Assessment of Food Security Determinants and Coping Strategies of Urban Households during COVID-19 Pandemic Lockdown in Jos, Plateau State, Nigeria

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ABSTRACT

The study focused on the assessment of the determinants food security and coping strategies among urban households during COVID-19 pandemic lockdown in Jos, Plateau state, Nigeria. The sampling technique used was multistage sampling technique in the selecting 265 households. A well-structured questionnaire was used in collecting data. Descriptive statistics, FDT Food security index, Coping Strategies Use Index (CSUI) and Z-statistics test were the analytical tools used for this study. The result indicates that 53% of the household heads were males while the mean age of the respondents was 34 years, the mean household size was 4 persons and 68% of the household heads were not members of cooperative association. The households' minimum and maximum daily calories intake of 679.67 kcal and 2246.79 kcal for food secure and insecure in this study is above the minimum and maximum recommended threshold of 587.58 kilocalories and 2200 kilocalories respectively. COVID-19 pandemic had effect (p<0.001) on the food security status of households. Age, household size, income and amount of credit were the significant determinants of food security status of households. Limited portions at mealtimes, reliance on less preferred food, ate less than they felt they should, times they couldn't afford to eat balanced meals and reliance on only a few kinds of low cost food to feed the children were the highest ranked coping strategies adopted by households during the pandemic lockdown. In conclusion, the understanding of the effect of the COVID-19 pandemic lockdown on food security status of households and the adopted coping strategies are important in developing policy measures such as social safety nets, home feeding programmes, the school feeding programme, conditional cash transfers schemes and improved marketing channels that will help mitigate against households falling into food insecurity during similar pandemic in the future.

Keywords: Determinants; Food security; COVID-19 lockdown; Coping strategies; Urban households

INTRODUCTION

In spite of agricultural policies and strategies introduced by various governments in Nigeria, the population of food insecure households has consistently increased; in was 18% in 1986 increased to 40% in 2005, and has been on the increase in the subsequent years. For instance, although agricultural sector remains one of the key components of the Nigerian economy, which contribute about 37% of GDP and employing about 70% of the active population, it receives less than 10% of the annual budgetary allocations. It rose from 1.70% in 2017 to 2.00% in 2018; fell to 1.56% in 2019 and 1.34 in 2020, 1.34% in 2021 and then 1.80% in 2022, which is lower than the minimum 10% as ratified by the Maputo, 2003 declaration. As a result, Nigeria's agricultural sector has significantly underperformed despite its vast potential. Consequently, it has failed to produce sufficient quantity of food and in the quality to feed the country's population growth rate which stand at 5.3%. Therefore, the food insecurity status in Nigeria has continued to rise steadily since the 1980's. Food security can be defined as the situation when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food for a healthy and active life. According to this exponential growth in population, Nigeria's food production is increasing at less 2.0% per year, while population growth is estimated to be 2.58% per year and according to the projection, has risen to 5.5% in 2022. Thus, the change in the population growth and available food production and supply has raised contention and an empirical question. This suggested theoretical disparity indicates that a low rate of food production and a high rate of population growth will generate a high rate of food demand, thereby giving rise to a food demand supply gap that can result in a rise in food insecurity.

Among the development problems facing Nigeria, food insecurity ranks highest. The national per capita food growth of 19.57% in the production of major food items in Nigeria has not been sufficient to satisfy the demand for an increasing population of 212,907,083. Varrella, also reported that, on average, between 2018 and 2020, 21.4% of the population in Nigeria experienced food insecurity. The prevalence of severe food insecurity among the Nigerian population has increased in recent years, as food demand has increased in tandem with the country's rapidly growing population.

Therefore, food insecurity remains a fundamental challenge in Nigeria. Idachaba also reported that many households and individuals in Nigeria merely eat for survival. The fight against food insecurity therefore demands an integrated set of actions. The concern for food security is a cornerstone in the development process for every country to weaken the vicious cycle of poverty among the teeming populations of developed and developing countries. Food security is one of the targets of the Sustainable Development Goals (SDG), which focus explicitly on food by seeking to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. However, multiple other goals relate to challenges in the food system, such as poverty reduction, where food has a key role to play, and to consumption and production.

Despite the various concerns by governments all over the world about ensuring that every household can at least provide three square meals per day, food insecurity continues to be a major development problem across the globe, undermining people's health, productivity, and often their very survival.

COVID-19 is a pandemic caused by a novel human Coronavirus (SARS-CoV-2), previously known as 2019-nCov (World Health Organization). As of September 1, 2020, over 25 million cases and 850 thousand deaths had been reported globally. The African region was so far the least affected continent, with 1,257,315 cases and 29,862 deaths, but the numbers are increasing. With the possibility of the COVID-19 pandemic increasing the total number of undernourished people in the world from 83 to 132 million in 2020 and even higher in the years ahead, achieving food security for every Nigerian remains a challenge, despite recent agricultural intervention policies aimed at minimizing reliance. In Africa, Nigeria has the fourth-highest burden of confirmed cases (54,008) and deaths (1,013). Due to the high rate of COVID-19 spread and the absence of a vaccine for its treatment or prevention, Nigeria adopted "lockdown" as an approach to reverse epidemic growth, reducing case numbers to low levels as reported by the Nigeria Center for Disease Control (NCDC) in 2020. The lockdown strategy in Nigeria entailed social distancing of the entire population through restriction of social gatherings, closing of educational institutions, halting all non-essential economic activities, and a ban on domestic (interstate) and international travel.

The COVID-19 pandemic and subsequent lockdown created health and economic crises that threaten food and nutrition security. COVID-19 has devastated the labor market. Lockdowns, movement restrictions, and reduced demand have resulted in widespread job losses and pay cuts. Income losses reduce access to food, especially for the poor and vulnerable, who spend proportionally more of their income on food, and they have an outsize effect on the incomes of informal enterprises and workers, who make up the majority of the agricultural sector. It has disrupted both global and domestic agri-food supply chains. Although the impact of the COVID-19 pandemic on international supply chains has been limited so far and global food markets have been well supplied and stable.

COVID-19 lockdown was implemented in Plateau state, Nigeria, from April 10 to June 13, 2020. This COVID-19 induced lockdown has directly affected food systems through impacts on food supply and demand and indirectly through decreases in purchasing power due to the inability of the working population to work. The capacity to produce and distribute food and the intensification of care tasks, all of which will strongly affect Nigerian households' capacity to meet the nutritional needs of their members. The lockdown due to the pandemic imposed serious restrictions and limitations on food access, both physically and socially and economically, on the households. This in turn posed serious hardship to households, which resulted in an unplanned adjustment in food intake by all age categories.

Many studies have been conducted in Nigeria and other parts of the world to assess people's food security status, but only a few studies have empirically investigated food security status and households coping strategies during the COVID-19 pandemic lockdown in the study area. This study has added to the body of knowledge by finding out the per capita daily calorie consumption by households on the one hand and the coping strategies adopted during this period of the study on the other. From the foregoing, the following objectives were therefore generated:

- Describes the socioeconomic characteristics of households in the study area.
- Determine the effect of COVID-19 pandemic lockdown on the food security status of urban households in the study area.
- Estimate the determinants of food status of households in the study area.
- Rank the food insecure households based on their coping strategies [1-6].

MATERIALS AND METHODS

Study Area

Jos metropolis (comprising of Jos North and South), Plateau state of Nigeria was the selected study area. Plateau state is located within Central states of Nigeria and with an area of 26,899 square kilometers, located between latitude 08°24'N and longitude 008°32' and 010°38' East while Jos metropolis lies within latitudes 9°45'00''N to 09°57'00''N and longitudes 8°48'00''E to 8°58'00''E. Plateau state derived its name from the geographical landscape that predominates in this part of the country.

Jos North local government area hosts the capital city and its headquarters which is located on latitude 9°56'21.7'' sNorth and longitude 8°54'8''east of Greenwich Meridian (GM). It has only of one (1) district which is Gwong district and has an area of 291 km^2 and an estimated population of 475,398 for year 2020 (NPC, 2006). The hot season lasts from February to April, with an average daily high temperature above 88°F while the hottest month of the year is March with an average high temperature of 92°F and low temperature of 65°F. The cool season lasts from July to October, with an average daily high temperature below 79°F. Throughout the year, there are 177.3 rainfall days, and 1233 mm (48.54") of precipitation is accumulated. Jos South local government area located between latitudes 9°30' to 10°N and longitude 8°48'E to 8.800°E of the Greenwich meridian. Jos South local government area has four districts: Du, Gyel, Kuru and Vwang districts and has total land area of about 1,037 km^2 with a population estimation of 493,818 for year 2020. The rainy season, which is between the months of May and October, has its peak in August. The mean annual rainfall varies between 1347.5 and 1460 mm per annum. The inhabitants of Jos North and South are Afizere, Anaguta, Bache, Irigwe, Berom, Hausa, Yoruba and Fulani. The inhabitants of Jos North and Jos South are mainly farmers who combine it with hunting, while the

common food crops grown in the area include potato, sweet-potato, maize, millet, acha, tomato and many varieties of vegetables. The ever green vegetation and free nature of the area makes cattle rearing, grazing and poultry farming is viable businesses in the area. The mild climatic condition and the accommodative nature of its people as well as tourists' attraction have continued to attract investors (Figure 1).

Figure 1: Map of plateau state showing the local government areas.

Sampling Procedure and Sampled Size

A multi-stage sampling technique was adopted in the selection of households in the study area. Purposive sampling was used in the first stage to select Gwong district, which is the only district in Jos North; out of the four districts in Jos south LGA, Du and Gyel districts were selected. The second stage involved the random sampling technique in the selection of four (4) villages: Two (2) from Gwong district, one (1) each from Du and Gyel districts, because the inhabitants of the locality are both high and low income earners. In the third stage, systematic random sampling technique was used selecting 142 and 123 households in Jos North and Jos South respectively, thus giving a total of 265 households used for this study.

Method of Data Collection

The data used for this study was primary. It was collected with the use of a well-structured, open and close ended questionnaire and an oral interview schedule designed according to the specific objectives of the study. Data on households' calories, food consumption pattern and coping strategies adopted by the respondents during this period was collected before and after the lockdown, which was from April 10th to June 13th, 2020.

Validation and Reliability of the Research Instruments

Content validity was adopted to assess the adequacy of the instrument items in this study. Content validity in this context was meant to determine the appropriateness and sufficiency of items included in the instruments. Using the Jury method, the entire instrument was subjected to the scrutiny of relevant specialists. Each was requested to solely give his opinion on the appropriateness and sufficiency of the items with respect to the specific objectives of the study. Various

questions of the questionnaire were scrutinized in terms of how relevant they are to the specific objectives of the study as well as how the prepared questions comprehensively cover the specific objectives of the study. Furthermore, the questionnaire was further assessed against the background of its adequacy in regard to the accomplishment of the objectives of the study.

An instrument of data collection is considered secure when it consistently produces the same result when applied to the same sample many times. The test-retest method of affirming instrument reliability was employed for this study. Correlation coefficient was calculated between two distributions of test scores obtained at two different times from the same respondents. The instrument was trialed on 34 respondents from the Jos North and Jos South local government areas. The information obtained from the responses to the instrument was analyzed using product moment correlation analysis. A high value of the mean product-moment correlation coefficient of 0.816 indicated high reliability of the instrument [7-12].

Analytical Techniques

Analytical tools such as descriptive statistics were used to achieve objective 1, Foster Greer and Thorbeeke (FGT) Food Security Index (FSI) was adopted to achieve objective 2, and Z-statistics was used to achieve objective 3.

Descriptive Statistics

Percentages, means, frequency distribution, and tables were the descriptive statistics used to depict the socioeconomic characteristics of the households.

Food Security Index

Foster, Greer, and Thorbeeke's (FGT) Food Security Index (FSI) was used for the determination of the food security status of households. The identification and aggregation procedures were achieved with the use of FGT FSI. The process of defining a minimum level of nutrition necessary to maintain a healthy lifestyle is called identification. Identification is referred to as the "food security baseline," below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line was used in this study based on the daily recommended levels of calories and protein, which are 2260 kcal and 65 g, respectively. In order to generate food security indices, the nutrient content of the food items consumed was used to derive calorie availability. This was used to achieve Objective 2.

It is given by:

Food security index (k)=(Household daily per capita calorie consumed(X))/(Household daily per capita calorie required(Y))   (1)

The FSI number must be greater than one for a household to be food secure; if it is less than one (<1), the household is said to be food insecure. The quantity of crop produced, purchased, and received as gifts was converted to kilograms and then to calories consumed per day per household and then compared with the standard (2260 kcal). For the purpose

of this study, a household is a group of individuals who contribute to and share a common economic resource base and rely on the income from that resource base for the greater part of their food acquisition and utilization.

Probit Regression Model

Probit model was adopted for the estimation of the factors determining food security status among urban households in the study area based on the households' food security index (Z_i). The model is specified as follows:

The explicit form of the model is expressed as:

$Z_i = \beta X_{ji} + U$

Z_i=Household food security status (food secure households=1, food insecure households=0)

X_j=Vector of explanatory variables U=Error term

β=Vector of the parameter estimates

X_{ij} are explanatory variables and are defined as follows:

X_1=Farming as main occupation (1=yes, 0=no);

X_2=Marital status of respondent (1=married, 0 for otherwise);

X_3=Gender of respondent (1=male, 0=female);

X_4=Household size (numbers);

X_5=Years of formal education (years);

X_6=Farming experience (years);

X_7=Age (years);

X_8=Household income (N);

X_9=Farm size (hectares);

X_{10}=Membership of social group (yes=1, no=0)

Coping Strategy Use Index (CSUI): This was used to identify the coping strategies for food secure and food insecure households in the study area. The CSUI allows for a better understanding of the likely areas where the government or stakeholders can intervene. In order to identify the coping strategies used by the households, a Coping Strategy Index (CSI) was developed by ranking. The first stage was the listing of all the coping strategies adopted by households. This was done by first eliciting information on coping strategies from the households. Following that, coping strategies based on an index were developed. The extent of use of the CSI was expressed using a four-point Likert scale with a scoring order of 3, 2, 1, and 0 for frequently used, occasionally used, rarely used, and not used, respectively. The formula used for developing the CSI score was adapted from, where they estimated the use of ethno-veterinary medicine in livestock management and rearing [13-18].

The CSUI was used in ranking order to know the position of each of the CSI in terms of their use. The extent of use of the CSI was then obtained for all households in the study area. It should be noted that household food security is an important dimension of well-being. Although it may not cover all

dimensions of poverty, the inability of households to obtain access to enough food for an active, healthy life is surely an important component of their poverty. In this study, devising an appropriate measure of food security outcomes was useful to capture the food-insecure farming households in the study area.

Hypothesis testing: Effect of the COVID-19 pandemic on food security, which was carried out using the following Z-statistics:

$$Z = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

Z=Calculated Z-value.

$(\bar{x}_1)$=Mean of food secure or household dietary diversity score before COVID-19.

$(\bar{x}_2)$=Mean of food secure or household dietary diversity score after COVID-19.

S_1=Standard deviation of food secure score before the pandemic.

S_2=Standard deviation of food secure score after the pandemic.

n_1=Number of food secure score before the pandemic.

n_2=Number of food secure score after the pandemic.

RESULTS AND DISCUSSION

The result found in **Table 1** indicates that 53% of the households were headed by men, while 47% were headed by women. Eyob in their study indicated that the gender dimension of the households revealed that they were primarily headed by men. Male dominance implies that men are more efficient and reliable to make strong decisions, care for the family, and provide shelter for the family when compared to their female counterparts. These characteristics are important in making most men the heads of their households. It was observed during the survey that the female-headed households were those whose husbands live in another city and those that were widowed. Furthermore, the finding shows that household heads aged 20-29 (31%), 30-39 (34%), 20-29 (31%), and 40-49 (23%), were the highest while those aged >60 (3%) were lowest. The respondents' mean age was 36. This is consistent with the findings of Abubakar, who claimed that household heads were in their prime ages and were less subject to food poverty. This means they will put their youthful energy into productive activities thereby increasing their wealth base, either through cooperative loans or bank savings thus making them less vulnerable to food shortages during the pandemic. Also, this finding suggests that the household heads were young, economically active, and viable to engage in agricultural activities. The age of a farmer plays a significant role in their

productivity as the majority of farmers in Nigeria operate on a small scale with the use of crude implements, which require energy and strength for their operation. **Table 1** further indicate that 50.6% of household members were married, followed by 49.6% singles, with 2% widows and 0.4% divorced constituting the smallest households. This was also observed by married households tend to have large families due to members living with them either as their children or extended families. This suggests that this study targeted the right population for this research, as research related to food security requires households. **Table 1** shows that 74 percent of the respondents have a household size range of 1–5, while 22 percent have a household size range of 6–10. The smallest household size is within the range of 11 to 15 family members (4.0%). According to Egwue, et al., rural households tend to have a large family size, though this was in contrast to the small household size in this study, which might be connected to the fact that the survey site is an urban household with several government parastatals in their locality, which might have given them some level of exposure through sensitization that a small family size enjoys better economic and social lives. The implication is that households with small families will spend less on feeding, education, health care, and other living expenses for their dependents. Although households with a large family base might have the tendency to engage in farming activities without the need to hire labor, which can boost the family's income.

According to **Table 1,** the majority of households (73%) had tertiary education as their highest level of education, followed by primary education (68%) and secondary education (20%). This is in agreement with the findings of in his research titled "Analysis of food insecurity and coping strategies among farming households in Osun state." The result from this study suggests that the level of literacy was relatively high among the household heads. A higher level of education is expected to assist household heads with their skill sets in adopting innovations in best agricultural practices, acquiring new jobs, and stratifying people with higher socioeconomic status. **Table 1** indicates that civil servants constitute the major primary occupation of the households (26%), followed by businessmen and women (24%), while others, such as farming and artisanship, constitute 15%, 23%, and 11%, respectively. This agrees with the study of who reported that the majority of the household heads are mainly civil servants and businessmen and women. The implication is that because the community is surrounded by federal government institutions, there is a high likelihood that some of the households will obtain white collar jobs.

Table 1 also shows that 68% of the households were not members of the cooperative societies, while only 32% of the households were members of the cooperative societies. This is in agreement with the findings of Egwue, et al., who observed low participation in cooperative societies among rural households. The implication is that cooperative associating helps household heads and farmers pool their resources together to enjoy the economies of scale and also assist them financially. **Table 1** shows that, in terms of having access to credit facilities, the majority of the households had

no access to credit facilities (64%), while only 36% of the households had access to credit facilities. This suggests low credit accessibility, as reported. The implication is that using personal funds hinders and determines households' level of operation. This could be the reason a high proportion of households in the study area were food insecure during the lockdown.

Table 1: Socioeconomic characteristics of households in the study area.

Variables	Frequency	Percentage
Gender		
Male	129	53
Female	116	47
Total	245	100
Age		
<20	1	0.4
20-29	75	30.6
30-39	83	33.9
40-49	56	22.9
50-59	22	9
>60	8	3.3
Total	245	100
Mean	36	
Standard deviation	10.748	
Marital status		
Married	124	50.6
Single	115	49.6
Widow	5	2
Divorced	1	0.4
Total	245	100
Household size		
1-5	182	74
6-10	52	22
11-15	11	4
Total	245	100
Mean	4	
Standard deviation	3.397	
Educational level		
Primary level	20	68
Secondary level	47	19

Tertiary level	178	73
Total	245	100
Primary occupation		
Civil Servant	64	26
Farming	37	15
Business	60	24
Artisanship	27	11
Membership of cooperatives society		
Non-members	167	68
Members	78	32
Total	245	100
Access to credit		
No access	156	64
Access	89	36
Total	245	100

Effect of COVID-19 Lockdown on the Food Security Status of Households

Food security status of households during the COVID-19 lockdown: Table 2 result shows the food security status of the households during the COVID-19 pandemic lockdown. As shown, the food secure household was 237 before the lockdown while the number of food insecure households was 8 households as compared with 183 and 62 food secure and insecure households after the COVID-19 pandemic respectively. This could be due to reduced availability of food calorie consumption to the households arising from abrupt introduction of lockdowns. The finding in this study is at variance with the findings of who observed that the pandemic had impact on rural households, thus making large proportion of the family members to be food insecure. The headcount ratio of food secure households was 0.75 while it was 0.25 for food insecure households. The food secure head count ratio which represent the proportion of the expenditure shortfall from the minimum food calorie consumption line indicated that 3% of the food insecure households' shortfall in terms of food calories consumption before the pandemic lockdown compared to 25% of the insecure households after the lockdown. The implication of this is that for every 10 persons in the study area, 8 persons were food secure while 2 persons

were food insecure. The headcount ratio further suggests that only 75% of the individuals in the study area were food secure while 25% of these individuals were food insecure, thereby subsisting on less than the minimum recommended calorie intake of 2260 kcal [19,20].

The surplus/shortfall index which is a measure of the depth of food insecurity or measures the extent of deviation from the food security line indicate that the food secure households exceeded the calorie requirement by 0.9%, while the food insecure fell short of the recommended calorie intake by 0.4%. This indicates in relative term that the food insecure households were close to the food security line. The mean calorie available (adult equivalent per day) for food secure households was 5860.52 kcal while mean calorie available (adult equivalent per day) for food-insecure households was 1707.88 kcal. The minimum and maximum daily mean calorie intake was 2263.71 kcal and 26865.00 kcal adult equivalent per day among the food secure households while the food insecure households consumed 679.67 kcal and 2246.79 kcal adult equivalents per day. These results imply that the pandemic had effect on food security among the households.

Table 2: Food security status of urban households in Jos.

Items	Before lockdown		After lockdown	
Food security status	Food secure	Food insecure	Food secure	Food insecure
Frequency	237	8	183	62

Mean daily calorie intake (kcal)	14399.96	1793.75	5860.52	1707.88
Maximum daily calorie intake (kcal)	9250	2260	26865	2246.79
Minimum daily calorie intake (kcal)	2570	1480	2263.71	679.67
Shortfall/surplus index (P)	0.671	-0.026	0.009	-0.004
Head count ratio (H)	0.97	0.03	0.75	0.25

Effect of COVID-19 Pandemic Lockdown on Households' Food Security Status

As shown in **Table 3**, the value of the Z-statistic is 12.454 and is significant at 1% level of probability. This implies that COVID-19 lockdown had effect on the food security of urban households in Plateau state.

Table 3: Z-test analysis showing the difference between food security status.

Variable	After	Before
Mean	14338.82	4776.55
Known variance	1.28E+08	15972391
Observations	245	245
Hypothesized mean difference	0	
Z-statistics	12.454[***]	
P(Z<=z) one-tail	0	
Z critical one-tail	1.645	
P(Z<=z) two-tail	0	
Z critical two-tail	1.96	

Note: [***]Significant at ($p < 0.01$) level of significance

The Determinants of Food Security Status of Urban Households

Table 4 shows the probit regression of the determinants of food security status of urban households. **Table 4** shows various variables which determine the factors affecting rural arable crop farming household food security status using the probit regression model. The results of the probit regression analysis are presented in the **Table 4**. From the probit analysis, the likelihood ratio statistics as indicated by χ^2 statistics (41.08) are strongly significant (P<0.0001), suggesting the model has a strong explanatory power in which three variables were found to be statistically significant at P<0.001 and one was significant at P<0.005 out of eight (8) variables included in the model. Age, household size, income and amount of credit are the determinants that influence food security status of urban households. The significance effect (p<0.001and p<0.005) implies that the selected variables are the major drivers of food security status of urban households. The coefficient of age was found to be negative and significantly related to the food security status of the respondents. The result means that age was a significant factor in determining the food security status of the urban households in the study area. This implies that as age of the respondents in the study area increase, it will reduce the probability of being food insecure. This is probably because accumulated knowledge and experience of working households acquired pays off over a long period of time.

The coefficient household size was positive and statistically significant at 1% level of probability. The result implies that household size was a significant factor in determining the food security status of the urban households in the study area. This means that an increase in household size will lead to an increase in the likelihood of being food secure, particularly if the composition of the household is made up of adults who are actively involved in economic activities. The coefficient of income and amount of credit accessibility of the urban households measured was positive and statistically significant at 1% level probability. The result means that income and access to credit facilities was a significant factor in determining the food security status of the urban households

in the study area. This means that an increase in income and access to credit facilities will result to an increase in the likelihood of changing the food security status of the respondents. This also means that, households with an additional source of income will be willing to meet the demand of the household and therefore are non-poor and food secure. This is in agreement with the findings. Also, as the household heads income increases, the probability of being food secure also increase. The implication of this result is that household heads with higher annual income were food secure than those with lower income. Higher income household heads may probably have much money to procure food items for consumption while a household with lower income may have less to spend on consumption. This conforms with the findings of Muche and Tadele; Ibok, et al.; Omotesho, et al., reported that income influenced the food security status of people positively. The low estimates of 10% for pseudo coefficient of determination implies that only few variables with lower weight influence the food security status of urban households. The trend in this study agrees with the report of Matchaya.

Table 4: Probit regression of the determinants of food security status of urban households.

Variables	Coefficient	Standard error	T-value
Constant	-0.1207	0.0299	-4.042
Sex	0.1039	0.1947	0.534
Age	0.0292***	0.0102	2.856
Marital status	0.1311	0.1897	0.691
Years of schooling	-0.0141	0.0343	-0.411
Household size	0.1172***	0.0363	3.225
Income	0.2640**	0.1155	2.286
Years of membership	-0.0267	0.027	-0.992
Amount of credit	0.3960***	0.107	3.701
Wald chi^2(8)	41.08		
Prob >chi^2	0		
Pseudo R^2	0.104		
Log pseudo likelihood	-121.688		

Note: ***and** significant at 1% and 5% levels of probability; Pseudo R^2: Coefficient of determination.

Ranking of Food Insecure Households Based on their Coping Strategies

On the coping strategies ranking during the COVID-19 pandemic lockdown, the study indicated that limiting portions at mealtimes was the most widely used of all the coping strategies and ranked 1st. This is probably because of the sudden shortage of food due to closure of markets. This was closely followed by reliance on less preferred food and having had to eat less than they felt they should which ranked 2nd and 3rd respectively. The study also indicated that the food insecure households adopted 'time you couldn't afford to eat balanced meals', 'reliance on only a few kinds of low cost food' to feed the children and 'ever cut the size of any of the children's meals' which ranked 4th, 5th and 6th respectively as a means of coping during the COVID-19 pandemic lockdown. These coping strategies were adopted by the households probably because of the soaring food prices arising from the demand supply gap. This agrees with the study by who reported that majority of the households adopted decreasing number of meal serving time, size of meal as their coping mechanism to cope up with the risks of food shortage and/or food insecurity. Households also adopted 'cut the size of meals or skip meals and lose weight because there wasn't enough food, purchase food on credit, reliance on help from a relative and borrow money to buy foodstuff purchase food on credit were ranked 7th, 8th, 9th, 10th and 11th respectively. These arose probably because households found it difficult to get to the banks and the Automated Teller Machine (ATM) during the lockdown and where the ATM were operational, there was insufficient funds in them, hence households had to resort to credit purchases and reliance on relative who live in close vicinities to get cash to meet their immediate food needs. Ever hungry but didn't eat, ever hungry but you just couldn't afford more food and Ever not eat for a whole day were ranked 12th, 13th and, 14th other coping strategies adopted by the households during the lockdown. This could be due to the fact that households' heads were out of cash arising the fact that they are self-employed and businesses and business centres and markets

were closed. The least adopted coping strategies were 'children skip a meal' and 'children ever not eat for a whole day' were ranked 15th and 16th respectively. In the overall, the distribution indicated the importance of scale of preference of insecure urban households in the choice of COVID-19 lockdown coping strategies against food insecurity. Similarly, the study stressed the importance of credit as a means of coping with food security risks. Credit is an important coping strategy with food insecurity risks and this has been confirmed in a study by Adegoroye, et al., in Ondo state, Nigeria who in their finding reported the importance of credit in coping with adverse economic conditions.

Table 5: Ranking of food insecurity coping strategies on insecure households based on their frequency of use.

Food coping strategy during COVID-19	Frequently used	Occasionally used	Rarely used	Not used	CSUI	Ranking
Limit portions at mealtimes	39	17	3	3	154	1st
Rely on less preferred food	35	15	7	5	142	2nd
Ever eat less than you felt you should	39	9	6	8	141	3rd
Time you couldn't afford to eat balanced meals	32	15	8	7	134	4th
Rely on only a few kinds of low-cost food to feed the children	31	16	9	6	134	4th
Ever cut the size of any of the children's meals	19	33	8	2	131	6th
Cut the size of your meals or skip meals	34	7	13	8	129	7th
Lose weight because there wasn't enough food	32	9	12	9	126	8th
Purchase food on credit	9	27	9	17	90	9th
Rely on help from a relative	9	23	9	21	82	10th
Borrow money to buy foodstuff	9	12	27	14	78	11th
Ever hungry but didn't eat	7	22	12	21	77	12th
Ever hungry but you just couldn't afford more food	15	13	4	30	75	13th
Ever not eaten for a whole day	8	9	13	32	55	14th
Children skip a meal	11	7	1	43	48	15th

Children ever not eaten for a whole day	7	8	8	39	45	16th

CONCLUSION

In conclusion, socioeconomic characteristics such as age, gender, and marital status, level of education, household size and membership of cooperative were important in describing the household heads in the study area. The result of food security status indicated that the food secure households consumed an average daily calorie of 14,399.96 Kcal before the pandemic lockdown while 5,860.52 Kcal was consumed after the pandemic lockdown; 1,793.75 Kcal was consumed by the food insecure households before the pandemic while 1,707.88 Kcal was consumed after the pandemic lockdown. It indicated that the pandemic lockdown had effect on the food security status of the urban households as indicated by the Z-statistic score (12.454^{***}) and significant at 1% level of probability. Age (1% level), household size (1% level), income (5% level) and amount of credit (1% level) were the significant determinants that influenced the food security status of the households; limited portions at mealtimes, reliance on less preferred food, ate less than they felt they should, times they couldn't afford to eat balanced meals and reliance on only a few kinds of low-cost food to feed the children were the highest ranked coping strategies adopted by households during the lockdown. Having found the presence of food insecurity during COVID-19 among households, it can be concluded that the understanding of the effect of the COVID-19 pandemic lockdown on food security status of households and the adopted coping strategies are important in developing policy measures such as social safety nets, home feeding programmes, the school feeding programme, conditional cash transfers schemes and improved marketing channels that will help mitigate against households falling into food insecurity during similar pandemic in the future.

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