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EXAMINING HOUSEHOLD FOOD SECURITY DURING COVID-19 PANDEMIC: EMPIRICAL EVIDENCE FROM NIGERIA

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Abstract

The outbreak of covid-19 pandemic in the late 2019, has threaten the global food security which serve as serious threat to the achievement of the sustainable development goal. the study examines the determinants of household food security during covid-19 pandemic in Nigeria using covid-19 national longitudinal high frequency phone survey 2020 of the World Bank, where logistic regression model was employed to analyse the data. It was revealed from the result that factors such as age of household head, level of education, marital status, being a farmer, having other businesses than farming, formally employed and receiving food assistance increase the likelihood of household food security. While age square, household size, residing in the urban area, reduction in income, and covid-19 restriction were more likely to increase the risk of household food security. It was concluded that covid-19 pandemic has significant negative impact on household food security in Nigeria. The study recommend that government being *the major stakeholder should double its efforts of providing food assistance and putting in place favorable policies that encourage household to embrace farming, which could be done through the provision of subsidies farming input and ensuring that it reached the target beneficiaries, there is need for household to diversify their source of income by learning various skills that serve as shock absorber when there is a sudden shock in the economy.*

Keyword: Covid-19, Food Security, Household, Logistic Regression.

JELCODE: I19, Q18, H31, C39.

1. Introduction

Global cases of corona virus of 2019 known as Covid-19 Pandemic have been growing at exponential rate since its emergence in Huwan Province of Huban China in the late 2019. Although there is progress in managing the pandemic, the rate of spread of the virus has been on the increase from 500 thousand in the late February 2020 to over 238,026,455 million as at September 2021, with over 4480581 death recorded globally (World Health Organization, 2021). Regionally, Asia is the worst heated area in terms of infection, with over 76,914,988 million infected persons and 1, 136,100 million death,

while Europe has the highest mortality rate with 60,145,552 million infection and 1,241,056 death continued to post a serious threat especially with the emergence of a new variant of the virus called Delta variant (World Bank, 2021). China was the epicenter of the virus that was later shifted to Europe, United State, Latin America, Low and Middle Income economies of Africa and Asia many of whom lack strong and viable health facilities that can content the devastating impact of the virus (Laborde, Martin & Vos, 2020). As part of the measures to reduce the spread of the virus, more than halve of the global population are still under different form of lock dawn or were under lock dawn, the measure of which, lead to the fall in the overall economic activities, due to the effects of the combination of policies and personal responses adopted to curtail the spread of the virus. With personal measures having more devastating effect on the fall in business activities than policy actions (Goolsbee & Syverson,2020, and Laborde, et, al. 2020). With the outbreak of the pandemic, it has been estimated that global working hours have fallen by about 17 percent, equivalent to the loss of about 500 million full-time jobs (International Labour Organization, 2020).

To cushion the effect of the pandemic, government of both developed and developing economies have taken various measures such as lock dawn, self-isolation, social distancing measures, curfew, border closure and travelling restrictions. These sudden measures seriously affected both social, physical and economic activities, which has a devastating impact on the ability to earn a living and has crippled virtually all sectors of the economy, this serve as a threat to the sustainable development goal of achieving food security, ending hunger and improving nutrition by the year 2030 (World Bank, 2020). Food Security is simply view as regular availability and access to food at affordable cost. It has also been viewed as a condition where households at all-time have access to balance diet, which meet their food demand (Food and Agricultural Organization, 1996). Furthermore, food security has also been viewed as physical and financial access of every person to the food required for the active and healthy human life (Nepal Food Sovereignty Acts, 2018).

It has been argued that the pandemic threat to global food security has been worsen by its impact on global recession that has cause income loss and increase in the number of vulnerable people that cannot afford their basic needs of food. Loss of income has not only affected the demand for food but induce shift in the food consumption mix that led to the consumption of low nutrient food such as fruits, vegetables and animal sourced food and relatively the consumption of more calorie rich food such grains, and sugar (World Bank, 2020; WHO,2020 and Food and Agricultural Organization, 2020). It has also affected the agricultural input market, farm production, marketing, and distribution of food cause by the need for social distance policy (FAO, 2020; Laborde, et, al. 2020; WHO, 2020).

According FAO (2020), covid-19 pandemic remains a serious threat to the United Nations' sustainable development goals of achieving universal food security by the year 2030. Furthermore, over 2.32 billion people globally have been estimated to food in secure and over 820 million people face hunger daily and lack access to micronutrient, which has served as threat to health and life expectancy. over 320 million fall food in secured due to the pandemic, majority of whom are living in low- and middle-income economies It has also been argued that if the quarantine measures continue, an estimated 660 more people will be food in secured by 2030. In Africa, over 47 million people have been reported to be food in secure due to covid-19 pandemic against 57 and 14 million in Asia and Latin America and Caribbean respectively (FAO, 2021 ; Kasime, et, al. 2020).

Food insecurity is cause by several factors such as lack of income, lack of access to basic social services, in adequacy of some public policies, drought, epidemics and pandemics, and insecurity (World Bank, 2020, Khorsandi, 2020 and Clapp & Moseley, 2020). In Nigeria, the situation is worsening by communal clashes, herdsmen-farmers clashes, and banditry and boko haram activities, compounded by the outbreak of covid-19 pandemic.

It is against this background that this study seeks to examine household food security determinants in Nigeria and whether covid-19 matter. Following the

introduction is the literature review, methodology, data analysis and discussion, and lastly conclusion and policy recommendations.

2.0 Literature Review

2.1 **Empirical Review**

The concept of food security is a multi-dimensional concept that has attracted different views across the globe and has gain global recognition in 1974 at the World food Conferences, during which the issue of hunger, famine and food crisis were extensively, discuss. According to the food and Agricultural Organization (1974), Food Security is as a situation in which households access quality sufficient food that meet their needed balance diet and food preference that enable them live a better life. Generally, definition of food security is based on four fundamental pillars of food availability, accessibility, seasonal fluctuations and utilization (Nsiah & Fayisa, 2019; Abdullahi et, al. 2019; Ibukum & Adebayo, 2020; and World Bank, 2020).

Studies have shown that the outbreak of covid-19 pandemic has spur the rate of hunger and food insecurity across the globe, especially, the steps adopted in attempt reduce the infection rate by the economies at both local, national and international level, that has hindered the ability of both individuals and households to access sufficient and nutritious food (Subedi, 2021; Khorsandi, 2020; Clopp & Maseley, 2020). For instance, Clopp and Moseley (2020) reported that the legacies of the previous pandemic on the global food system and policies have created much unfavourable environments to the vulnerable households in the face of covid-19 pandemic, though, the loss of income, disruption of global food supply chain and means of livelihood. They also opined that global recession and uneven food prices across the globe that were unleashed by various factors such as in security in developing countries have aggravated the problem of food insecurity.

In low- and middle-income countries, Islam, et, al. (2020) in their study on food security and covid-19, reported that the lock dawn measures have a significant negative impact on food security especially in low income countries. While Seleiman et, al. (2020) reported that closing of borders, movement restrictions and social distancing measures contributed significantly to food insecurity especially in the developing economies that rely so much on food import.

To Mouloudi et, al. (2020), covid-19 pandemic has a significant impact on food security especially perishable food, developing economies, war zones and war affected regions, and that although advanced economies were also affected the effect of covid-19 pandemic on food security is more pronounced in developing economies. Ray, et, al. (2020) in their studies, posited that covid-19 pandemic significantly affected food security and nutrition in both developed and developing economies with the developing economies being the worst affected. It was also reveal that labour availability, market and farm prices, supply chain disruption, and occupational cut are some of the factors that worsen the food insecurity in developing economies.

Akter (2020) study the effects of covid-19 on food prices in Europe, reported that the severity of stay at home restrictions increases the overall food prices by 1 %, it further revealed that meat, fish, seafood and vegetables are the significantly affected food during the pandemic, although the study reported that the impact of the pandemic varies across European regions. Labrde et, al. (2020) found that coviid-19 pandemic affected food security in South Asia and Sub-Saharan Africa significantly, with urban population being the most affected due to the movement restrictions and lock dawn measures. The study also reported that following the outbreak of the pandemic, over 150 million people lack access to food daily in the two regions.

In Bangledesh, Hanna,et,al. (2020) reported that outbreak of covid-19 pandemic has affected the quantity and quality food consume, created limited access to opportunities which lead to the reduction in the volume of consumption, allocation for food consumption, taking out loans, and increase the desire for relief materials. The study also reported that people with stable income have lesser risk of food insecurity than people with unstable sources of income.

From the literature surveyed, much of the attention has been focus on effect of covid-19 on household food security either globally, or else where

nationally. This study differs from those studies by exploring factors that determined household food security in Nigeria during the pandemic has it will help government and policy makers in deciding which direction of factors to dwell much on when designing food security policies especially during the current pandemic.

2.2 Theoretical Framework

The study adopted Unitary Household Utility theory. It posits that household demand for food is not different from the demand for other goods (Feleke, et, al. 2004). The theory posits that like any other commodity, household food security is determined by several factors such as price, income level and other factors such as preference and other socioeconomic factors. Household utility is said to be maximize when he derived maximum satisfaction from the consumption own produce good, purchase goods and leisure subject to some economic, social and demographic factors (Garett & Ruel, 1999).

3. Methodology

3.1 Sources of Data

To achieve the objective of the study, national covid-19 longitudinal phone survey wave-12 2020 carried out by the World Bank, Bill and Melinda foundation and Nigerian National Bureau of Statistics was employed. 1950 household was surveyed in Nigeria where questions on indicators of covid-19 were asked to track the progress made in addressing the pandemic and its effect on livelihood.

3.2 Model Specification

To achieve the objective of this study, food security model is specified as follows:

$$Y_i = \sum_{i=1}^{n} \beta_i Z_i + \mu_i$$

Where Y_i is food security, β_i is the slope coefficient to be estimated, Z_i is the vector of explanatory variables, which constitute household socio demographic characteristics and food security variable and μ_i is a random error term with zero mean and standard deviation δ, and normally distributed.

However, estimation of the determinants of household food security gives a serious problem especially when there are limited dependent variables or latent variables (Stephen & Samuel, 2013). To solve this problem, Tobit (1958) developed a random choice utility model that best fit a limited dependent variable that is stated as follows:

$$\emptyset_i^* = \varphi_i \alpha_i + \epsilon_i$$

Where $\emptyset_i^*$ is a limited dependent variable that has the values greater than δ_i and censored if otherwise. The value of $\emptyset_i^*$ is define as

$$\emptyset_i = \begin{Bmatrix} \emptyset^* \; if \; \emptyset^* > \delta \\ \delta_\emptyset \; if \; \emptyset_i^* \leq \delta \end{Bmatrix} \quad (3)$$

Equation (2) is a maximum likelihood estimation method, which has a likelihood function as

$$= \pi_i^N \left[\frac{1}{\sigma}\, \tau\left(\frac{\varphi_{i-}\, \varepsilon_i}{\omega}\right)\right]^{d_i} \left[1 - \tau\left(\frac{e_i}{\omega}\right)\right]^{1-d_i} \quad (4)$$

However, the Tobit model assume that $\delta_i = 0$, which means that the dependent variable is censored at zero, and hence, ε_i is parameterize as $x_i\beta_i$ and obtain Tobit likelihood function as

$$\mu = \pi_i^N \left[\frac{1}{\sigma}\, \tau\left(\frac{\varphi_{i-x_i\beta_i}}{\omega}\right)\right]^{d_i} \left[1 - \tau\left(\frac{x_i\beta_i}{\omega}\right)\right]^{1-d_i} \quad (5)$$

With log likelihood equation as follows

$$Ln\mu = \sum_{i=1}^{n} \left\{ d_i \left((1) Ln\omega + Ln\tau\left(\frac{\varphi_{i-x_i\beta_i}}{\omega}\right)\right) + (1-\omega_i)\, Ln\left(1 - \tau\left(\frac{x_i\beta_i}{\omega}\right)\right)\right\} \quad (6)$$

The first part of equation (5) gives the Ordinary Least Squares estimate of uncensored variables whereas the second part of the equation portrays the probability of censored variables. Optimizing equation (5) subject to $\alpha_i's\ and\ \omega$ gives the coefficient estimate of the maximum log likelihood.

The marginal effects coefficients of the Tobit model is given as follows:

$$\frac{\vartheta E(\frac{\emptyset}{x_i})}{\vartheta x_1} = \vartheta^* prob(0 < \emptyset_i < 1) \quad (7)$$

3.3 Variables and their Measurement

Dependent variable

Food Security: the measure of household food security that takes the value of 1 if food secured, 0.5 moderately food secured and 0 if food insecure.

Independent Variables

Age: age of the head of the household.

Agesqre: the square of the head of household age.

HHSize: size of household

Education: household head is educated=1 and otherwise=0

Marital Status: Household head is married or otherwise.

Farmer: Household head is a farmer during covid-19=1 and otherwise=0.

Other Business: head of Household engage into other business than farming during covid-19=1 and otherwise=0

Work Status: Household Head engaged in formal employment=1 and otherwise=0

Assistance: Household head receive any food assistance during the pandemic=1 otherwise=0

Reduce income: Household head experience reduction in income during covid-19=1 and otherwise=0

Covid-19 Restrictions: Head of household experience any form of restriction during the covid-19 pandemic, with the value of 1 if yes and otherwise=0

3.4 Method of Data Analysis

Generally, given the nature of the dependent's variable-limited dependent variable, Tobit regression model was used to achieve the objective of the study.

4. Results and Discussion

Table 1, Regression Results

foodsecuruty2	Tobit Regression	Marginal Effects
agee	0.007	0.007
	(2.47)*	(2.47)*
agesqr	-0.000	-0.000
	(1.75)	(1.75)
hhsize	-0.030	-0.030
	(10.86)**	(10.86)**
edu	-0.015	-0.015
	(1.07)	(1.07)
married	-0.132	-0.132
	(3.90)**	(3.90)**
farmer	0.001	0.001
	(2.14)*	(2.14)*
otherbusiness	0.075	0.075
	(2.99)**	(2.99)**

work	-0.025	-0.025
	(0.85)	(0.85)
assistance	0.117	0.117
	(3.05)**	(3.05)**
reduce_income	-0.052	-0.052
	(1.01)	(1.01)
covid_19restrictions	-0.265	-0.265
	(4.16)**	(4.16)**
_cons	-0.072	-0.072
	(0.91)	(0.91)
var(e.foodsecuruty2)	0.703	0.703
	(26.35)**	(26.35)**
N	8,320	8,320

Source: Author's computation using Stata16.1. Standard Error in parenthesis, * *denote significance at 5%*; and ** *significance at 10%*

From the result in table 1, it can be observed that age of the household head is significantly more likely to increase food security, as the coefficient of age shows that as household head age increases by one year the chances of his food security increase by about 0.07 during covid-19 pandemic. However, the coefficient of age square which is the measure of non-linearity of age shows that as household age increases beyond 75 years, the risk of the household food in-secured significantly more likely to increase during the pandemic.

The coefficient of household size revealed a significant negative relationship with household food security, from the table1 it can be observe that as the number of people in the household increases beyond 11, the risk of the household food insecurity significantly increases by about 3 percent this is confirmed by the marginal effects which shows that the size of household is less likely to increase food security. This may be connected to lock dawn measures which have led to the loss of jobs, food scarcity and inflation, that addition to the household increase the already existing pressure on the little or no available food. This contradicts the findings of Sisay and Idriss (2013) and Stephen and Samuel (2013) who reported in their studies that household size significantly influences the chances of food security.

The coefficient of level of education revealed from table 1 that increase in household head level of education is more likely to increase the chances of household food insecurity, for instance from the table educated household head 1.5 percent more likely to be food insecure than the uneducated household head during the pandemic. This is because educated headed households are more concern with white color jobs with little or no attention given to agricultural activities and with the lock dawn many people lost their jobs especially those working with private sector unlike the illiterate headed household who mostly rely on farming. This finding is not in tandem to findings of Cataglayan, Kosan, and Star (2012), Sisay and Idriss (2013), Stephen and Samuel (2013) who reported in their separate studies that level of education is more likely to increase household food security. Furthermore, from table1, the coefficient of marital status of household head shows that married headed household is significantly more likely to be food insecure than single headed household during the pandemic. This is because of the burden of the dependents from both the couples' side in the African settings where in case one marred, both relatives of the husband and the wife channeled their problems to husband and given the lock dawn measures taken during the pandemic cost of living becomes high and hence increase in the risk of married household food insecurity.

Being a farmer as shown in table 1, significantly reduce the risk of household food security by about 0.1 percent during the pandemic, this implies that farming headed household is more food secured during the pandemic because they tend have food in their stores the

quarantine measures taken during the pandemic does not have significant impact on the household food security.

The number of incomes generating activities household head is involve significantly increase the chances of food security by about 7.5 percent, this shows that household head with diversified sources of income is more likely to withstand shock of either, weather, loss of job or pandemic than the once that relied on single source of income. The coefficient is insignificant which may be connected quarantine measures of the pandemic. This is consistent with findings of Sisay and Idriss (2013) and Stephen and Samuel (2013) who in their separate studies reported that having a more diversified income sources increases household food security.

Conversely, employed household head is 2.5 percent more likely to be food insecure than the unemployed household head. This is because policies employed to content the spread of the pandemic such as lock dawn, social distancing and travel restrictions significantly affected seriously household head that relied formal jobs and with outbreak of the pandemic, employers especially the private sector employers resorted retrenching workers who heavily relied on their jobs for their means of livelihood and hence, threaten their food security.

Similarly, assistance in the form of palliatives and transfers is 11.7 percent more likely to increase hold food security as shown in table 1. Though the coefficient is statistically significant, which is because the food assistance will help significantly in ameliorating the gravity of household food insecurity especially when it reaches the target households during the pandemic.

In addition, household head that experience reduction in income during the pandemic is 5.2 percent less likely to be food secured as shown in table1. This is because the quarantine measures taken by government to contain the pandemic affected economic activities and hence, it has a trickle dawn effects on the level of income of households and their effective demands

The coefficient of covid-19 restrictions as presented in table 1, shows a negative relationship between food security and the measures, which indicate that the quarantine measures significantly increases the risk of household food insecurity by about 7.2 percent. This is because the restrictions put in place by the government seriously affected the means of livelihood of the households especially the once that relied on daily pay jobs for their living.

5. Conclusion and Recommendations

Covid-19 pandemic has continued to pose a serious threat to social and economic activities, this has compelled governments and stakeholders to design appropriate policies that would reduce the spread of the virus, the policies of which affected the working of the economies and livelihood means of economic agents. This study examined the determinants of household food security during covid-19 pandemic in Nigeria, using national longitudinal Phone survey (NLPS-Covid-19, 2020) and analyzed using tobit regression. From the results, it was concluded that age of the household head, level of education, marital status, being a farmer, having other income generating activities, formally employed and receiving food assistance are more likely to increase household food security during covid-19 pandemic in Nigeria, although only age, level of education and a single headed household are significant. Conversely, age square, household size, household residing in the urban areas, reduce income, and covid-19 restriction have negative impact on household food security, which implies that they are more likely to increase the risk of household food insecurity during the pandemic with age square, and household size having significant impact.

The study further recommend that, government being the major stakeholder should double its efforts of providing food assistance and putting in place favorable policies that will encourage household to embrace farming, which could be done through the provision of subsidies farming input and ensuring that it reached the target beneficiaries, there is need for household to diversify their source of income by learning various skills that will serve as shock absorber when there is a sudden shock in the economy.

More so, the development partners should assist the households with not only the vaccine but also with some food and cash transfers that will enable them cushion the problem of lack of food in their households.

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