Pakistan) contend that activities such as farming, fishing, carpentry, businesses etc are partaken majorly by the men. As such they earn income needed to buy food. In addition, Aboaba, Fadiji and Hussayn, (2020) established that households headed by women are more food insecure than their men counterparts. Their argument is that females are relatively poor with the majority of them being widow, aged which further limit their participation in many income generating activities. In contrast, Babatunde et al. (2021) in Nigeria found that households headed by women are more prone to food insecurity than households headed by men which is contrary to the expectations. However, some studies found a negative link between marital status and household food insecurity (Ubokudom et al., 2017 in Nigeria; Aboaba, Fadiji, & Hussayn, 2020 in Nigeria). They believe that unmarried households experience less food insecurity than their counterparts. In a study conducted by Aido, Mensah and Tuffour (2006) in Ghana established that those households headed by married people are more plausible to be food insecure. Married people usually have increasing number of wards to take care of and hence, many people to feed.

More so, involvement in agricultural activities is among the factors determining food insecurity because the major source of food is agriculture. A study conducted by Dunga (2020) in South Africa revealed that agricultural activities increased the chances of food insecurity. It implies that, being involved in agriculture the households could produce enough food for consumption and hence improve their level of food security. Thus, a negative relationship exists between agricultural activities and household food insecurity. It can be seen from the empirical studies reviewed above that the majority of the studies on food insecurity were carried out in African sub-regions. This is because of the high level of poverty and natural factors that are affecting the regions. In addition, studies done in Nigeria on food insecurity were mostly carried out in southern Nigeria and none of them were carried out in Gombe metropolis, Gombe State Nigeria. İn view of the findings in literature, this study explored the predictors of food insecurity with households in Gombe metropolis.

2. METHODOLOGY

This part dwells on presenting sources of data and instruments for data collection vis-a-vis the estimation techniques. Before starting the study, we obtained an approval from Microeconomics and Development Ethics Sub-Committee of Department of Economics, Gombe State University with the decision dated 17.05.2022 and numbered 2022/1039.

2.1. Data Collection

The data used in this study was collected using a multi-stage sampling, stratified and purposive sampling techniques through a structured questionnaire. The questionnaire was designed in such a way that it has both open and closed ended questions. The questionnaires were strictly administered only to the sample respondents.

2.2. Target Population and Sample Size

The general population of this study consists of all the households in Gombe metropolis, Gombe state. The Gombe metropolis has a total population of 374,897 as at 2015 annual population projection (NPC, 2006). Thus, the target population of the study is 374,897 households. However, the sample size for the study was chosen using "Yamane" Formula for sampling a finite population. The formula serves as an effective avenue to compute sample size, that is reasonable part of the population. The formula is given as:

$$n = \frac{N}{1 + N(e)^2} \qquad (1)$$

Where n = the sample size

N = the finite population

e= level of significance (limit of tolerable error)

1 = a constant (unity)

Note: for this study, e = 0.05 or 5%

Given the total population of 374,987, the sample size is obtained as;

n = 374897/(1+374897(0.05)^2)

n = 400

Hence, the sample size of 400 respondents in the study area is obtained from the total population of 374,987 households within Gombe metropolis.

2.3. Model Specifications

In this study, we use logit regression technique to explore the impact of various predictors on food insecurity among households in the study area. The essence for the appliocation of this econometric technique is that the dependent variable is binary dummy in nature (it takes of value 1 or 0). The variable is coded 1 to reveal that a household does not face food insecurity, otherwise it is coded 0. Thus, the logit regression model will be specified in a manner done by Cameron and Trivedi (2005) and Baum (2006), and it is given in equation (2):

$$log[Pr(HFI)/(1 - Pr(HFI))] = \alpha_0 + \sum \beta_n X_i + \mu_i \qquad (2)$$

Where, Pr(HFI) is the plausibility for a household to be food secure while 1-Pr(HFI) is the likelihood for a household to not be food secure. X_i is a vector of explanatory variables (Gender, Age, Marital status, Household size, Income and farming status); α_i is the constant and μ_i is the error term

Table 1. Variables and their Measurements

Variables	Measurement
Household Food Insecurity	1 = If Food secured & 0 otherwise
Household's Age	Age of the household in years
Household's Gender	0 = If Male & 1 = If female
Household's Size	Number of Dependents
Household's Marital Status	1 = If Married and 0 = Otherwise
Household's Income	Household's monthly income
Household's Farming Status	1 = If engage in farming
	0 = otherwise

Table 1 depicts that household food insecurity, female gender, marital status and farming status are binary choice variables while household size, monthly income and age are continuous variables.

3. RESULTS AND DISCUSSIONS

Given the fact that the study is primary in nature, it collects primary data using questionnaire administered to households. The sourced information or data covered the objective of the study. The information gathered include socio-economic and demographic factors that could impact on household food insecurity. However, descriptive statistics and logit regression models were employed as the estimation techniques. We utilize descriptive statistics to clean and provide summary statistics of the variables while the latter (logit regression model) was utilized to observe the predictors of household food insecurity

3.1. Descriptive Statistics

Table 2 below reveals the characteristics of the household respondents. The respondents were divided gender wise as 291 (76.38%) male and 90 (23.62%) female. It can be seen that the majority of the household heads were male and charged with the responsibility of providing food for the family members. In a few cases, females sometimes become household heads more especially in the events where their husbands died or some other reasons.

However, with regards to the age majority of the households were quite mature and could make food available to their members. They were distributed 29 (33.86%) in the less than 29 category, 147 (38.58%) in 30-49, 93 (24.41%) in 50-59 and 12 (3.15%) in 70 and above. In addition, the majority of the respondents, about, 331 (86.88 %) were married while only 50 (13.12%) were single. In the study area, the majority of the household had a small size.

Table 2. Characteristics of the Households

Variable	Frequency	Percentage
Gender		
Male	291	76.38
Female	90	23.62
Total	381	100
Age:		
<29	129	33.86
30-49	147	38.58
50-69	93	24.41
Above 70	12	3.15
Total	381	100
Marital Status		
Married	331	86.88
Single	50	13.12
Total	381	100
Household size		
1-5	176	46.19
6-10	98	25.72
11-15	43	11.29
16-20	11	2.89
21 and above	6	1.57
No Dependents	47	12.34
Total	381	100
Income		
<18,000	76	19.95
N18,000- N30,000	106	27.82
31,000-N50,000	121	31.76
51,000-100,000	58	15.22
Above 100,000	21	5.25
Total	381	100
Food Security Status		
Food Secured	229	60.10
Food Insecurity	152	39.90
Total	381	100

Source: Field Survey, 2020

The study is conducted in the urban area where many people are fairly educated and as such the practice of family planning is feasible. The distribution of household size is 176 (46.19%) had 1-5 members, 98 (25.75%) had 6-10 members, 43 (11.29%) had 11-15 members, 11 (2.89%) had 16-20 members, 6 (1.57%) had 21 and above members, 47 (12.34%) are the number of dependents. Furthermore, it can also be seen from the same table above that the majority of the households fall within the income level of N31, 000 and N50, 000 which accounts for about 31.76%.

3.2. Econometric Analysis

Table 3 reports the binary logit model on predictors of household food insecurity in Gombe metropolis. The table reveals that household size and income level of the household head are the important predictors of food insecurity among the households in Gombe metropolis. The model shows that an upsurge in the household size results in higher chances for households to be food-insecured. The corresponding odd ratio of household size reveals that an increase in the household size causes a 1.24 times larger odds for households to be food-insecured than a decrease in the household size.

Table 3. Logistic Model on Predictors of Household Food Insecurity in Gombe Metropolis

Variables	Coefficient	Odd Ratio
Age	0.00338	1.003383
	(0.175)	
Gender	-0.274	.7606617
	(0.290)	
Marital Status	-0.0409	.9599536
	(0.283)	
Household Size	0.215***	1.239288
	(0.0446)	
Income level	-0.307***	.7359869
	(0.107)	
Farming	-0.204	.815493
	(0.189)	
Constant	-0.505	.6033938
	(0.402)	
Pseudo R2	0.1443	
Prob> chi2	0.0002	
Log pseudo likelihood	-182.25476	
_hat	1.13851***	
	(.167692)	
Hatsq	-.503712***	

	(.101174)
Observations	314

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' Computation Using STATA14

The model also indicates that a rise in the income level of the household head brings about less probability for households to be food-insecured. The odd ratio of income level suggests that as the household moves from one income level to the higher one, the odds of food insecurity decrease by 26 percentage points (1-0.74).

Table 4. Hosmer–Lemeshow Goodness of Fit Test

Observations	314
Covariate patterns	165
Pearson chi2(111)	202.30
Prob> chi2	0.0100

Sources: Authors' Computation Using STATA14

Note that household size and income level are statistically significant at 1 percent level of significance (since halves of their coefficients are far greater than their corresponding standard errors). Specification test (in Table 4) of the model shows that the model can be either specified as linear or nonlinear given the significance of hat or hat-squared. This means the model has been correctly specified as linear.

4. CONCLUSION

The principal goal of this study remains to explore the key predictors of household food insecurity in Gombe metropolis. The study utilized cross-sectional data using structured questionnaires and 384 sampled households were chosen out of the total population of 374, 897. We analyse the data collected while utilizing descriptive statistics and logit regression model. Based on the evidence obtained from the regression results of the model, the study concludes that only household income and family size that majorly determine food insecurity in Gombe metropolis. This is because they are found to be statistically significant all at 1% level of significance. However, household income negatively predicts the likelihood of food insecurity. Thus, as the income of the household increases, the probability of food insecurity reduces and vice- versa. This finding is similar to those of Akarue and Bakporhe (2013) in Delta State Nigeria; Ndobo (2013) in South Africa; Phami et al. (2019) in Laos; Bulawayo, Ndulu and Sichone (2019) in Zambia; Dunga, (2020) in South Africa; Eshetu and Guye (2021) in Southern Ethiopia; Diallo et al. (2021) etc..

In addition, household size positively impacts on household food insecurity. The implication of this is that the larger the household, especially one with more unproductive members, the more probable for the household to be food insecure. The findings of this study is in line with those of Diallo and Toah (2019) in Mali; Phami et al (2019) in Laos; Aboaba, Fadiji, and Hussayn, (2020) in Nigeria; Cordero-Ahiman et al. (2020) in Ecuador; Diallo et al. (2021) in Mali; Eshetu and Guye (2021) in Southern Ethiopia, etc..

Therefore, in line with the above findings the following recommendations were given:

- Given that household income is an important predictor of food insecurity in the study area, the government should create more job opportunities that will enhance the income level of people. In so doing, it would reduce the magnitude of food insecurity in Gombe Metropolis. This can also be achieved by establishing skills acquisition centers with equal opportunities in the areas of computer training centers, vocational training such as carpentry, mechanics and so on.
- It is also part of the policy recommendation that provision of family planning measures should be introduced by the government in order to curtail the population size in the study area.

AUTHOR DECLARATIONS

Declarations of Research and Publication Ethics: This study has been prepared in accordance with scientific research and publication ethics.

Ethics Committee Approval: Before starting the study, we obtained an approval from Microeconomics and Development Ethics Sub-Committee of Department of Economics, Gombe State University with the decision dated 17.05.2022 and numbered 2022/1039.

Authors' Contributions: Aisha Adamu Hassan and Dr. Adamu Jibir drafted the introduction; Aisha Adamu Hassan reviewed the literature; and Musa Abdu contributed in writing the methodology. Aisha Adamu Hassan and Musa Abdu did the analysis and discussion of results. Dr Adamu Jibir wrote the concluding part. All the authors read the entire work and approved it.

Conflict of Interest: There is no conflict of interest arising from the study among the authors or third parties.

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