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Assessment of COVID–19 Pandemic Risk Behaviour among Rural Households in Nigeria: Implication for Food Security

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Abstract

The COVID-19 pandemic has badly affected the rural population in income generation, productivity and food security. This study assessed COVID-19 pandemic risk behaviour among rural households in Nigeria using data from the Nigeria COVID-19 National Longitudinal Phone survey (NLPS), (2020) conducted by National Bureau of Statistics in collaboration with the World Bank. Descriptive and regression analysis were used to analyze the sample size of 1195 rural households across all the six geopolitical zones of Nigeria. From the findings of this study; hand-washing (97.1%), avoiding crowded places/gathering (91.0%) and avoiding travelling (81.1%) were the three most reported risk-reduction measures known by the rural households. In many of the rural households, at least a member had to skip a meal; ran out of food in some households; and at least one adult went without a meal as a result of movement restrictions occasioned by the COVID-19 pandemic. The overall Poisson regression model showed a joint significant influence of awareness of identified COVID-19 risk-reduction measures and self-perception of risk on risk-reduction behavior (LR Chi=13.23, $p<0.01$). We also found a positive and significant relationship between awareness and behaviour (IRR=1.022, $p<0.01$). However, self-perception of risk was not significantly related to risk-reduction behavior. The study concluded that although the awareness of preventive measures was high but did not translate to expected behavioural change. This may put most productive rural household members at risk of infection and further aggravate the food insecurity in Nigeria. Hence, Government should change the sensitization strategy on COVID-19 preventive measures in order to ensure the needed behavioural change among the rural populace in Nigeria.

Keywords: Corona virus, risk, behaviour, rural households, food security, mitigation, Nigeria.

Introduction

The coronavirus pandemic began in Wuhan, Hubei Province, China and has rapidly spread to almost every region of the world. The disease is caused by a new and severe type of Coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) and the disease it

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causes has been named "Coronavirus Disease 2019" (abbreviated "COVID-19") by the World Health Organization (World Health Organization, 2020). The infection has no confirmed immediate treatment and vaccine. The first known patient of Coronavirus started experiencing symptoms in Wuhan, China on 1 December 2019. Since then, there have been over 173 million reported cases and 3,727,605 deaths across the world as at 7th of June, 2021 according to data released by the World Health Organization. The pervasive rate of spread across nations within a very short period and significant mortality pushed its declaration as a world pandemic on 11th of March, 2020 (World Health Organization, 2020).

On February 27, 2020, an Italian on a business trip to Nigeria was recorded as the first case of the virus in the country. From then, import of the virus were reported at various instances in major cities especially Lagos and Abuja. Later, the onset of community transmission was indicated by 2nd of April, 2020 (Adejoro, 2020). Update as at 7th of June, 2021 shows that the number of laboratories confirmed cases stood at 166,767, while the number of recoveries and death were 163,096 and 2,117 respectively (Nigeria Centre for Disease Control, NCDC, 2021). To combat the spread of the virus, government agencies, non-governmental organizations as well as civil society organizations have been at the fore-front with the presidential inaugurated COVID- 19 task force for the roll out of enlightenment campaigns and the enforcement of essential measures for mitigating the bloom of the virus in the country. The Federal government on March 30, 2020 officially directed the enforcement of various containment strategies including the closure of national borders and airspaces, schools, religious centres and all public places alongside the cancellation of mass gatherings and events. Also, Federal Capital Territory, Lagos and Ogun states were mandated to be on lockdown for an initial period of fourteen days and this was replicated in some States. Testing laboratories and isolation centres were set up in different parts of the country and curfews were imposed in many territories (Ewodage, 2020). Many faith organizations complied with the directives to stop public worshipping, prevent hand shaking and informed members of their congregation to pray at home while observing personal hygiene (Makinde *et al.*, 2020; Olatunji, 2020).

The fact remains that unlike urban, rural dwellers may be more isolated from widespread infection of COVID-19. However, widespread could impact negatively on outputs of livestock and crop production especially amongst older farmers that could be more vulnerable to the Coronavirus infection. Ajibola, (2020) observed that the pandemic could equally affect the active rural population, thereby leading to shortages of labor; both for production and processing activities. Also, rural farming households, especially women, children and youths are more susceptible to effect of COVID-19.

Restrictions in movements and social distancing, could lead to shortage of labour for agricultural production, harvest and post-harvest activities and subsequently culminate to high cost of production and disruption in crop production cycles. Supply and distribution of agricultural inputs (improved seeds, herbicides and fertilizers) to rural farming communities could be hindered owing to the lockdown situations as the linkages between major cities in the various states in Nigeria might become very difficult. This could discourage farmers from crop cultivation leading to less production and scarcity of food. Food supply chains could as well be interrupted due to restriction in human and vehicular movements and may result to hunger, wastage and dearth of essential food items for household consumption (Ozili and Arun, 2020).

Klynveld, Peat, Marwick and Goerdeler (KPMG) (2020) examined the economic impact of COVID-19 in Nigeria with emphasis on business activities. Findings revealed that the pandemic has a twin shock on the Nigerian oil-dependent economy, namely, global and domestic shocks as well as oil price shock. The study opined that the twin shocks are expected to affect the economy through the supply, demand and financial channels. The study concluded that, unlike the threat of Ebola, Zika and SARS viruses which faded with time, the social-economic impact of the pandemic might still persist well after the virus had been conquered. Ayandele *et al.*, 2020 worked on preliminary assessment of Novel Coronavirus (COVID-19) knowledge and perceptions in Nigeria. The study assessed knowledge and perceptions about COVID-19

among the general public in Nigeria during the initial week of the pandemic lockdown in the country. Findings of their study revealed that Nigerians have relatively high knowledge, mostly derived from traditional media, about COVID-19. Their perceptions of COVID-19 bear implications across public health initiatives, compliance with precautionary behavior as well as bilateral relations with foreign nations. Ozili and CBN (2020) analyzed COVID-19 pandemic and economic crisis in relation to the Nigerian experience and structural causes. The study concluded that the spillover of COVID-19 pandemic into Nigeria coupled with declining oil price, which were external shocks, caused the economic crisis in Nigeria in 2020.

Most of the research works on COVID-19 in Nigeria have largely focused on economic impact, knowledge and perceptions (KPMG 2020; Ayandele *et al.*, 2020; Ozili and CBN, 2020). This leaves a dearth of empirical information on personal risk behavior of rural households whose responses to the pandemic would underpin food security impact of the scourge. In the light of this, it is imperative to empirically examine COVID-19 pandemic risk behaviour of rural households and draw relevant implications as it affects food security situation in Nigeria

Objectives

The objectives of the paper were to

i. assess rural households' awareness of COVID-19 risk-reduction measures in Nigeria;
ii. examine COVID-19 self -perception of risk among rural households in Nigeria;
iii. establish COVID-19 risk-reduction behavior among rural households in Nigeria; and
iv. determine the effects of COVID-19 awareness of risk reduction measures and self-perception of risk on risk-reduction behavior among rural household in Nigeria.

Method

Data Source

The data for the study was extracted from the Nigeria COVID-19 National Longitudinal Phone survey (NLPS) 2020 conducted by National Bureau of Statistics (NBS) as primary investigator in collaboration with the World Bank. The survey was sponsored by the Bill and Melinda Gates Foundation and Federal Government of Nigeria. The baseline survey covered all the de jure households but excluded institutional settings such as prisons, hospitals, military barracks and school dormitories.

Sampling Procedures and Data Collection

The COVID-19 baseline survey used the Wave 4 of the General Household Surveys (GHS) –Panel survey conducted in 2018/2019 as the sampling frame. A nationally representative sample of 1800 households for the baseline survey were successfully targeted using Computer Assisted Telephone Interview (CATI) between 20th of April, 2020 and 11th of June, 2020. The final sample size comprised 1,950 households. For the present study, only rural households were selected from the total making the final sample of 1195 rural households. To correct for over sampling and under-sampling for national estimates, the weighting factor to the data provided by the households was rightly applied

The NBS trained a number of interviewers who individually made phone calls from their respective homes due to the total lockdown in the country as at the time of data collection to gather information from the respondents who must be a member of the household targeted. The respondents however, were allowed to consult with other members of the households if necessary, in order to provide all necessary data on each household member. Details of the sampling procedures, data collection as well as the details of the computation of sampling weighting can be found in the Basic Information Document Nigeria COVID-19 National Longitudinal Phone Survey (COVID-19 NLPS)

Analytical techniques

The study employed analytical tools based on the stated objectives. They include descriptive and Poisson regression analysis. Descriptive statistics was used to achieve objective (1- 3) while the last objective of the study was achieved by application of Poisson regression analysis.

Variable measurement.

There were two main independent variables and one dependent variable in the study. The independent variables were awareness of of COVID-19 risk-reduction measures and self-perception of risk from COVID-19 while the dependent variables was COVID-19 risk-reduction behaviour

Awareness of COVID-19 risk-reduction measures

The respondents were asked to indicate whether or not they were aware of the following ten COVID-19 risk-reduction measures:

1. Hand-washing
2. Use of Sanitizer
3. No handshaking/physical greetings
4. Use of mask
5. Use of gloves
6. Avoid travelling
7. Staying at home/avoid going out
8. Avoiding crowded place or gathering
9. Maintain enough social distancing of at least 1 meter
10. Avoiding touching your face

Each question has a binary response 1 to indicate Yes to each of the ten measures or '0' otherwise. A composite measure was generated for awareness of COVID-19 reduction measure on a range of 0 to 10 with 0 indicating awareness of none of the ten measures and 10 indicating all the ten measures.

Self-perception of risk

The respondents were asked to state how they felt about the possibility of either them or any member of their family becoming ill from COVID-19. The response options were in Likert scale format: very worried (coded 4), somewhat worried (coded 3), not too worried (coded 2) and not worried at all (coded 1). Thus, the self-perception of risk was measured on a scale of 1 to 4 with 4 indicating highest level of risk of becoming ill from COVID-19 and 1 the lowest level.

Risk-reduction behaviour

Risk-reduction behaviours were measured by asking the respondents the following four questions:

i. Since mid-March 2020, did you wash your hands with soap more often than you used to?
ii. Since mid-March 2020, did you avoid handshakes/physical gathering?
iii. Since mid-March 2020, did you avoid groups of more than 10 people?
iv. Since mid-March 2020, did you stock up on more food than normal?

A composite score was generated for COVID-19 risk-reduction behavior to indicate 1 for Yes to each of the four questions or '0' otherwise. Thus, the risk-reduction behaviour score ranges from 0 to 4

Results

Household Characteristics

Table 1 shows the available data on household characteristics such as geopolitical zone, work status in the past 7 days preceding survey, work status before mid-march of year 2020 and whether family engaged in business before year 2020. Most of the households sampled (27.0%) were from the North West zone while the least proportion (8.9%) of the households were from the South West zone. North-South dichotomy distribution showed that 42.9 percent and 57.1 percent were from the South and North respectively. At least 46.8 percent of the respondents have worked 7 days preceding survey. Slightly more than half (52.4%) of the respondents claimed their main occupation was agriculture, hunting and fishing, a substantial proportion (17.0) were into buying and selling; while 14 percent were engaged in personal services, education and health related work.

Table 1: Percentage Distribution of Rural Household characteristics (n=1195)

Variables	Frequency	Percent
Geopolitical Zone		
North Central	202	16.9
North East	157	13.1
North West	323	27.0
South East	176	14.8
South South	230	19.2
South West	107	8.9
Worked for pay 7 days preceding Survey		
Yes	558	46.8
No	637	53.2
Main activity of the business or Respondents' work		
Agriculture, Hunting and Fishing	299	52.4
Mining, Manufacturing	4	0.6
Electricity, Gas, Water Supply	6	1.0
Construction	38	6.6
Buying and Selling	97	17.0
Transport, driving	30	5.4
Professional activities: Finance	4	0.6
Public Administration	14	2.4
Personal Services, education, Health	79	14.0

Source: NBS/World Bank COVID-19 NLPS 2020

Households' awareness of COVID-19 Risk-Reduction Measures

Table 2 showed the results of respondents' awareness of COVID-19 risk reduction measures. Handwashing (97.1%), avoiding crowded places/gathering (91.0 %) and avoiding travelling (81.1%) were the three most reported risk reduction measures known by the rural households. The least reported awareness of risk-reduction measures were avoiding touching of face (64.3%) and the use of gloves (53.1%). Slightly more than 20 percent of the rural households were aware of 5 risk-reduction measures or less and about 80 percent were aware of at least 6 risk-reduction measures. This implies that awareness of risk reduction is high among the rural households. Olapegba (2020) had earlier reported that regular handwashing and social distancing were the most reported by the respondents as COVID-19 preventive measures in a preliminary study of COVID-19 pandemic in Nigeria. Lau *et al.* (2020) also found handwashing as the most common risk reduction practice to COVID-19 in a cross-sectional study among income-poor households in the Philippines

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Table 2: Percentage Distribution of Households by Awareness of COVID-19 Risk-Reduction Measures (n=1195)

Variables	Frequency	Percent
Handwashing	1158	97.1
No Handshake/physical greetings	973	81.5
Use of mask	852	71.5
Use of gloves	646	53.1
Avoid travel	967	81.1
Staying at home/Avoid going out	1059	88.8
Avoid crowded places/gathering	1085	91.0
Leave distance of at least 1 metre	956	80.1
Avoid touching your face	767	64.3
Knows 5 measures or less	243	20.4
Knows at least 6 measures	950	79.6

Source: NBS/World Bank COVID-19 NLPS 2020

Rural Households' COVID-19 Self-Perception of Risk by Geopolitical Zone

Results in Table 3 showed the percent distribution of rural households by COVID-19 self-perception of risk according to their geopolitical zones. Across all the 6 zones, at least 7 in 10 households were very worried they might be at risk of having COVID-19. In the Northern part of the country, at least 8 in 10 households in North-East (87.9%) and North West (88.9%) and 78.2 percent in the North Central were very worried of having COVID-19. In the Southern part of Nigeria, less than half of the households (44.9%) in the South West, 50 percent of those in the South East and 63.9 percent of households in the South South geopolitical zones were very worried they might be at risk of contracting the virus. This analysis showed that self-perception of risk of contracting the new corona virus was higher in the rural households of Northern Nigeria compared with rural households in the South.

Result from Figure 1 showed the overall risk perception of rural households of contracting the new corona virus. For example, at least 7 in 10 (72.5%) were very worried about the virus; nearly 10 percent were somehow worried and 12.0 percent reported that they were probably not worried at all of contracting the new corona virus. Variations in self-perception of risk of COVD-19 have also been reported in other studies. For example, in a study in Germany, 62.1percent agreed that they are worried about COVID-19 in general but only 28.2 percent were afraid of being infected. Specifically, 29.5 percent of respondents who have not been tested believe it is likely or very likely they will be infected in the near future while at least one third believed that their friends and other members of the family were very likely to become infected in the near future (Gerhold, 2020). Huynh (2020) also reported regional variations in perception of risk with higher risk perception among people of Central and Southern Vietnam compared with those from northern Vietnam. High perceived susceptibility was also recorded in a cross-sectional online study during the early phase of the pandemic among 1715 respondents in Hong Kong (Kwok *et al*., 2020).

Table 3: Percentage Distribution of Rural Households' COVID-19 Self-Perception of Risk by Geopolitical Zone

Zone	Very worried	Somehow worried	Not too worried	Not worried at all	n%
North Central	158 (78.2)	19 (9.4)	12 (5.9)	13 (6.4)	202 (100.0
North East	138 (87.9)	14 (8.9)	2 (1.3)	3 (1.9)	157 (100.0)
North West	287 (88.9)	15 (4.6)	4 (1.2)	17 (5.3)	323 (100.0)
South East	88 (50.0)	32 (18.2)	20 (11.4)	36 (20.4)	176 (100.0)
South South	147 (63.9)	24 (10.5)	18 (7.8)	41 (17.8)	230 (100.0)
South West	48 (44.9)	14 (13.1)	12(11.2)	33 (30.8)	107(100.0)
Nigeria	866 (72.5)	118(9.9)	68 (5.7)	143 (12.0)	1195(100.0)

Source: NBS/World Bank COVID-19 NLPS 2020

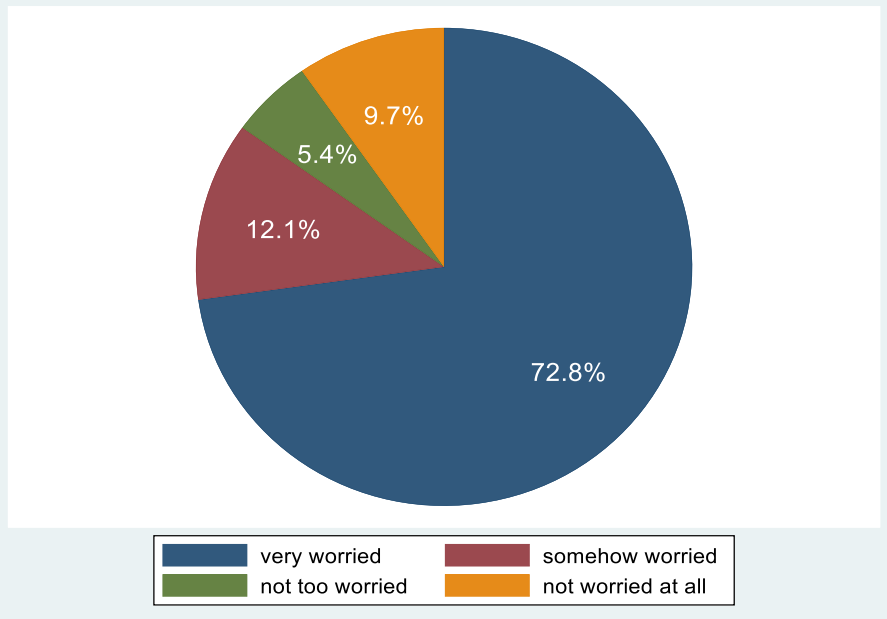

Fig 1: Self-perception of risk
Source: NBS/World Bank COVID-19 NLPS 2020

Rural Households' COVID-19 Risk-Reduction Behaviour

Results in Table 4 displayed the percentage distribution of respondents of the rural households' risk-reduction behaviour according to geopolitical zones. Four risk reduction behaviours were captured by the survey. The results showed that there were variations in the reported behaviour of the rural households by geopolitical zones. For example, of the four risk-reduction behaviours captured, at least 8 in 10 rural households in the 6 zones reported all the risk-reduction behaviors except stocking up on more food than normal since mid-March, 2020. This is expected because of the economic implication of doing so as a result of high rate of poverty in the rural area as reported in the literature (Alao *et al*., 2020)). In four of the six zones – North Central (91.7%); North East (96.1%); South East (94.0%) and South West (94.4%), at least 9 in 10 rural households reported both washing of hands with soap more than before and avoiding shaking hands. More rural households in the North East (96.1%) and South West (95.9%) than other zones reported both washing of hands with soap and avoidance of

large gathering. Compliance with risk-reduction was the highest in 2 of the 3 southern zones – South East (50.5%) and South West (45.8%) for all the 4 behaviours compared with other geopolitical zones. Our findings were similar to those of Gerhold (2020) who found in a German study at least 4 in 5 respondents washing of disinfecting hands, avoiding public places/events and avoiding public transports more than ever before. In another study in the United States of America, most respondents indicated that they were engaging in protective behaviours such as handwashing and social distancing more than usual (Wise *et al.*, 2020).

Table 4: Percent Distribution of Rural Households' COVID-19 Risk-Reduction Behaviour

RISK-REDUCTION BEHAVIOUR	**GEOPOLITICAL ZONE**						
	North Central	**North East**	**North West**	**South East**	**South South**	**South West**	**NIGERIA**
	(%)	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
Wash hands with soap more often since mid-March 2020	98.84	99.05	94.47	96.18	91.86	99.78	96.04
Avoid shaking hands since mid-March 2020	92.32	96.12	89.12	96.22	90.20	94.43	92.31
Avoid large gatherings since mid-March	90.04	97.04	91.89	87.09	94.96	95.91	92.65
Stock up on more food than normal since mid-March	50.75	39.98	36.76	48.07	56.25	49.08	46.07
Wash hands with soap more often & avoid shaking hands	91.71	96.07	86.85	93.96	84.02	94.43	90.07
Wash hands with soap more often & avoid large gatherings	89.89	96.09	89.36	84.37	87.60	95.91	89.84
Avoid shaking hands & large gatherings	85.15	94.97	88.28	85.21	87.87	94.43	88.65
Wash hands with soap more often/Avoid shaking hands/avoid large gathering	84.54	94.92	86.01	82.98	81.70	94.43	86.41
No preventive behavior	0.11	0.00	3.00	0.52	0.78	0.22	1.08
Only 1 preventive behavior	0.63	2.71	3.14	1.66	2.12	0.59	2.01
Any 2 preventive behaviours	7.86	2.16	6.69	6.81	10.69	4.76	6.91
Any 3 preventive behaviours	49.12	55.38	52.97	51.74	35.87	48.63	48.78
All the 4 preventive behaviours	42.28	39.76	34.21	39.26	50.54	45.80	41.23
n	**202 (100.0)**	**157 (100.0)**	**323 (100.0)**	**176 (100.0)**	**230 (100.0)**	**107 (100.0)**	**1195 (100.0)**

Source: NBS/World Bank COVID-19 NLPS 2020

COVID-19 Pandemic and Rural Household Food Security

The survey asked the following three questions on household food security:

i. Did you or any adult in your household have to skip a meal?
ii. Did you or any other adult in your household run out of food?
iii. Did you or any adult in your household go without eating for a whole day?

Results in Figure 2 showed the responses of the respondents to the above indicators of food security. In more than 7 in 10 households (72.3), the respondents or any adult member of the household had to skip a meal as a result of movement restrictions occasioned by the COVID-19 pandemic. In 56.4 percent of the households, the respondent or any other adult member ran out of food on a given day as a result of the pandemic while in nearly a quarter of the household (24.8%), the respondent or any other adult member went without eating for a whole day. The results showed the extent of hardship rural households experienced in terms of feeding as a result of the COVID-19 pandemic. Similar studies that have also affirmed the negative effect of the pandemic on rural households included those of Adjognon *et al*., (2021) in Mali; Ibunkun and Adebayo (2021) in Nigeria and Hirvonen *et al*., (2021) in Addis Ababa.

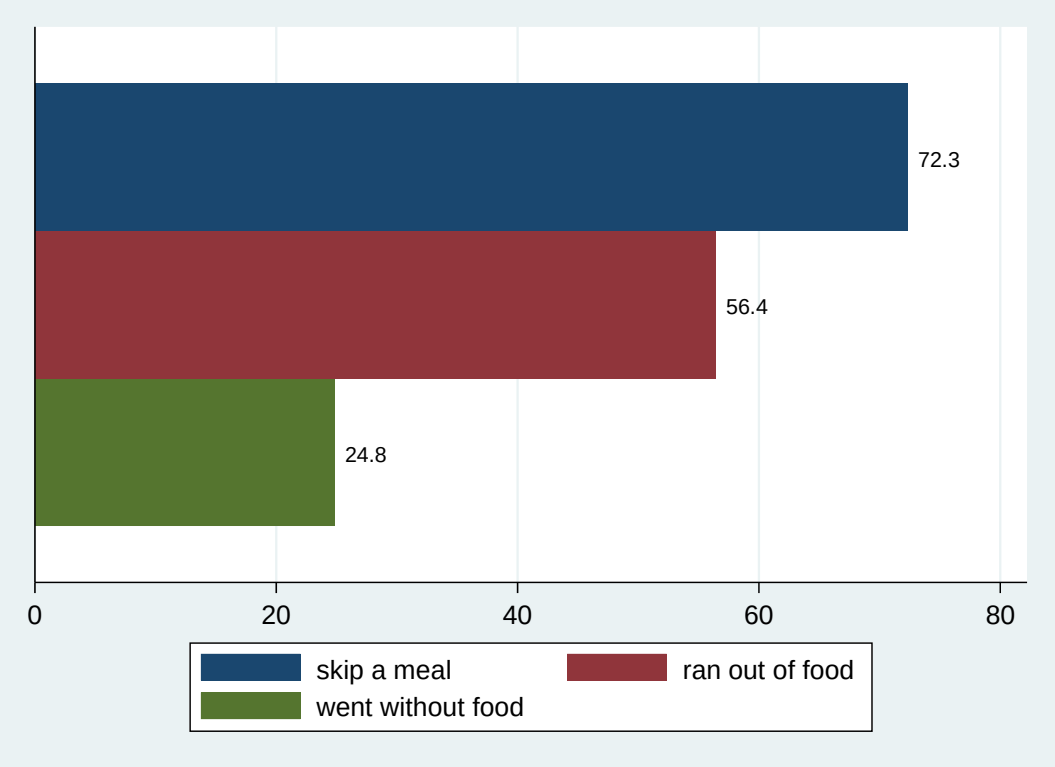

Fig 2 : COVID-19 Pandemic and Rural Household Food Security
Source: NBS/World Bank COVID-19 NLPS 2020

Effects of COVID-19 awareness of preventive measures, self- perception of risk and risk reduction behaviour

Results in Table 5 showed the Poisson regression of the effects of COVID-19 awareness of preventive measures and self-perception of risk on risk-reduction behavior of rural households. In this model there are three variables namely risk-reduction behaviour (dependent), awareness of preventive measures and self-perception of risk (independent). The p-value associated with LR chi square of 13.23 was small ($p<0.01$) which suggests an overall fit of the model in explaining the effect of awareness of preventive measures and self-perception of risk on risk-reduction behaviour. The overall Poisson regression model showed that there was joint significant influence of awareness of COVID-19 preventive measures and self-perception of risk on risk-reduction behavior (LR Chi=13.23, $p<0.01$). The results further showed an estimated incidence rate ratio of 1.022 for a one unit increase in awareness of preventive measures given that the self-perception of risk was held constant in the model. This suggests that for a one unit increase in awareness score, the incidence rate for behaviour would be expected to change by a factor of 0.022 (an increase of 2.2%) while holding the second variable in the model constant. Thus, there is a positive and significant relationship between awareness of preventive measures and risk-reduction behaviour (IRR=1.022, $p<0.01$). Although there was a positive relationship between self-perception of risk and risk-reduction behaviour, the relationship was however not significant. While it is expected that awareness of preventive measures will translate to behavioural change, self-perception of risk should also influence behavioural change, but the results of this study indicated otherwise. This means behavioural change may or may not be as a result of whether or not someone perceived himself /herself to be at risk or not at risk. Similar findings have been reported in the study of sexual behaviour and HIV/AIDS by Adedini *et al*., (2011). With respect to COVID-19 pandemic Wise *et al. (*2020) investigated the relationship between risk perception and protective behavior and found risk-perception as a significant predictor of protective behavior of handwashing and social distancing.

Table 5: Poisson regression of effects of COVID-19 awareness of prevention measures, self- perception of risk and risk reduction behaviour

				Number of obs	**= 1195**
				LR chi2	= 13.23
Log likelihood = -2158.29				Prob>chi2	= 0.001
Dependent Variable: COVID-19 Risk-reduction behavior					
Independent variables	**IRR**	**Std error**	**Z**	**p>|z|**	**95% Confidence Interval**
Awareness of COVID-19 preventive measures	1.022	0.006	3.56	0.000	1.010 1.034
Self-perception of risk of COVID-19	1.016	0.041	0.41	0.680	0.940 1.100
Constant	2.719	0.163	16.69	0.000	2.418 3.058

Source: NBS/World Bank COVID-19 NLPS 2020

Conclusion and Recommendation

The study assessed COVID-19 pandemic risk behaviour among rural households with a view to drawing implications for food security situations in Nigeria, using data from National Longitudinal Phone Surveys. Findings showed that respondents were aware of COVID-19 infection preventive measures. The study also found that most rural households were worried of getting infected and a substantial number were either somehow worried or not worried at all. Slightly more than 2 in 5 adhered to all the four risk-reduction behaviours such as handwashing with soap and water, social distancing, avoid shaking

of hands and stocking food at home. In many of the rural households at least a member had to skip a meal; ran out of food and in some households, at least one adult went without a meal as a result of movement restrictions occasioned by the COVID-19 pandemic. The results showed the effect of COVID-19 pandemic on food security situation of the rural households. Although there was a positive relationship between self-perception of risk and risk-reduction behaviour, the relationship was however not significant. While it is expected that awareness of preventive measures will translate to behavioural change, self-perception of risk should also influence behavioural change, but the results of this study indicated otherwise. The study recommend that Government should change the sensitization strategy on COVID-19 preventive measures in order to ensure the needed behavioural change among the rural populace most of whom are into agriculture and food production in the country, so as not to worsen the problems of food security in Nigeria.

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Conflict of Interest
The authors declare that there is no conflict of interest.

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