

THE COVID-19 PANDEMIC, FOOD SAFETY NET PROGRAMMES AND HOUSEHOLD FOOD SECURITY IN OYO STATE, NIGERIA

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ABSTRACT

The study examines the impact of COVID-19 on household food security and the role of food safety net programmes, using primary data from 120 households in Ibadan, Oyo State, Nigeria. Household food security status was measured using the Household Dietary Diversity Score (HDDS). Descriptive and comparative analyses were used to examine changes in food security and coping strategies before and during the pandemic. A probit regression model was used to identify determinants of food security. The Inverse Probability Weighted Regression Adjustment (IPWRA) method was employed to estimate the impact of COVID-19, proxied by job loss. Results show increased reliance on less-preferred, cheaper foods, reduced meal sizes and frequency, and food borrowing as coping mechanisms employed by households. The incidence of food insecurity increased by 17% between 2019 and 2020. Education, marital status, and the number of income earners were positively associated with food security. In contrast, age, household size, and male-headed households were found to be negatively associated. Only 34.17% of households accessed food safety net programmes, with no significant effect on food security. IPWRA results indicate that the pandemic caused a 21% decline in household food security. The study recommends improved access to quality education, skills training, and more effective government food safety net programmes.

Keywords: COVID-19 pandemic, Household food security, Food safety nets, IPWRA

JEL classification: H5, H530, I1

1. Introduction

Food security is a complex sustainable development issue linked to health and nutrition (Farzana et al., 2017). It is defined as a situation ‘when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’ (FAO, 1996). Adewuyi (2012) defined food security as a state in which all individuals have access to safe, nutritionally adequate, and personally acceptable food at all times while maintaining human dignity. Watts (2013) identified the important elements of food security as food availability, accessibility, utilization, and stability. It, therefore, requires that all individuals and households have access to sufficient food either by producing it themselves or by generating sufficient income to purchase food (Smith & Haddad, 2015). Household food insecurity, on the other hand, is a situation of limited or unclear access to sufficient, safe, and healthy food for household members to maintain healthy and active lifestyles (USDA, 2016; Bovell et al., 2015).

Food insecurity is a pressing issue that was worsened by the global COVID-19 pandemic. The outbreak, declared a pandemic by the World Health Organization in 2020, caused significant mortality and morbidity worldwide, with Nigeria recording its first case on February 27, 2020 (NCDC, 2020), and by May 2020, Lagos, Kano, and the Federal Capital Territory (FCT) had emerged as high-burden states, accounting for 64.5% of the cumulative cases in Nigeria (Dan-Nwafor et al., 2020). Additionally, Oyo State reported its first case on March 22, 2020, and by December 13, 2020, contributed 5.1% and 3.8% of all recorded cases and deaths in Nigeria respectively (Adedire & Ndam, 2021; NCDC, 2020).

To combat the spread of the virus, the Nigerian government, mirroring global efforts, implemented measures such as border closure, movement restriction, lockdown, travel ban, mask mandate, and quarantine (NCDC, 2020). Such strategies, while necessary to control the spread of the disease, had unintended negative consequences for global food security, particularly in low- and middle-income countries (Paslakis et al., 2021). Therefore, the pandemic disrupted food systems directly and adversely affected household incomes and physical access to food through imposed lockdowns (Devereux et al., 2020). This disruption led to reduced incomes and higher food prices, making it

difficult for many individuals and households to afford adequate, nutritious food, thereby undermining their right to food (HLPE, 2020).

The COVID-19 pandemic had far-reaching consequences for the food system, particularly affecting workers in the informal sector, who often face exploitation and low wages (HLPE, 2020). In particular, measures such as quarantine and social distancing disrupted trade, resulting in a sudden decline in food demand and adversely affecting the livelihoods of food producers and workers (Torero, 2020). Similarly, COVID-19 restrictions not only limited movement but also adversely affected food production, distribution, accessibility, affordability, and utilization in Nigeria. Disruptions in the food chain forced many households to adopt extreme coping strategies, including reducing food consumption, resorting to low-nutrient options, and excessive borrowing for food purchases, resulting in poor nutrition and impoverishment of many Nigerian households (Arndt et al., 2020).

While Nigeria was already grappling with high poverty levels before the pandemic, the economic situation of many Nigerian households became dire with its onset. The Nigerian government implemented various measures to mitigate the impact of the pandemic, including tax rebates for formal businesses, ₦20,000 conditional cash transfers to poor and vulnerable households, stimulus packages from the Central Bank, and food relief initiatives supported by the government and private sector (Dixit et al., 2020). However, ineffective implementation of national response strategies at the local and community levels, coupled with limited socioeconomic support for households and informal businesses, limited the effectiveness of these measures (Jacobs & Okeke, 2022).

This study, therefore, sought to examine the food consumption coping strategies used by households in Ibadan metropolis before, during, and after the COVID-19 pandemic, the changes in the food security status of households, the impact of the food safety net programmes implemented during the pandemic, as well as the impact of the COVID-19 pandemic on household food security.

2. Literature Review

Existing literature consistently shows that households adopt a range of food-consumption coping strategies in response to food insecurity, with the intensity

and diversity of these strategies increasing as food insecurity worsens. Studies from South Africa, The Gambia, and Nigeria indicate that common coping mechanisms include skipping meals, purchasing less-preferred or cheaper foods, reducing portion sizes, prioritizing children's consumption, borrowing food, and buying food on credit (Grobler & Dunga, 2017; Mendy et al., 2020; Ibok et al., 2014). These behavioural responses are often shaped by broader structural constraints affecting livelihoods and food systems, including insecurity and declining agricultural productivity, which have been shown to undermine household welfare in Nigeria (Chima, 2023).

The COVID-19 pandemic significantly exacerbated household food insecurity through income losses, job disruptions, rising food prices, and supply-chain constraints. Empirical studies across Nigeria and other developing countries have reported substantial declines in income, reduced food consumption, lower dietary diversity, and increased reliance on negative coping strategies during lockdown periods (Balana et al., 2020; Ariyo et al., 2021; Amare et al., 2021; Ogunniyi et al., 2021). Pandemic-related shocks also interacted with pre-existing institutional and macroeconomic weaknesses, limiting recovery and amplifying household vulnerability (Okpala et al., 2024; Onwioduokit & Effiong, 2024). Quantitative analyses further revealed significant increases in the incidence of food insecurity, ranging from 6% to over 20%, particularly among poorer, larger, and less educated households (Amare et al., 2021; Ibukun & Adebayo, 2021).

Across contexts, limited access to government assistance and food safety net programmes constrained households' ability to buffer pandemic-related shocks, reducing their effectiveness in mitigating food insecurity (Ogunniyi et al., 2021; Balana et al., 2020). This reflects broader challenges in policy design, implementation, and public engagement during crisis periods, as documented in studies on institutional capacity and socio-economic responses to shocks (Mulonzi et al., 2024; Saidu et al., 2024). International evidence from Indonesia and Iran shows that income loss and socioeconomic shocks significantly worsened household food security and dietary diversity during the COVID-19 pandemic (Syafiq et al., 2022; Ghanbari Movahed et al., 2022).

Despite this growing body of evidence, few studies explicitly quantify the causal impact of COVID-19-related employment shocks on household food security at the subnational level in Nigeria, particularly while accounting for

participation in food safety net programmes. This study contributes to the literature by addressing this gap.

3. Methodology

3.1 Data description and source

The Ibadan North Local Government Area (LGA) was selected for this study because it is one of the five LGAs in Ibadan, the capital of Oyo State and it has the largest land area among Nigeria's urban local government areas.

A multistage sampling technique was used to select respondents for this study. The first stage involved stratifying the LGA into three residential classes, following Allen and Adekola (2014): Low-Class Residential Areas (LCRAs), Middle-Class Residential Areas (MCRAs), and High-Class Residential Areas (HCRAs). The LCRAs are typically congested indigenous areas with poor housing quality, low-income residents, and poor environmental quality. The MCRAs, on the other hand, have relatively fair housing quality, residents with better economic status than the LCRAs, and a better environmental quality; while the HCRAs have well-planned residential estates with good quality housing inhabited by the highest income earners in the study area. The household stratification used for Ibadan North LGA (the study area) is presented in Table 1. The second stage involved the random selection of 2 residential areas from each stratum. This selection is shown in Table 2. The households interviewed were then randomly selected from the two residential areas within each stratum, using a proportionate-to-size sampling method, yielding a total sample of 120.

The socioeconomic characteristics, household expenditure profiles, and food-consumption coping strategies employed by households were analysed using frequency tables, means, and percentages. Additionally, a comparative analysis was conducted of the food-consumption coping strategies used by households in the pre-COVID-19 (2019), during-COVID-19 (2020 and 2021), and post-COVID-19 (2022) periods. Data for 2022 were considered post-COVID-19, as most COVID-19 restrictions had been relaxed by that year.

Table 1. Stratification of Residential Areas in Ibadan North LGA

Residential class	Study areas
Low-Class Residential Areas (LCRAs)	• Beere • Oje • Oke Aremo • Yemetu
Medium Class Residential Areas (MCRAs)	• Agbowo • Bodija Market Area/Ojuirin • Mokola • Orogun
High Class Residential Areas (HCRAs)	• Agodi • Ashi • Ikolaba • New Bodija

Source: Adapted from Allen and Adekola (2014).

Table 2. Selection of Households per Stratum

Residential Strata	Major Residential Areas Selected	Number of Sampled Households	Total
LCRAs	• Beere	23	41
	• Oje	18	
MCRAs	• Agbowo	20	43
	• Orogun	23	
HCRAs	• Ashi	16	36
	• New Bodija	20	
Total			120

Source: Adapted from Allen and Adekola (2014).

3.2 Model specifications and estimation techniques

3.2.1 Household Dietary Diversity Score (HDDS)

The Household Dietary Diversity Score (HDDS) was used to assess the food security status of households in the study area. To better reflect the quality of a household's diet, the method used the number of distinct food groups consumed rather than the number of distinct food items. Therefore, a household received a score of 1 if it consumed a particular food group and 0 otherwise. A scale of 1 – 12 food groups consumed by households based on FAO (2017) and Swindale and Bilinsky (2006) was used to compute the HDDS. The food groups included: (i) cereals, (ii) vegetables, (iii) fruits, (iv) meat, (v) egg (vi)

fish and other sea products, (vii) legumes, nuts, and seeds (viii) milk and milk products (ix) oil and fats (x) sweets, (xi) spices, condiments, and beverage (xii) tubers.

The mean HDDS of the study sample was used to classify households into food secure or food insecure categories (Thea et al., 2021) – households with their HDDS at or above the mean were considered to be food secure, while those below the mean were regarded as food insecure. Further, the means of the HDDS results were compared using a paired t-test to assess whether there were statistically significant differences in household dietary diversity between the referenced COVID-19 periods.

3.2.2 Probit Regression Model

A probit regression model was estimated for the determinants of the food security status of the households as follows:

$$Y_i = \beta_0 + \beta_i X_i + \mu_i \quad (1)$$

where:

Y_i = food security status/score of households

X_i = vector of explanatory variables

β_s = coefficients to be estimated

μ_i = random error term

The explanatory variables included: Number of Years of Formal Education, Age of Household Head, Square of Age of Household Head, Household Size, Sex of Household Head (male = 1, 0 otherwise), Marital Status of Household Head (married = 1, 0 otherwise), Membership of Social Group(s) (member = 1, 0 otherwise), Number of Income Earners in Household, Participation in Safety Net Programmes (participate = 1, 0 otherwise).

3.2.3 Inverse Probability Weighted Regression Adjustment (IPWRA)

The Inverse Probability Weighted Regression Adjustment (IPWRA) was used to assess the impact of the COVID-19 pandemic on households' food security status. The IPWRA estimator combines regression and Propensity Score Matching (PSM) techniques to provide some robustness against parametric

model misspecification. While PSM compares each treated observation to a corresponding untreated observation, and then calculates the average difference in the outcome variable between the two, the primary aim of the IPWRA estimator is to measure impact by the Average Treatment Effect on the Treated (ATET), which is the average effect of the treatment (job loss) limited to the households who experienced job loss as a result of the COVID-19 pandemic which was used as a proxy for COVID-19 in the model. Other parameters, such as the Average Treatment Effect (ATE) and the Potential Outcome Means (POMs), were also estimated. The ATE is the average effect of COVID-19 (job loss) among all households. On the other hand, the POM is the potential outcome (food security status) at a specific treatment level, assuming that none of the households experienced job loss during the COVID-19 pandemic. The year 2022 was chosen as the reference year for this analysis.

Based on the treatment scenarios of job losses due to the pandemic, the IPWRA model predicted the household food security status based on the following model:

$$Y_i = \alpha_i + \theta_i x_i + \varepsilon_i \text{ for } i = [0, 1] \quad (2)$$

where:

- Y_i = outcome variable of interest (food security status of households)
- x_i = set of controls (job loss, education, sex)
- α and θ = parameters to be estimated
- ε = error term

4. Results and Discussion

4.1 Socioeconomic profile of households

The mean age of the respondents was 46 years, indicating that most were still economically active. Saleh and Mustafa (2018), in a study from Kaduna, Nigeria, also reported a mean age of 46 years, drawing a similar conclusion. Further, most (78.3%) of the household heads in the sample were male. Munonye et al. (2022) reported similar findings, noting that households are mostly headed by males who traditionally assume decision-making roles.

Educational attainment was high among respondents, with 50% of household heads having completed tertiary education. This finding is logical,

as higher educational attainment is expected in urban areas due to the greater availability of educational institutions. It was also found that 68.3% of respondents were married (monogamous or polygamous), and households averaged 5 members. On average, there were 2 income earners per household, thereby providing some cushioning against economic shocks such as a job loss for one income earner, as was the case for many households during the COVID-19 pandemic.

The analysis of the employment status of household heads revealed that the majority (55.8%) were self-employed. It was therefore reasonable that the informal sector (44.2%) was the dominant sector of engagement, with the civil service and agriculture accounting for only 22.5% and 6.7% of respondents respectively. This finding of low involvement in agriculture by urban households aligns with the study of Odozi et al. (2021), who found that only 8.3% of their urban respondents (household heads) were engaged in agriculture. Further, it was revealed that the majority of household heads (72.1%) did not belong to any social groups, while, among those who belonged to social groups, only 7.5% claimed to have received assistance from these groups in the form of food (44.4%), loans (22.2%), and cash (33.3%) during the pandemic. This finding aligns with those of Ibukun and Adebayo (2021), who reported that the majority (73%) of households in their study did not receive any form of assistance during the COVID-19 pandemic to mitigate its impact on household welfare; and the World Bank (2022), which found that only a small proportion of Nigerian households received any form of social assistance during the pandemic, largely concentrated in food-related support. Table 3 presents the distribution of socioeconomic characteristics for respondents and their households.

Table 3: Socioeconomic Distribution of Households

Variables	Percentage (n = 120)	Variables	Percentage (n = 120)	Variables	Percentage (n = 120)
Age of the HH* head		HH size		Type of agriculture practiced	
≤ 30	19.2	1-5	69.2	Aquaculture	12.5
31-40	19.2	6-10	30.0	Crop production	62.5
41-50	20.0	>10	0.8	Livestock	25.0
51-60	34.2	Mean = 4.6		System of crop production	
>60	7.5	Household members ≥ 18years		Mixed farming	40.0
Mean = 46.3±11.36		1-3	72.5	Mixed cropping	60.0
Sex of HH head		3-5	25.0	Major output	
Female	21.7	>5	2.5	Cassava	37.5
Male	78.3	Mean = 2.2		Poultry	25.0
Education of HH head		No. of Income Earners in HH		Soya-beans	12.5
Non-formal	5.8	≤ 2	70	Yam and Cocoyam	12.5
Vocational	2.5	3-4	29.17	Cat fish	12.5
Primary	6.7	>4	0.83	Social group membership	
Junior	4.2	Mean = 2.2		No	72.10
Secondary		Employment status of HH head		Yes	27.90
Senior	30.8	Full time	31.7	Received assistance from a social group during the COVID-19 pandemic	
Secondary		Part-time	1.7	No	92.5
Tertiary	50.0	Self-employed	55.8	Yes	7.5
Marital status of HH head		Unemployed	6.7	Assistance obtained from a social group during the pandemic	
Monogamous	63.3	Retired	4.2	Food aid	44.4
Polygamous	5.0	Primary occupation of HH Head		Loan	22.2
Never married	7.5	Agriculture	6.7	Cash	33.3
Informal union	10.0	Informal sector	44.2		
Widowed	8.3	Civil Service	22.5		
Divorced	0.8	Others sectors	26.7		
Separated	5.0				

* HH = Household

Source: Authors' computation.

4.2 Expenditure profile of households relative to pandemic periods

Table 4 presents the household expenditure profile for the 4 reference periods, 2019 to 2022. Each expenditure category was reported with its mean value and standard deviation (SD), alongside the percentage change (Δ) from the previous year. The results reveal that, overall, during the period of interest (2019 to 2022), mean (cumulative) household expenditure showed a consistent upward trend, with the largest increase observed between 2021 and 2022 (31.8%). This suggests a general increase in household expenditure due to the heightened cost of living during the pandemic years.

Food expenditure, in particular, increased significantly during the COVID-19 pandemic, particularly between 2021 and 2022 (27.2%). This probably indicates the higher food prices that households faced as they adapted to pandemic-related changes. On the other hand, healthcare expenditure significantly increased in 2020 and 2021, likely due to the health impact of COVID-19. This increase, however, slowed significantly in 2022 (an increase of only 3.3%), attributable to stabilization in healthcare spending as the pandemic progressed and households became accustomed to observing COVID-19 health protocols, as well as to increased vaccinations. Non-food expenditure remained relatively stable in 2020 but increased significantly in 2021 (30.2%) and 2022 (37.5%), likely a reflection of higher spending on goods and services by most households as pandemic restrictions eased and consumer confidence returned.

Overall, the results indicate that households spent more during the pandemic, with the largest increase occurring in 2022. Food and non-food expenditures showed the largest increases, suggesting shifts in household spending priorities and likely reflecting broader economic factors such as inflation and supply chain disruptions caused by lockdown protocols. This aligns with recent empirical evidence showing that rising prices in Nigeria have been driven by pandemic-induced recessionary pressures, exchange rate depreciation, and persistent inflationary dynamics that weakened purchasing power and increased the cost of living (World Bank, 2022; International Monetary Fund [IMF], 2023). Healthcare spending also increased, particularly in the early years of the pandemic, highlighting the impact of health-related concerns.

Table 4: Household Mean Expenditure Profile Before and During the Pandemic

Monthly Expenditure	2019		2020		2021		2022	
	Mean $\pm$ SD	Δ	Mean $\pm$ SD	Δ	Mean $\pm$ SD	Δ	Mean $\pm$ SD	Δ
Cumulative Averages	85,412.08 $\pm$92,079.00	-	95,428.57 $\pm$113,318.27	11.7	112,436.97 $\pm$129,145.57	17.8	148,184.87 $\pm$173,504.68	31.8
Food	37,403.36 $\pm$ 27,473.66	-	46,084.75 $\pm$ 36,062.29	23.2	50,452.99 $\pm$ 38,177.10	9.5	64,169.49 $\pm$ 46,748.88	27.2
Healthcare	6,013.39 $\pm$ 11,694.78	-	7,292.04 $\pm$ 13,539.25	21.3	8,062.50 $\pm$ 14,159.50	10.6	8,327.43 $\pm$ 12,280.53	3.3
Other non-food	46,234.28 $\pm$ 65,586.48	-	46,733.94 $\pm$ 77,613.82	1.1	60,870.37 $\pm$ 92,015.35	30.2	83,678.90 $\pm$ 125,315.80	37.5

Notes: Δ = percentage change from the previous period; SD = Standard deviation

Source: Authors' computation.

4.3 Households' reported exposure to and effects of COVID-19

Table 5 summarizes households' reported exposure to COVID-19 and the perceived effects on their welfare. It reveals that 34.2% of households reported that at least one member experienced COVID-19 symptoms, with the most common ones being sore throat (68.29%), fever (56.10%), and cough (48.78%). Similar findings were made by Onyeaka et al. (2021). However, only 4.16% of households in which members reported COVID-19 symptoms received a positive diagnosis. The majority of diagnoses occurred in 2021 (60%), which corresponds to the pandemic timeline, with case counts surging in 2021 relative to the initial outbreak year (2020) in Nigeria (Sasu, 2022).

Approximately 56.67% of households reported experiencing income or job loss due to COVID-19. This indicates the economic disruption caused by the pandemic, leading to financial instability for many households. Household heads accounted for the majority (53.23%) of those affected by income loss due to the pandemic, followed by spouses (24.19%) and other household members (14.52%). This has significant ramifications for household welfare. For example, Amare et al. (2021) found that greater declines in earning capacity were associated with a 15% decline in household food security across Nigeria. Furthermore, 72.5% of households reported that job loss altered their eating patterns, suggesting that job loss reduced households' ability to maintain

their previous consumption patterns, thereby negatively affecting their food security, as noted by Padmaja et al. (2022).

Furthermore, 35.83% of the respondents reported difficulty in finding new employment after job loss, and 58.33% had not secured new employment. Among the households that experienced job loss and found new employment, 36% reported a significant decrease in their household's total income.

4.4 Food consumption coping strategies employed by households

Table 6 presents the distribution of food-consumption coping strategies employed by surveyed households from 2019 to 2022. The distribution was based on the frequency [All the Time (ATT), Quite Often (QO), Once in a While (OAW), Rarely (RL), Never (NV)] with which each coping strategy was used by households during the reference periods. The results reveal that reliance on less-preferred foods increased significantly in 2020, as the proportion of households using this coping mechanism all the time increased to more than double that of 2019. This may have resulted from households adjusting their consumption in response to worsening economic conditions at the start of the pandemic. Although this scenario declined slightly in 2021 and 2022, it remained above the pre-pandemic (2019) level, suggesting that the pandemic's economic impacts on households persisted. There was also an increase of almost 20% in the proportion of households relying on less expensive foods at all times between 2019 and 2020, likely due to the economic hardships they experienced and the consequent need to stretch limited resources. While reliance on less expensive foods decreased slightly in 2021 and 2022, the proportion of households that used this strategy consistently remained significantly higher than in 2019, indicating ongoing financial pressure.

Reliance on help from friends and relatives increased by almost 7% in 2020, indicating a strong community response to economic difficulties. Similar to the strategy of consuming less expensive food, consumption decreased slightly in subsequent years but remained higher than pre-pandemic levels, suggesting ongoing community support. The practice of limiting portions at mealtimes increased significantly in 2020 and remained higher than pre-pandemic levels, suggesting a common strategy to manage food scarcity.

Table 5: Households' Reported Exposure to and Effects of COVID-19

Had COVID-19 Symptoms		Mobility Restriction Consequences		No access to financial assistance	5.00	No Change in Income	2.00	Yes	100
No	65.80	Job loss	7.00	Local inputs are too expensive or inaccessible	10.83	Slight Increase in Income	34.00	Did Food Price Change affect Access to Food	
Yes	34.20	Reduced working hours	52.3	Job Loss Caused Changes in Eating Patterns		Significant Increase in income	18.00		
Symptoms Experienced		Increased workload	20.9	No	27.50	Did Household Experience Food Supply Disruption?		Minimally	7.50
Cough	48.78	Difficulty commuting	23.3	Yes	72.50	No	12.50	Moderately	20.83
Fever	56.10	Work from home	32.5	Job Loss Affects Food Accessibility?		Yes	87.50	Significantly	45.83
Chills	7.32	Income or Job loss as a result of the pandemic		Extremely decreased access	25.45	Did Pandemic Affect Household Access to Food		Extremely	12.50
Pains	34.15	No	43.33	Significantly decreased access	43.64	Not at all		29.52	
Sore Throat	68.29	Yes	56.67	Moderately decreased access	12.73	Minimally		47.62	
Loss of taste	29.27	Who Lost their Jobs in the Household?		Slightly decreased access	14.55	Moderately		14.29	
Shortness of breath	2.44	Household head	35.71	No change in access	3.64	Significantly		6.67	

Running nose	26.83	Spouse	46.43	Difficulty Finding New Employment?		Extremely	1.90
Fatigue	29.27	Other household members	42.86	No	64.17	Did Pandemic Affect Food Availability in the Community	
Diarrhoea	2.44	Pandemic Impact on Household Income		Yes	35.83	Not at all	6.67
Household Member Diagnosed with COVID-19?		Job loss	23.33	Found New Employment?		Minimally	59.05
No	95.8	Reduction in working hours	33.33	No	58.33	Moderately	21.90
Yes	4.16	Reduced demand for goods and services	58.33	Yes	41.67	Significantly	9.52
Year of Diagnosis		No market to sell goods and services	19.16	How did New Employment affect Household Income		Extremely	2.86
2020	40	Transport limitation	24.16	Significant Decrease in Income	36.00	Did Pandemic Cause Food Price Increases?	
2021	60	Income earner unwell	1.00	Slight Decrease in Income	10.00	No	0

Source: Authors' computation; Figures are percentages.

Table 6: Food Consumption Coping Strategies among Households (2019 – 2022)

Year	2019					2020					2021					2022				
Coping strategies	ATT	QO	OAW	RL	NV	ATT	QO	OAW	RL	NV	ATT	QO	OAW	RL	NV	ATT	QO	OAW	RL	NV
Relying on less-preferred foods	12.5	7.5	12.5	18	49	26.7	21	15.8	15	22	22.5	16	17.5	16	28	19.2	11	15.8	14	40
Relying on less expensive foods	13.3	12	11.7	16	48	31.7	19	19.2	13	17	26.7	15	26.7	10	22	25	12	16.7	20	27
Borrowing money	1.7	3.3	7	10	78	4.2	5.8	11.7	12	67	4.2	4.2	8.3	9.2	74	3.3	2.5	7.5	9.2	78
Relying on help from friends and relatives	3.3	1.7	14.2	9.2	72	10.8	11	12.5	6.7	59	9.2	8.3	9.2	10	63	7.5	5	7.5	7.5	73
Purchase of food on credit	3.4	2.5	10.9	16	67	8.3	11	17.5	13	50	7.5	7.5	16.7	13	56	5.8	5	10.8	16	63
Soliciting funds	0.8	-	1.7	2.5	95	0.8	1.7	2.5	3.3	92	0.83	1.7	3.3	1.7	93	0.8	-	3.3	1.7	94
Limiting portions at mealtimes	6.7	5.8	18.3	13	57	17.5	15	23.3	9.2	35	15	13	20.8	13	39	11.7	12	15.8	12	49
Limiting adult intake for children	9.2	3.3	5.8	11	71	13.3	13	11.7	8.3	54	11.7	8.3	11.7	11	58	10.8	5	5.8	13	65
Reducing the number of meals	7.5	4.2	16.7	11	62	23.3	13	12.5	11	40	18.3	13	14.2	9.2	47	11.7	10	15.8	12	51
Increasing consumption of street food	7.5	-	8.3	5.8	78	7.5	2.5	4.2	-	86	8.3	5	8.3	5	73	8.3	1.7	13.3	5.8	71
Skipping eating for a day	3.4	0.8	1.7	10	84	5	2.5	5	6.7	81	3.3	2.5	5	5	89	3.3	2.5	2.5	7.5	84
Selling off assets	-	-	0.83	0.8	98	-	1.7	2.5	4.2	92	-	0.8	3.3	3.3	95	-	-	-	1.7	98
Sending children off to relatives	-	0.8	0.83	-	98	-	0.8	1.7	1.7	96	-	0.8	1.7	2.5	95	-	0.8	0.83	0.8	98
Relying on food assistance programmes	2.5	-	0.83	2.5	94	2.5	1.7	1.7	3.3	90	2.5	0.8	2.5	2.5	92	2.5	-	1.7	3.3	93

Notes: ATT = All the Time, QO = Quite Often, OAW = Once in a While, RL = Rarely, and NV = Never; Figures are percentages.

Source: Authors' computation.

There was an increase in limiting adult intake to favour children during the pandemic, reflecting efforts to prioritize children's nutrition as resources were scarce in many households. Moreover, the number of meals per day declined by nearly 16% between 2019 and 2020, indicating that households had to respond rapidly to acute and severe food shortages. Although slightly fewer households reported using this strategy consistently in subsequent years, the proportion remained above the 2019 level.

It is noteworthy that reliance on food assistance programmes was rarely adopted as a coping strategy, indicating that most households lacked access to government programmes implemented during the pandemic. Overall, the data revealed that households significantly adjusted their food-consumption coping strategies during the pandemic years (2020-2022) relative to the pre-pandemic period (2019).

4.5 Household dietary diversity

Household food security status was analysed using the Household Dietary Diversity Score (HDDS), as explained in Section 2.3.2. The results reveal that the mean HDDS in 2019, 2020, 2021, and 2022 were 7.89, 6.28, 6.96, and 7.27, respectively. This result shows a drop in dietary diversity of households by 1.61 between 2019 and 2020, which could be a reflection of the harsh economic situation caused by the pandemic, as well as the difficulty in accessing a variety of foods due to lockdown protocols, which made it more difficult for households to consume more diverse food groups in their meals. The figure increased slightly (by 0.68) in 2021 and further increased by 0.31 in 2022, reflecting the gradual easing of economic conditions as the pandemic declined. However, the mean HDDS in 2022 remained below the pre-pandemic (2019) level, indicating that the pandemic's economic impact persisted. The paired t-test results in Table 7 confirm that the differences in HDDS between the periods were statistically significant.

Table 7: Paired Sample t-test of Comparison of Mean HDDS

HDDS (Year)	Mean	Standard Error	t – statistic	P value
2019	7.89	0.229	9.728	0.0000
2020	6.28	0.230		
Difference	1.61	0.166		
2021	6.96	0.233	-3.620	0.0004
2022	7.27	0.236		
Difference	-0.68	0.101		

Source: Authors' computation.

The incidence of food insecurity increased by 17.5% from 2019 to 2020 (Table 8), indicating that the COVID-19 pandemic adversely affected household food security. Although this figure declined slightly (by 1%) in 2021, it increased by 1.67% in 2022, remaining higher than in the pre-pandemic period. These results suggest that the pandemic-related challenges to food security persisted.

Table 8: Household Food Security Status Based on the HDDS Measure

Household Food Security Status (n = 120)	2019	2020	2021	2022
Food Insecure	40.83	58.33	48.33	50.0
Food Secure	59.17	41.67	51.67	50.0

Note: Figures are percentages.

Source: Authors' computation.

4.6 Households' reported access to food safety net programmes

Table 9 reveals that only 34.17% of households reported participating in any food safety net programme. Further, the perceived effectiveness of these programmes varied among households. While some found them slightly helpful (36.59%) or moderately helpful (7.32%), the majority (46.34%) were undecided about their effectiveness. However, only 7.32% reported that these programmes significantly aided them, while 2.24% found the safety net programmes not helpful at all.

Table 9: Households' Reported Access to and Perception of Food Safety Net Programmes

Have You Participated in Any Food Safety Net and Assistance Programmes?	
No	65.83
Yes	34.17
Effectiveness of the Programme(s)	
Not at all	2.24
Slightly	36.59
Undecided	46.34
Moderately	7.32
Significantly	7.32

Note: Figures are percentages.

Source: Authors' computation.

With regard to the types of assistance reported by households, food aid was the most common. Furthermore, the highest proportion (90.24%) of these households received food aid in 2020, with a decline of 9.75% by 2021 and a sharp drop of 26.83% between 2021 and 2022. Regarding the sources of assistance, the majority of households reported receiving aid from their communities. Table 10 summarizes these findings.

Table 10: Form of Safety Net Assistance Received by Households and their Sources

Type	2019	2020	2021	2022
Food aid	56.10	90.24	80.49	53.66
Cash Transfer	-	2.44	2.44	-
Palliatives	-	19.51	12.20	-
Source				
Government	-	21.95	14.63	2.44
Religion	12.20	24.39	29.27	12.20
Community-Based Help	51.22	85.37	75.61	41.46

Note: Figures are percentages.

Source: Authors' computation.

4.7 Determinants of household food security

The parameter estimates for the determinants of household food security are presented in Table 11. They reveal that each additional year of formal education was associated with a 0.257 increase in the household food security score, which was statistically significant at the 1% level. This is in line with the findings of Ibok et al. (2014) and Oyebanjo et al. (2013), who reported that education had a positive effect on food security due to the greater earning power associated with people with more education. On the other hand, a one-year increase in the age of the household head was associated with a 0.319 decrease in food security, with a 10% statistical significance. This is expected, as the older a household head is, the less engaged they are in income-generating activities, which could negatively affect household food security.

Furthermore, the results reveal that larger household sizes were associated with lower food security, with each additional household member resulting in a 1.075 decrease in the household food security score. Owoo (2021) similarly linked larger households to poorer food security outcomes, which are more likely in urban Nigeria due to increased resource demands and the resulting competition for scarce resources. Moreover, female-headed households were associated with a 6.168 decrease in the food security score relative to male-headed households, at the 1% significance level. This result is expected given the limitations women typically face in accessing economic resources and their lower incomes relative to men in many Nigerian communities. Further, being married was associated with a 4.594 increase in the food security score, at the 5% significance level. Sasu (2022) also found that households with married heads were more likely to be food secure. This result is plausible, given that married individuals can pool resources to provide for their families, thereby improving food security.

Additionally, an additional income earner in the household was associated with a 2.758 increase in the food security score, at the 5% significance level. This aligns with Salman et al. (2019), who opined that a household's total income could be boosted by family members' involvement in various income-generating activities, which can positively affect the food security status of the household. Significantly, however, participation in safety net programmes was associated with a 2.228 decrease in the food security score, at the 1% significance level. This counterintuitive result may suggest that the households

participating in these programmes are not having their needs met or that significant flaws exist in the design or execution of the safety net programmes, coupled with inaccurate targeting, or inadequate coverage to the vulnerable who need it the most, as Zafar and Zehra (2022) agree.

Table 11: Parameter Estimates of the Determinants of Household Food Security

Variables	Coefficient	Standard Error	P>Z
Years of Formal Education	0.257	0.069	0.000***
Age of Household Head	-0.319	0.192	0.097*
Square of the Age of Household Head	0.352	0.266	0.186
Household Size	-1.075	0.632	0.089*
Sex of Household Head	-6.168	2.357	0.009***
Marital Status of Household Head	4.594	2.222	0.039**
Membership of Social Group	-1.077	0.986	0.274
Number of Income Earners in Household	2.758	1.374	0.045**
Participant in Safety Net programs	-2.228	0.796	0.005***
Constant		10.877	

Notes: ***, ** and * represents significance at 1%, 5% and 10% respectively.

Source: Authors' computation.

4.8 IPWRA measure of the impact of the COVID-19 pandemic on household food security

The estimated impact of the COVID-19 pandemic on household food security based on the IPWRA estimator is presented in Table 12. To estimate the impact of the COVID-19 pandemic on household food security, 2022 food-security outcomes among households that experienced job loss are compared with those of households that did not experience job loss. This is known as the average treatment effect on the treated (ATET).

The ATE result indicates that job loss due to the pandemic would reduce household food security by 0.21 (significant at the 5% level) if all households experienced job loss. Thus, the estimated ATE indicates that an average household in the population has a 21% lower probability of being food-secure under a scenario in which all households experienced job loss.

Similarly, the conditional treatment effect, which measures the ATET for households that actually experienced job loss, is 0.28, indicating that an average household that experiences job loss is 28% less likely to be food-secure ($p < 0.01$) than one that did not experience job loss. The potential outcome mean (POM) shows that if none of the households had experienced job loss during the COVID-19 pandemic, 63.2% of them would have been food secure (significant at 1%), compared to the 50% of households found to be food secure in the study (see Table 8). These results, therefore, confirm the negative impact of the COVID-19 pandemic on household food security.

Table 12: IPWRA Estimates of ATE and ATET

Treatment Effect	Coefficient	Standard Error	P > Z
Average Treatment Effect (ATE)	-0.210	0.085	0.014**
Average Treatment Effect on the Treated (ATET)	-0.280	0.095	0.003***
Potential Outcome Mean (POM)	0.632	0.068	0.000***

Notes: *** and ** represent significance at 1% and 5% respectively.

Source: Authors' computation.

5. Conclusion and Recommendations

This study has shown that the COVID-19 pandemic had a markedly negative impact on food security among households, leading most of them to adopt various coping strategies to deal with the dire situation. Primary among these were: relying on less-preferred foods, relying on less expensive options, limiting portion sizes, limiting adult intake for children, and reducing meal numbers. These strategies, in themselves, pose a threat to the food and nutrition security of the households and their members. Moreover, HDDS food security estimates indicated that the incidence of food insecurity among households increased significantly between the pre-pandemic and pandemic periods. Although the situation improved in the immediate post-pandemic period, food security remained worse than in the pre-pandemic period. Furthermore, most households did not receive any support through food safety net programmes to mitigate the harsh effects of the COVID-19 pandemic, and, where they did, it was mainly at the community level and was considered mostly ineffective by the recipients. Furthermore, large, male-headed households with older heads

were more susceptible to food insecurity. In addition, job losses during the pandemic significantly increased the depth of food insecurity experienced by households. The absence of mitigating factors for this shock adversely affected household welfare. Recommendations are therefore made based on the findings of this study.

Food safety net programmes need to be strengthened to increase their accessibility to target groups and improve their effectiveness. They should be designed primarily to provide timely and adequate support to the most vulnerable households. There should also be sustained efforts to increase awareness of such food safety net programmes. By promoting awareness campaigns and simplifying access to these programmes, more households can benefit and improve their food security. Moreover, effective feedback mechanisms must be established to gather input from beneficiaries and non-beneficiaries on the effectiveness of food security programmes so as to make necessary adjustments during implementation.

Local communities should be engaged in the planning and implementation of food assistance programmes to ensure that the programmes are appropriately tailored to household needs. There should be robust data collection and monitoring systems to enable policymakers to track and accurately evaluate the effectiveness of food safety net programmes. Monitoring the impact of these programmes will enable necessary adjustments and improvements to ensure they reach their intended beneficiaries and achieve their desired outcomes.

Vocational education and skills training programmes should be made available to communities, households, and individuals in order to increase employment opportunities and incomes, particularly for those who have experienced job losses and ongoing income disruption as a result of the pandemic. Providing the necessary knowledge and skills can help individuals secure stable employment and increase their earning potential.

Self-employment and entrepreneurship should be encouraged across all communities to address food security challenges, particularly in the event of future similar economic shocks. This can be achieved by providing access to microfinance, business development services, and targeted training programmes. Such support can empower individuals to start their own businesses, generate income, and become more resilient to food insecurity.

Households can also be encouraged to engage in home gardening to supplement their food sources and enhance food security.

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