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IMPACTS OF INCOME SHOCKS AND SOCIAL PROTECTION ON RURAL HOUSEHOLDS' FOOD INSECURITY EXPERIENCES DURING THE COVID-19 PANDEMIC IN CONFLICT-AFFECTED STATES IN NORTHERN NIGERIA

Abstract. Social protection is one of the major policy instruments for addressing households' vulnerability to income shocks and poverty across the globe. In Nigeria, the COVID-19 pandemic presented a double tragedy to rural households in northern Nigeria due to their pre-pandemic exposure to several income shocks and conflicts. Therefore, this study analysed the impacts of income shocks and social protection on food insecurity experiences (FIE). The data were collected by the Food and Agriculture Organization (FAO) as Data in Emergency Monitoring (DIEM) from 4412 households in two Rounds in 2021 and 2022. The data were analysed by negative binomial regression and treatment effects with regression estimator. The results showed that majority of the respondents were permanent residents (94.88%), while the highest reported income shocks were high food price (34.00%), violence (23.07%), high fuel price (20.24%), and loss of employment (11.65%). Social assistances in the form of food and cash vouchers were received by 5.92% and 2.61%, respectively. At the mild level of food insecurity, 67.84% worried about food, 71.48% ate less healthy food, and 71.62% ate few food, while at chronic level, 23.13% went the whole day without food. The negative binomial regression showed that education levels, male headship, income, and permanent residence significantly reduced ($p<0.05$) the expected number of FIE. The average treatment effect (ATE) showed that loss of employment, other household shocks, high food prices, other economic shocks, animal diseases, violence and insecurity significantly increased ($p<0.05$) FIE, while pest outbreaks reduced it. Also, those who received food had significantly higher FIE ($p<0.05$). It was concluded that income shocks promoted FIE during the COVID-19 pandemic, while social assistances insignificantly addressed the problems. It was recommended that efforts to address food insecurity should be gender sensitive, address insecurity of human lives and properties, and promote education among rural households.

Keywords: *Income Shocks, Social Protection, Food Insecurity, COVID-19, Conflict, Nigeria.*

JEL Classification: C01; C21; D12; I31.

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Introduction. Social protection is one of the major policy instruments for addressing households' vulnerability to income shocks and poverty across the globe. This is particularly so in the context of growing incidences of idiosyncratic and covariate shocks, which often impact people's socio-economic activities with utmost retrogressive ruthlessness (Nicola et al., 2020). Therefore, the international community is unanimously

forthright in asserting the essentiality of social protection as a fundamental right of every citizen for a dignified and healthy life[1]. Although over the past few decades, progress in activating some social protection programmes has been very sluggish, in many developing countries, emphases are now placed on their utilization as primary interventions to safeguard the welfare of extremely poor and vulnerable households from the precarious impacts of income shocks. Therefore, some developing countries have integrated targeted marginal interventions executed in the form of in-kind or cash transfers to facilitate the processes of poverty reduction in line with the 17 expedient Sustainable Development Goals (SDGs) (Tabor, 2002; Dadap-Cantal et al., 2021; Grosh et al., 2022).

In Africa, although poverty reduction is the crux of several development plans and programmes, the major problem remains inadequate targeting of interventions which often connotes deliberate diversion of programmes' benefits to unintended beneficiaries. Therefore, a framework for enhancing the targeting efficiency of poverty reduction programmes is of fundamental relevance in advancing economic inclusion of the poor, with utmost promotion of economic equity and sustainability. Specifically, over the past few decades, Africa's aspiration to ensuring a society with adequate coverage of social protection has met with several obstacles. It is important to note that the ILO has assisted several African countries to design social protection programmes following the adoption of the Social Security Convention in 1952. More importantly, over the past few decades, African policy makers have adopted several policy frameworks towards expansion of social protection initiatives[2]. Some reflections on African leaders' commitments towards promotion of social protection are highlighted in "Agenda 2063: The Africa We Want" and "Abidjan Declaration"[3].

Therefore, policy initiatives to ensure households' economic stability through mitigation of the impacts of income shocks are fundamental necessities in many African countries. The COVID-19 pandemic presents a precursory symbol of international connectedness of global economies and the systematic importance of mitigating the impacts of income shocks through some social protection initiatives. It should be emphasized that African economies contracted by 1.6% in 2020 due to the COVID-19 pandemic[4]. The lingering impacts of the COVID-19 pandemic as well as global inflationary trends are critical factors influencing economic performances of many African countries since the wane of the pandemic in 2022. More importantly, other welfare shocks with different impacts across the African continent include environmental hazards like drought, flooding, and hails, while the significance of progressive insecurity manifesting as terrorism and communal conflicts cannot be over-emphasized.

In Nigeria, the impacts of income shocks in defining households' economic status cannot be overemphasized. This can be buttressed from the fact that before the COVID-19 pandemic surfaced with such devastating economic ruthlessness, the Nigerian economy had battled severe insecurity problems promoted by political and religious extremists. The country currently ranks fourth and eighth among the countries most impacted by terrorism in Africa and the entire world, respectively[5]. It should also be noted that Nigeria is among the ten countries in the world that accounted for 85% of global deaths from activities of terrorists[6]. The problem of insecurity in Nigeria has progressively escalated into increased devolvement of terrorism in the form of protracted herder-farmer conflicts, kidnapping for ransoms or rituals, communal banditry, and fatal attacks on religious centres.

The fundamental predisposition of economic policies and reforms that had been recently implemented to address economic stagnation and promote international competitiveness of Nigerian economy has unfortunately unfolded a perpetual

1 International Labour Organization (ILO). Africa Regional Social Protection Strategy, 2021-2025: Towards 40 % – a social protection coverage acceleration framework to achieve the SDG. 2021. URL: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@africa/@ro-abidjan/documents/publication/wcms_828423.pdf (дата звернення: 29.12.2024).

2 International Labour Organization (ILO). Africa Regional Social Protection Strategy, 2021-2025: Towards 40 % – a social protection coverage acceleration framework to achieve the SDG. 2021. URL: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@africa/@ro-abidjan/documents/publication/wcms_828423.pdf (дата звернення: 29.12.2024).

3 Ibid.

4 African Development Bank (AfDB). African Economic Outlook 2022: Africa's 2021 economic rebound impacted by lingering Covid-19 pandemic and Russia-Ukraine war. 2022. URL: https://www.afdb.org/en/news-and-events/press-releases/african-economic-outlook-2022-africas-2021-economic-rebound-impacted-lingering-covid-19-pandemic-and-russia-ukraine-war-51865 (дата звернення: 06.12.2024).

5 Institute for Economic and Peace. Global Terrorism Index 2023. 2023. URL: https://reliefweb.int/attachments/91c7f4ee-9db7-47c4-a487-0d166b3d4274/GTI-2023-web.pdf (дата звернення: 06.12.2024).

6 Ibid.

syndrome of sufferings prescriptively encapsulated by growing inflation, poverty and economic inequality. Therefore, in the context of households' growing exposure to income shocks, the Nigerian government is implementing social protection programmes targeted at economically vulnerable households. Moreover, with slow progress in devolving such initiatives to poor households and the tightness of national budgets, there have been initiatives from other stakeholders in developing a framework for social assistance, especially during the COVID-19 pandemic.

Although data paucity has often prevented research into the impacts of formalized social protection initiatives and informal assistances in Nigeria, especially during the COVID-19 pandemic, a clear understanding of their impact is essential for promoting some monitoring and evaluation activities divulged at understanding their relevance for the overall human capital development and poverty reduction. This study therefore aims to analyse the impact of income shocks and social protection interventions on households' food insecurity during the COVID-19 pandemic with focus on conflict-affected households in northern Nigeria. The specific objectives were to analyse the determinants of Food insecurity experiences and determine the impacts of income shocks and social assistance interventions using the ATE and ATET frameworks with regression adjustment estimator.

Literature Review. The framework for analysing the impacts of income shocks and social protection on food insecurity can be derived from the classical microeconomic theory of utility maximization (Akter & Basher, 2014). This theory postulates that households would always seek for utility maximization based on the constraints posed by commodity prices and their levels of incomes (Metcalfe, 2001). Therefore, a stable consumption behaviour requires a stable level of income either permanently or transiently (Aikaeli et al., 2021). In addition, income shock is a form of income destabilization exposure that promotes income insecurity (Ansah et al., 2021). This situation always requires some form of social assistance to facilitate consumption smoothening. Without adequate social assistance, income shocks, such as the COVID-19 pandemic is bound to subject vulnerable households to food insecurity.

Food insecurity has been defined in different ways. It is expressed as inability to procure sufficient food that is required for healthy living (Schroeder and Smaldone, 2015). Food insecurity is therefore synonymous with hunger, which defines a situation of deplorable painful state that has been promoted by insufficient food intakes[1]. This is well captured in the definition of food security that was provided by FAO (1996) as "People having at all times, physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life". This definition reemphasizes the basic pillars of food insecurity which are "availability, accessibility, utilization, and stability" (Aborisade & Bach, 2014).

Some dimensions of food insecurity have been defined in the literature. Specifically, the Food Insecurity Experience Scale (FIES) identified four levels, which are food secure, mild food insecure, moderate food insecure and severe food insecure (Pool & Dooris, 2022). These divisions have afforded policy makers some basic information for understanding the urgency of strategic policy interventions to address hunger and malnutrition. Specifically, the seriousness of such interventions can be gauged from the fact that attainment of zero hunger by 2030 is one of the Sustainable Development Goals (SDGs) with utmost significance and economic cost (Laborde et al., 2016; Bizikova et al., 2020).

Among the several factors that have been identified as correlates of food insecurity in the literature, income shock is notable. In absence of adequate coping strategies, income shocks are bound to destabilize the households' accessibility, utilization and stability pillars of food security. Similarly, COVID-19 was a form of income shock, which exposed the vulnerability of many households to other shocks. There have been several studies on the impacts of COVID-19 on food insecurity. These studies generally reported the negative impacts of the pandemic on households' food security levels through the channels of income losses, job losses and reduction in purchasing power (Hirvonen et al., 2021; Béné et al., 2021).

In Nigeria, the impacts of COVID-19 pandemic on households' food insecurity cannot be denied. Ibukun and Adebayo (2021) reported a higher prevalence of severe food insecurity with education levels, wealth index and income being significant correlates. Balana et al. (2023) also found

1 Food and Agriculture Organization (FAO). Hunger and food insecurity. 2025. URL: https://www.fao.org/hunger/en (дата звернення: 18.03.2025).

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prevalence of severe food insecurity during the pandemic in Nigeria and income loss was a major correlate of food insecurity. In addition, ownership of livestock was found to reduce the impacts of the pandemic while government's social protection programmes did not have significant impact. Amare et al. (2021) found that using Nigeria's panel data, food insecurity was promoted by conflicts, lockdowns, non-farm business and residence in rural areas.

Amusan and Agunyai (2021) also found that the lockdowns that were implemented during the pandemic promoted food insecurity through significant loss of households' purchasing power. Omotayo et al. (2022) also found that income, education, gender, and household size were the determinants of food security during the COVID-19 pandemic in Nigeria. Bwala et al. (2023) also found that during the COVDI-19 pandemic in Nigeria, households' heads gender, education, income and work hours were significantly associated with food security.

In some other previous studies, the correlation between income shocks or social protection and food insecurity had been estimated. However, although some studies concluded on the relevance of income shocks and social protection in defining the food insecurity status of some households, the magnitude of their impacts based on some case control design was not estimated. Examples of such studies include Leete and Bania (2010) who reported statistical significance of income and income shocks in explaining food insufficiency. Akter and Basher (2014) found that price shocks adversely influenced food insecurity, while Vu et al. (2022) predicted negative impact of COVID-19 pandemic on households' food insecurity in Vietnam. Alam et al. (2024) also reported the negative effect of price shocks on food insecurity during the COVID-19 pandemic. Niles and Salemo (2018) found that climatic shock reduced the likelihood of being food secure.

Furthermore, Temple et al. (2019) analysed the food insecurity dimensions among social assistance recipients in Australia. It was found that food insecurity was more pronounced among social assistance recipients. In another study in British Columbia, Li et al. (2016) found that increase in social assistances reduced food insecurity. Using a meta-analysis, Hidrobo et al. (2018) found that social protection enhanced caloric food intakes, food expenditures and acquisition of some productive assets. King (2017) also found that informal assistance reduced the likelihood of being food insecure. Waildler and Devereux (2019) found that in South Africa, food insecurity reduced with receipt of older people's grants while child support grant had no significant impacts. Miller et al. (2011) also found that social assistance in the form of cash transfer significantly enhance food security in Malawi. Moreover, Abay et al. (2023) reported a significant impact of social assistance on households' food security during the COVID-19 pandemic in Ethiopia.

This paper is contributing to existing body of knowledge through adoption of a case control design that identifies the impacts of social assistance and income shocks on food insecurity in Nigeria during the COVID-19 pandemic. Our adopted methodology goes beyond a statistical analysis of the correlates of food insecurity, we estimated the impacts of income shocks and social assistances using the econometrically justified case control regression adjustment estimators. In the remaining parts of the article, we presented the materials and methods, results and discussion and conclusion.

Research Methodology.

Data and Sampling Methods

The data for this study were the first and second rounds of the Data in Emergency (DIEM), which were collected by the Food and Agriculture Organization (FAO) for the monitoring of agricultural activities and food security in Nigeria. These surveys were implemented in five selected states, including Zamfara, Yobe, Katsina, Borno, and Adamawa. The first round of the survey comprised of 2709 households, and was implemented between May and June, 2021. However, the first round was conducted between June 26 and July 8 in 2022 among 1703 households[1 2]. The first round comprised of 1703 households which were interviewed using face-to-face method, while the second round comprised of 1398 households which were interviewed with computer-assisted telephone interviews[3]. The surveys are comparable although during the round 2, insecurity mandated some changes in the sampling design with replacement of some areas in Borno due to pronounced insecurity.

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

3 Ibid.

The distribution of sampled households across the selected states is in Table 1.

Estimated Model

We estimated the negative binomial regression model in this study. The starting point of our analysis was estimation of a Poisson regression due to the count nature of the dependent var(2021). iable. However, we subjected the results to overdispersion test in STATA 18 software. The result, using the *estat gof* command revealed that there was overdispersion The dependent variable in this study is the number of food problems reported by each household. In its additive form, the estimated model can be presented as:

$$Y_{ij}=exp(\alpha_0+X_{ik}\,\beta_k)+\varepsilon_i, \quad (1)$$

In the above equation, Y_{ij}, denotes the number of food problems experienced by ith household, the vector of the independent variables is denoted as β_k, α_0 represents the constant term and ε_i is the stochastic error term. The independent variables (X_{ik}) are coded as follows: second round (yes = 1, 0 otherwise), households' agricultural activity (none is the reference) [crop (yes = 1, 0 otherwise), livestock (yes = 1, 0 otherwise), livestock and crop (yes = 1, 0 otherwise)], male headed household (yes = 1, 0 otherwise), households' heads education (none is the reference group) [basic education (yes = 1, 0 otherwise), primary education (yes = 1, 0 otherwise), secondary education (yes = 1, 0 otherwise), religious or informal (yes = 1, 0 otherwise), higher education (yes = 1, 0 otherwise)], residence type (IDP is reference) [permanent resident (yes = 1, 0 otherwise), resident migrant (yes = 1, 0 otherwise), refugees (yes = 1, 0 otherwise), returnees in the past two years (yes = 1, 0 otherwise)], total income (Naira), not affected by COVID-19 prevention (yes = 1, 0 otherwise), States (Adamawa is the reference) [Borno (yes = 1, 0 otherwise), Katsina (yes = 1, 0 otherwise), Yobe (yes = 1, 0 otherwise), Zamfara (yes = 1, 0 otherwise)], Income shocks are lost employment or work (yes = 1, 0 otherwise), other intra household shock (yes = 1, 0 otherwise), higher food prices (yes = 1, 0 otherwise), higher fuel prices (yes = 1, 0 otherwise), could not work or do business (yes = 1, 0 otherwise), other economic shock (yes = 1, 0 otherwise), pest outbreak (yes = 1, 0 otherwise), plant disease (yes = 1, 0 otherwise), animal disease (yes = 1, 0 otherwise), non-available pasture (yes = 1, 0 otherwise), other crop and livestock problems (yes = 1, 0 otherwise), cold, temperature or hail (yes = 1, 0 otherwise), flood (yes = 1, 0 otherwise), drought (yes = 1, 0 otherwise), landslides (yes = 1, 0 otherwise), natural fire (yes = 1, 0 otherwise), other natural hazard (yes = 1, 0 otherwise), violence (yes = 1, 0 otherwise), theft of products and assets (yes = 1, 0 otherwise), and fire outbreaks (yes = 1, 0 otherwise), the assistances received are food (yes = 1, 0 otherwise), cash vouchers (yes = 1, 0 otherwise), seeds (yes = 1, 0 otherwise), extension services (yes = 1, 0 otherwise), livestock feed (yes = 1, 0 otherwise), and other assistances (yes = 1, 0 otherwise). The Variance Inflation Factor (VIF) was used to test for multicollinearity among the explanatory variables.

Treatment Effects Estimation for the Impacts of Income Shocks and Social Assistance

The impacts of income shocks and social assistances on experiences of food insecurity were evaluated using regression adjustment estimator. The Average Treatment Effect (ATE) shows the difference in expected food problems across the differences in income shock exposure

Table 1. Distribution of respondents across the selected states in Nigeria

States	Round 1	Round 2	Total
Adamawa	526	336	862
Borno	568	336	904
Katsina	758	360	1118
Yobe	535	336	871
Zamfara	322	335	657
Total	2709	1703	4412

Sources: computed by the authors from Nigeria's Data in Emergency Round 1 and 2[1] [2]

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

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and receipt of a particular assistance (treated) and those who did not get exposed to the shock or receive the assistance (control) [. We also computed the Average Treatment Effect on the Treated (ATET) which shows the difference in the expected number of food problems for income shock exposed households and those who received assistances and what they would have got if they never got exposed to the shock or receive the assistance (counterfactuals) ([.

Main Results.

Respondents' demographic characteristics

Table 2 shows the distribution of the respondents' demographic characteristics. It reveals that more than 90% of the respondents were males, while 49.95% had higher education. These results show that rural households in northern Nigeria, just as in other parts of the country, are largely headed by men (Mazzotta & Ng'weno, 2020). Also, attainment of higher education is fairly high and similar to findings previously reported in some studies conducted in rural Nigeria (Charity et al., 2021). The results further show that 13.85% was not engaged with farming, while 47.93% was involved in crop farming. Rural households' sources of livelihood are often selected based on acquired skills, access to production resources and expected financial needs. The findings are in accordance with those of Abiodun et al. (2019) and Ibrahim et al. (2009) who emphasized the role of crop and livestock farming in rural Nigeria.

Based on residence status, the results in Table 2 showed that 94.88% of the total respondents were permanent residents. However, the 1.68% and 0.34% were internally

Table 2. Distribution of respondents' selected demographic variables

Variable	Round 1 – 2021		Round 2 – 2022		Total	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Households' head gender						
Female	0.0716	0.2579	0.0517	0.2214	0.0639	0.2446
Male	0.9284	0.2579	0.9483	0.2214	0.9361	0.2446
Education						
None	0.0306	0.1724	0.4551	0.4981	0.1945	0.3958
Basic education	-	-	0.4146	0.4928	0.1600	0.3667
Primary education	0.0258	0.1587	-	-	0.0159	0.1250
Secondary education	0.1827	0.3865	-	-	0.1122	0.3156
Religious or informal	0.0676	0.2510	-	-	0.0415	0.1994
Higher education	0.6932	0.4612	0.1304	0.3368	0.4760	0.4995
Agricultural activities						
None	0.1938	0.3953	0.0505	0.2190	0.1385	0.3454
Crop	0.2791	0.4486	0.4821	0.4998	0.3574	0.4793
Livestock	0.3045	0.4603	0.4034	0.4907	0.3427	0.4747
Livestock and crop	0.2226	0.4161	0.0640	0.2448	0.1614	0.3679
Household residence type						
Internally Displaced Person (IDP)	0.0151	0.1221	0.0194	0.1379	0.0168	0.1284
Permanent resident	0.9328	0.2504	0.9742	0.1587	0.9488	0.2205
Resident migrant	0.0369	0.1886	0.0018	0.0419	0.0233	0.1510
Refugees	0.0055	0.0742			0.0034	0.0582
Returnees in the past two years	0.0096	0.0975	0.0047	0.0684	0.0077	0.0875

Sources: computed by the authors from Nigeria's Data in Emergency Round 1 and 2[1 2]

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

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displaced and refugees, respectively. The problem of insurgencies in Nigeria is a major socioeconomic development challenge affecting agricultural activities and livelihood choices (Adelaja & George, 2019; Ajiboye et al., 2024). The results showed that the proportions of the households that were not affected by COVID-19 increased from 13.33% in 2021 to 74.34% in 2022. These findings reveal the fact that the impacts of the pandemic on people's livelihoods declined over time (Kim & Kwan, 2021; Kesar et al., 2021).

Income Shocks and Social Assistances

Table 3 shows the distribution of respondents' income shocks and the social assistances that were received during the COVID-19 pandemic. It reveals that in the combined data, the households that experienced higher food prices reported the highest percentage with 34.00%. This was followed by exposure to violence (23.07%), higher fuel price (20.24%) and loss of employment (11.65%). It should be noted that across the country, in March 2020, the price of petrol was N145.40, which decline slightly in April and May after the first lockdown was implemented. In 2021 and 2022, Also, those who indicated higher food prices increased from 27.39% to 44.51%. The results further showed that between 2021 and 2022, exposure to violence declined from 31.30% to 9.98%, respectively. The income shocks that were least reported in the combined data

Table 3. Income Shocks and Social Assistances Received by Rural Households

Variable	Round 1 – 2021		Round 2 – 2022		Total	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Lost employment or work	0.1665	0.3726	0.0370	0.1888	0.1165	0.3209
Other intra household shock	0.0354	0.1849	0.1098	0.3127	0.0641	0.2450
Higher food prices	0.2739	0.4460	0.4451	0.4971	0.3400	0.4738
higher fuel prices	0.1425	0.3496	0.2977	0.4574	0.2024	0.4018
Could not work or do business	0.0764	0.2657	0.0258	0.1587	0.0569	0.2317
Other economic shock	0.0413	0.1991	0.0822	0.2748	0.0571	0.2321
Pest outbreak	0.0329	0.1783	0.0540	0.2261	0.0410	0.1984
Plant disease	0.0214	0.1448	0.1315	0.3381	0.0639	0.2446
Animal disease	0.0340	0.1812	0.0587	0.2352	0.0435	0.2040
Non-available pasture	0.1318	0.3383	0.0076	0.0871	0.0839	0.2772
other crop and livestock problems	0.0092	0.0956	0.0164	0.1272	0.0120	0.1090
Cold, temperature or hail	0.0026	0.0508	0.0012	0.0343	0.0020	0.0451
Flood	0.0838	0.2771	0.0793	0.2702	0.0820	0.2745
Drought	0.0129	0.1129	0.0241	0.1533	0.0172	0.1301
Landslides	0.0015	0.0384	0.0006	0.0242	0.0011	0.0336
Natural fire	0.0103	0.1012	0.0018	0.0419	0.0070	0.0835
Other natural hazard	0.0081	0.0898	0.0059	0.0764	0.0073	0.0849
Violence	0.3130	0.4638	0.0998	0.2999	0.2307	0.4214
Theft of products and assets	0.0912	0.2879	0.0476	0.2129	0.0743	0.2624
Fire outbreaks	0.0170	0.1292	0.0047	0.0684	0.0122	0.1100
Received food	0.0532	0.2244	0.0687	0.2530	0.0592	0.2359
Received cash vouchers	0.0299	0.1703	0.0200	0.1399	0.0261	0.1593
Received seeds	0.0314	0.1744	0.0264	0.1604	0.0295	0.1691
Received extension services	0.0074	0.0856	0.0047	0.0684	0.0063	0.0794
Received livestock feed	0.0041	0.0636	0.0070	0.0837	0.0052	0.0720
Received other assistances	0.0303	0.1714	0.0587	0.2352	0.0413	0.1989

Sources: computed by the authors from Nigeria's Data in Emergency Round 1 and 2[1] [2]

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

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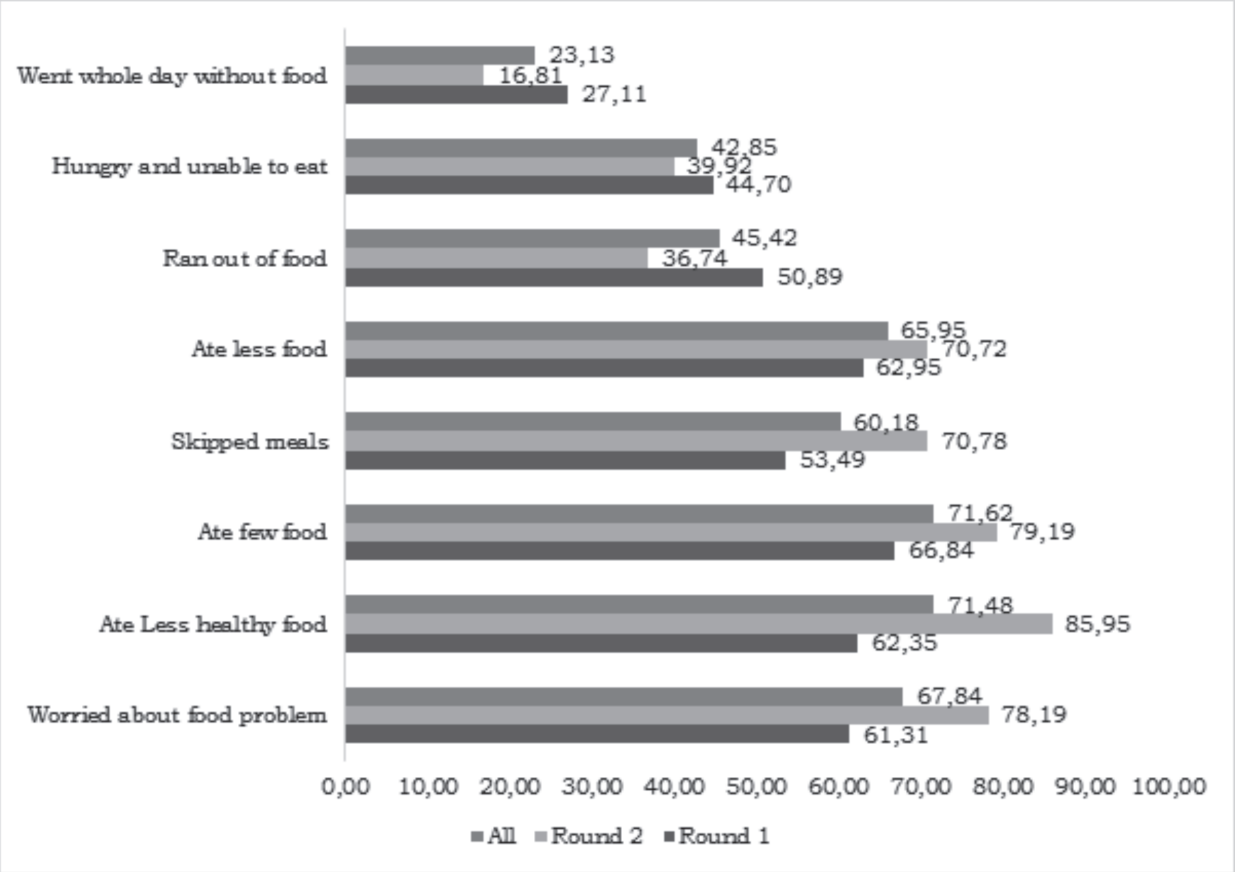

Fig. 1. Distribution of respondents' nature of food insecurity experienced

Sources: drawn by the authors from Nigeria's Data in Emergency Round 1 and 2*, **

* FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

** FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

were landslide (0.11%), cold temperature or hail (0.20%) and natural fire (0.70%).

Specifically, in June 2020, the average price of petrol was N128.88, which increased by government decision to N143.63 in July, 2020. More importantly, the Nigerian government increased petroleum prices several times in 2020 (Sasu, 2024). These increases in fuel price automatically led to increase in consumers' prices, with inflation rate increasing from 12.13% in January 2020 to 17.52% in December 2021[1] [2]. Violence was an added income shock among the respondents due to activities of terrorists in the selected States. Ochogwu (2024) highlighted the need to address ruralisation of conflicts in northern Nigeria with progressive increase in activities of terrorists, bandits, kidnappers, and insurgents.

Table 3 further shows the distribution of the respondents based on receipt of social assistances. It reveals that in the combined data, food was received by 5.92% of the households. This was followed by 4.13% who received other assistances, 2.95% who received seeds and 2.61% who received cash vouchers. The findings attest to the fewness of social protection programmes in Nigeria during the pandemic. Precisely, Lain and Vishwanath (2021) submitted that between 2021 and 2022, about 4% of Nigerians received cast transfer assistances from government either at the federal, state or local level.

Nature of Food Insecurity Experiences and their Intensity

Figure 1 shows the distribution of food insecurity problems which were experienced by the respondents. It reveals that between

1 National Bureau of Statistics. CPI and Inflation Report January 2020. URL: https://www.nigerianstat.gov.ng/elibrary/read/1058 (дата звернення: 03.02.2025).

2 National Bureau of Statistics CPI and Inflation Report January 2021. URL: https://www.nigerianstat.gov.ng/elibrary/read/1241113 (дата звернення: 03.02.2025).

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2021 and 2022, the proportions of households who reported to have worried about food, ate less healthy food, ate fewer food, skipped meals, and ate less than required food quantity increased. Precisely, worrying about food issues, which is the first signal of food problem, increased from 61.31% in 2021 to 78.19% in 2022. In addition, progression of food insecurity into eating of less healthy food was experienced by 62.35% in 2021, which increased to 85.95% in 2022. In 2022, the proportions of the households who ate few food, skipped meals and ate less food were 79.19%, 70.78% and 70.72%, respectively. However, on the extreme end of the scale, in 2022, there were some declines for those who ran out of food, hungry and unable to eat, and went the whole day without food at 50.58%, 44.70% and 27.11%, respectively. In addition, in the combined data, 71.62%, 71.48%, and 67.84% respectively ate few foods, ate less healthy food and worried about food. These results emphasize the general situation of economic uncertainties in many households during the pandemic. These were presented as deplorable situations where households' food needs became a matter of concern (Ibukun & Adebayo, 2021; Akinyetun, 2022).

Table 4 shows the number of food problems which were experienced by the households. It reveals that in 2021 and 2022, 16.69% and 10.28% of the respondents did not experience any food problem, respectively. These are the people who were food secure. In addition, the proportions of those who were severely food insecure by experiencing all the eight food-related problems decreased from 16.54% in 2021 to 14.91% in 2022. Those who indicated to have experienced seven food-related problems increased from 13.95% in 2021 to 15.97% in 2022. The proportions of the respondents who faced six and seven food-related problems increased from 11.00% and 11.33% in 2021 and 2022, respectively, to 20.02% and 11.57%. The proportions of those who could be said to be mildly food insecure with exposure to one or two food problems decreased between 2021 and 2022, while those who reported three problems increased from 7.75% in 2021 to 8.46% in 2022.

Determinants of the Number of Food-Related Problems Experienced by Farmers

Table 5 shows the determinants of the number of food-related problems experienced by the households, the average treatment effect (ATE) and the average treatment effect on the treated (ATET). It reveals that the model produced a good fit for the data since the estimated Wald Chi square shows statistical significance ($p<0.05$). Among the variables that were included, the parameter of round 2 (2022) data collection shows statistical significance ($p<0.05$) with negative sign. This implies that when compared with 2021, the expected number of food-related problems reduced in 2022. This is expected because the social and economic impacts of the pandemic eventually waned in many countries after the initial economic lockdowns in 2020 and 2021 (World Bank, 2022). Therefore, although economic recovery was still progressing, in 2022, households were able to return for their

Table 4. Distribution of respondents' number of experienced food problems

	2021		2022		Total	
Food Problem Experiences	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Zero	452	16.69	175	10.28	627	14.21
One	212	7.83	74	4.35	286	6.48
Two	198	7.31	85	4.99	283	6.41
Three	210	7.75	144	8.46	354	8.02
Four	206	7.60	161	9.45	367	8.32
Five	298	11.00	341	20.02	639	14.48
Six	307	11.33	197	11.57	504	11.42
Seven	378	13.95	272	15.97	650	14.73
Eight	448	16.54	254	14.91	702	15.91

Sources: computed by the authors from Nigeria's Data in Emergency Round 1 and 2[1] [2]

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

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economic activities while social distancing and other preventive measures were still being observed (Dreger, 2022; Okoye & Dike, 2024).

Furthermore, among the parameters for agricultural activities, only that for livestock and crop shows statistical significance ($p<0.05$) with positive sign. This implies that compared to those who were non-farmers, respondents who were into mixed farming had a higher expected number of food problems. This can be explained from current on-going disruptions to farming activities in northern Nigeria due to terrorism, banditry and kidnapping. It also emphasises the growing importance of non-farm income ins some farming communities (Oladimeji et al., 2015; Adeyonu et al., 2024).

The parameter for household head gender shows statistical significance ($p<0.01$) and a negative sign. This implies that male headed households have lower expected number of food problems when compared to female headed households. This goes in line with expectation because female headed households have been found to be poorer due to different restrictions surrounding allocation of resources (Brown & Van de Walle, 2021; Oyewunmi & Obayelu, 2023). In some other studies, female headed households were found to be more food insecure (Nnaji et al., 2022; Ashagidigbi et al., 2022). The parameters for primary, secondary, and higher education were statistically significant ($p<0.05$) with negative sign. These imply that when compared to households with no education, households with formal education had lower expected number of food problems. Our findings are in line with expectation because formally educated households may be at a higher advantage in terms of adoption of improved framing technologies and engagements in non-farming activities. The findings are related to those of Santos et al., (2022) and Bukari et al (2022) but contrary to those of Batal et al., (2021).

Based on residence status, the findings show that households who were permanent residents had significantly lower ($p<0.01$) expected number of food problem when compared with internally displaced households. This is in line with expectation since conflicts aggravated by terrorism, banditry and kidnaping are prevailing socioeconomic problems in Northern Nigeria with significant consequences on agricultural activities and rural livelihood. Our finding is in alignment with those of Bellinger and Kattelman (2021), Okafor and Chikalipah (2021) and Oyelami et al. (2023). The parameter of income shock is statistically significant ($p<0.01$) with negative sign. This shows that increase in households' income reduces expected number of food problems. This is expected because food is the basic need of man on which income is spent. In some previous studies, income was found to positively influence food security (Shuvo et al., 2022; Wudil et al., 2023).

Impacts of Income Shocks and Social Assistances on Food Insecurity Experiences

The impacts of income shocks on food insecurity experiences were estimated using the ATE and ATET statistics using the regression adjustment estimator. These results were presented in fourth to seventh columns of Table 5. The results show that the parameter of loss of employment is statistically significant ($p<0.01$) with positive sign. This implies that exposure to employment-related shocks increased expected number of food problems. The ATE also shows statistical significance ($p<0.01$) and implies that the respondents who reported loss of jobs had their expected food problems being higher by 0.6564. Also, the ATET reveals that exposure to job losses resulted into expected number of food problems being higher by 0.6643, compared to if they never lost their jobs. Job loss was the major source of economic problems during the pandemic. Specifically, in 2020, about 20% of full-time workers were relieved of their jobs because of the pandemic (UNDP, 2021). In addition, distortion of economic activities during the pandemic resulted into decline in business profitability, which in some instances, mandated rationing and suspension of salary payments to some workers (Vaccaro et al., 2020).

The results further show that the parameter of other intrahousehold shocks shows statistical significance ($p<0.01$). This reveals that households who reported this shock had higher expected number of food problems. In addition, the ATE reveals that the expected number of food problems for households with intrahousehold shocks was significantly higher ($p<0.01$) by 1.1223, when compared with their counterparts without exposure. Similarly, the ATET reveals that the expected number of food problems for households who experienced intrahousehold shocks was higher by 0.9580, compared to if they never got exposed. These findings reveal the negative impacts of intrahousehold income shocks during the pandemic (Pelluffo & Viollaz, 2021; Pailhé et al., 2021). More importantly, the prevailing economic problems resulted into several idiosyncratic

income shocks in the form of household members' sicknesses, family tension due to deteriorating financial situations (Pailhé et al., 2021), psychological disturbances and emotional problems.

The parameters of higher food prices, higher fuel prices and other economic shocks also showed statistical significance ($p<0.01$). These results imply that exposure to higher food price and other economic shocks increased the expected number of food problems, while higher fuel price reduced it. The ATE for higher food price and other economic shocks are statistically significant ($p<0.01$) with positive and while that for higher fuel price has negative sign and statistically significant ($p<0.01$). These findings imply that households that indicated food price shock had their expected food problems being higher by 0.6980 and 0.1303, respectively when compared with those who did experience those shocks. Also, the ATET shows that the expected number of food problems by those who indicated other economic shocks was higher by 0.6539 compared to if they never got affected by that shock. In addition, the ATET for respondents who were affected by fuel price shock was lower by 1.2059, compared to if they never got exposed. It should be emphasized that escalation of food prices was a consequence of economic distortions during the COVID-19 pandemic. The Nigerian case is pathetic due to several initiatives by the government to increase fuel and electricity prices (Olubusoye et al., 2021). The food transmission impacts of these policies reduced households' purchasing power, thereby promoting poverty and food insecurity (Kpodar & Liu, 2022).

Furthermore, with respect to plant and livestock-related problems, the parameters of pest outbreaks, plant diseases, non-availability of pasture, and other crop and livestock problems show statistical significance ($p<0.05$). Precisely, the expected number of food problems decreased for those who indicated pest outbreaks. Similarly, the computed ATE reveals that expected number of food problems declined by 0.7720 for those who were affected by pest outbreaks in comparison with those who were not. The ATET also shows that compared to if they were not infected, pest outbreak affected households had their expected number of food problems being lower by 2.0989.

The parameter of plant disease is with positive sign. This shows that households that were affected by plant disease had their expected number of food problem being significantly higher ($p<0.01$). However, the ATE and ATET for plant diseases do not show statistical significance ($p>0.05$). Although the parameter of animal diseases in the negative binomial regression did not show statistical significance ($p>0.05$), the ATE shows statistical significance ($p<0.05$). This shows that the expected number of food problems by animal disease affected households is higher by 1.0325, when compared with those not affected. The parameter of non-availability of pasture shows statistical significance with positive sign ($p<0.01$). This implies that the households who were affected by non-availability of pasture had their expected number of food problems being higher. The computed ATET also reveals that the expected number of food problems for households that indicated non-availability of pasture increased by 0.5108, in comparison with if they had not faced the income shock.

Although some of these results are contrary to expectation, it should be noted that the impact of pest outbreaks on households' food production system can vary significantly depending on the nature of crop, type of pests and the stage of crop growth and development during which infestation occurs (Tonnang et al., 2022; Anjos et al., 2022). In addition, farmers' familiarity with certain pests can significantly offset the cost of control and associated economic losses (Filiptseva et al., 2023; Ali et al., 2023; Brown & Henry, 2022). However, majority of the findings are emphasizing the productivity reducing influence of animal and crop pests and diseases (Lamichhane & Reay-Jones, 2021). Disturbances to the food production systems during the COVID-19 pandemic may have also contributed to effective management of crop and livestock pest and disease management. Specifically, restrictions on economic activities could have influenced availability of some crop pest and disease control chemicals in market or reduced the availability of extension agents (Dharmawan et al., 2021). In addition, availability of veterinary services during the pandemic may have been affected and negatively affect farmers' incomes (Morris et al., 2021).

The results in Table 5 further reveal the impacts of some environmental shocks on households' experiences of food insecurity. It reveals that only the parameter of drought shows statistical significance ($p<0.01$). Therefore, the households that were affected by drought had higher expected number of food problems. Moreover, in the estimated ATE and ATET, there was no statistical significance among the estimated parameters. The principal reason for omitted results

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for many of the parameters was the non-convergence of the estimators. The impact of drought in northern Nigeria is of significant policy discussion. Therefore, inadequacy of rainfall often result into crop failure and death of livestock (Shiru et al., 2018; Tofa et al., 2021; Clinton & Chinago, 2021).

The results in Table 5 further show the impacts of violence and fire outbreaks in explaining the number of food problems. The estimated parameters for these variables show statistical significance ($p<0.05$). The result shows that the respondents who were affected by violence and fire outbreaks had higher expected number of food problems. The ATE also shows that the expected number of food problems reported by those who were affected by violence was significantly higher ($p<0.01$) by 0.5437, when compared with those who were not affected. In addition, the ATETs shows that among those who were affected by violence and fire outbreaks, their expected numbers of food problems were significantly higher ($p<0.01$) by 0.5732 and 0.7747, respectively, compared to if they were not affected. It should be noted that the impact of violence in social and economic development activities in northern Nigeria cannot be over-emphasized (Ojo et al., 2023). In some instances, fire outbreaks may also be an aftermath of violence. Over the years, some parts in northern Nigeria have become the hide-outs for banditry, terrorism and kidnappers (Ladan & Matawalli, 2020). The nefarious activities of these people are affecting agricultural activities since most of the attacks are targeted at farming households (Chikalipah, 2021; Oyelami et al., 2023). More importantly, extended drought can promote fire outbreaks with significant consequences on households' welfare (Jones, 1963; Adeoti & Akintunde, 2014).

The impacts of social assistances were also evaluated in the study. The results showed that among the assistances that were received, the parameters of food, cash vouchers, and extension services showed statistical significance ($p<0.05$). These results indicate that those who received food had higher expected number of food problems. However, receipt of cash vouchers and extension services are with negative parameters, indicating that those who received these assistances had lower expected number of food problems. The ATE indicates that the expected number of those who received food assistances was higher by 0.5437, when compared with that for non-recipients. Similarly, ATET reveals that the expected number of food problems for those who received food assistances was higher by 0.5732, compared to if they never received the assistance. However, the ATETs for receipt of cash vouchers and extension services show that the expected number of food problems by the recipients is lower by 0.5549 and 1.079, respectively, when compared with those of non-recipients. The findings are reemphasizing the relevance of social assistances in addressing food problems among rural households in northern Nigeria.

Table 5. Results of the Negative Binomial Regression and ATE/ATET Causal Estimators Using Regression Adjustment Estimator

Variables	Coeff	Std error	z-stat	ATE		ATET	
1	2	3	4	5	6	7	8
Second round	-0.1064	0.0500	-2.13	-	-	-	-
Households' Agric activity (none is the reference)				-	-	-	-
Crop	0.0469	0.0356	1.32	-	-	-	-
Livestock	0.0539	0.0344	1.56	-	-	-	-
Livestock and crop	0.0762	0.0384	1.99	-	-	-	-
				-	-	-	-
Male headed household	-0.1194	0.0342	-3.49	-	-	-	-
Households' heads education (none is the reference group)				-	-	-	-
Basic education	0.0204	0.0292	0.70	-	-	-	-
Primary education	-0.2383	0.0989	-2.41	-	-	-	-
Secondary education	-0.1295	0.0506	-2.56	-	-	-	-
Religious or informal	-0.0905	0.0582	-1.55	-	-	-	-
Higher education	-0.2829	0.0431	-6.56	-	-	-	-
Residence type (IDP is reference)				-	-	-	-
Permanent resident	-0.2403	0.0550	-4.37	-	-	-	-

Continuation Table 5

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Resident migrant	-0.0075	0.0752	-0.10	-	-	-	-
Refugees	0.0062	0.1460	0.04	-	-	-	-
Returnees in the past two years	0.0724	0.1025	0.71	-	-	-	-
Total income	-2.24e-07	0.0000	-5.85	-	-	-	-
Not affected by COVID-19 prevention	-0.0094	0.0296	-0.32	-	-	-	-
States (Adamawa is the reference)							
Borno	-0.0805	0.0330	-2.44	-	-	-	-
Katsina	-0.0272	0.0312	-0.87	-	-	-	-
Yobe	0.1211	0.0311	3.90	-	-	-	-
Zamfara	0.1493	0.0330	4.52	-	-	-	-
Income shock exposure							
Lost employment or work	0.1588	0.0290	5.47	0.6564	3.63	0.6643	4.47
Other intra household shock	0.1684	0.0342	4.92	1.1223	4.89	0.9580	5.31
Higher food prices	0.1900	0.0227	8.36	0.6980	5.74	0.2222	0.96
Higher fuel prices	-0.2137	0.0288	-7.43	0.2509	0.98	-1.2059	-8.12
Could not work or do business	0.0178	0.0416	0.43	0.0858	0.38	0.0134	0.07
Other economic shock	0.1303	0.0326	3.99	1.1653	4.94	0.6539	3.93
Pest outbreak	-0.3684	0.0648	-5.68	-0.7720	-2.04	-2.0989	-6.94
Plant disease	0.1389	0.0412	3.37	0.3233	0.80	0.3010	0.28
Animal disease	0.0519	0.0472	1.10	1.0325	2.41	0.1665	0.75
Non-available pasture	0.1423	0.0346	4.11	0.0790	-0.32	0.5108	3.04
Other crop and livestock problems	0.1417	0.0614	2.31	0.7799	1.16	0.7139	2.24
Cold, temperature or hail	0.1329	0.1838	0.72	-	-	-	-
Flood	-0.0241	0.0346	-0.70	0.0489	0.24	-0.2603	-1.58
Drought	0.2751	0.0622	4.42	-	-	-	-
Landslides	-0.0076	0.3747	-0.02	-2.1881	0.04	-0.0169	-0.01
Natural fire	0.1845	0.1055	1.75	-	-	0.8245	1.53
Other natural hazard	0.1132	0.1053	1.07	-	-	0.4452	0.85
Violence	0.1392	0.0241	5.77	0.5437	4.65	0.5732	4.82
Theft of products and assets	-0.0228	0.0376	-0.61	0.1162	0.45	-0.2003	-1.02
Fire outbreaks	0.1527	0.0696	2.19	-	-	0.7747	2.38
Need Responsive Interventions							
Received food	0.1199	0.0360	3.33	0.4726	2.13	0.6976	3.92
Received cash vouchers	-0.1468	0.0663	-2.21	-0,5549	-1,76	-0.5769	-2.21
Received seeds	-0.0614	0.0626	-0.98	1.0919	1.59	-0.2534	-0.98
Received extension services	-0.2354	0.0974	-2.42	-	-	-1.079	-2.58
Received livestock feed	0.0972	0.1398	0.70	-	-	0.388	0.66
Received other assistances	0.0751	0.0444	1.69	-	-	-	-
Constant	1.8798	0.0821	22.88				
Lnalpha	-1.6084	0.0791					
Alpha	0.2002	0.0158					
Number of obs = 4412							
Wald chi2(46) = 619.76							
Prob > chi2 = 0.0000							

Sources: computed by the authors from Nigeria's Data in Emergency Round 1 and 2[1 2]

1 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 1. 2021. URL: https://openknowledge.fao.org/server/api/core/bitstreams/9fa3e26b-0c35-4e52-9d13-72305cdee8db/content (дата звернення: 07.01.2025).

2 FAO. Nigeria DIEM – Data in Emergencies Monitoring brief, round 2. 2022. URL: https://openknowledge.fao.org/server/api/core/bitstreams/65ae5854-0176-455d-bda7-922b1dc58077/content (дата звернення: 07.01.2025).

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These results are contrary to those of Balana et al. (2023) but concur with those of Ayo-Lawal (2022). The fundamental problem in implementing social assistance during the pandemic was inadequate documentation of vulnerable households.

Conclusion. The significance of income shocks in promoting food insecurity in developing countries cannot be over-emphasized. The COVID-19 pandemic aggravated existing vulnerability through exposure of many households to several covariate and idiosyncratic shocks. Although the Nigerian government took some decisive actions to provide some form of social assistances to people during the pandemic, there have been some valid concerns on the coverage and adequacy of such interventions. This study therefore achieved the objective of determining the impacts of income shocks and social assistances on households' food insecurity experiences during the COVID-19 pandemic. Our results are adequately representative of rural areas in five conflict-affected states in northern Nigeria, with generated parameters being robust based on regression adjustment impact assessment estimator. The findings of this study have highlighted the food insecurity inducing role of several economic shocks, environmental shocks, communal violence and production shocks. Therefore, concerted efforts targeted at addressing the different shocks through social assistance interventions and insurances will go a long way in stabilizing households' income for a sustainable nutrition and food security. Specifically, such social protection can be delivered in the form of cash vouchers, farm input provision and extension service delivery. In addition, interventions to address food problem in rural areas in northern Nigeria should be sensitive to educational attainments of households' heads, gender, state of residence with Yobe and Zamfara states being worst affected, and farming systems.

Список використаної літератури

1. Abay, K. A., Berhane, G., Hoddinott, J., & Tafere, K. (2023). COVID-19 and food security in Ethiopia: do social protection programs protect? Economic Development and Cultural Change, 71(2), 373-402. doi: https://doi.org/10.1086/715831
2. Abiodun, T. C., Olutumise, A. I. and Ojo, S. O. (2019). Evaluation of choices of livelihood strategy and livelihood diversity of rural households in Ondo State, Nigeria. Journal of Social Sciences and Humanities, 5(1), 17-24.
3. Aborisade, B., & Bach, C. (2014). Assessing the pillars of sustainable food security. European International Journal of Science and Technology, 3(4), 117-125.
4. Adeoti, S., & Akintunde, T. B. (2014). Poverty implications on natural disasters occurrence in Nigeria. The International Journal of Engineering And Science, 3(10), 8-14.
5. Adeyonu, A., Akerele, D., Kehinde, M.O., Ologbon, O.A.C., Akintayo, O., & Kolawole, R. (2024). Nexus between participation in nonfarm enterprises and poverty among rural farm households: evidence from Nigeria. International Journal of Social Economics, 51(11), 1402-1419. doi: https://doi.org/10.1108/IJSE-06-2023-0493
6. Aikaeli, J., Garcés□Urzainqui, D., & Mdadila, K. (2021). Understanding poverty dynamics and vulnerability in Tanzania: 2012–2018. Review of Development Economics, 25(4), 1869-1894. doi: https://doi.org/10.1111/rode.12829
7. Akinyetun, T. S. (2022). Torn between Two pandemics: poverty pandemic and coronavirus pandemic in Nigeria. Southern African Journal of Policy and Development, 6(1), 7.
8. Akter, S., & Basher, S. A. (2014). The impacts of food price and income shocks on household food security and economic well-being: Evidence from rural Bangladesh. Global Environmental Change, 25, 150-162. doi: https://doi.org/10.1016/j.gloenvcha.2014.02.003

References

1. Abay, K. A., Berhane, G., Hoddinott, J., & Tafere, K. (2023). COVID-19 and food security in Ethiopia: do social protection programs protect? Economic Development and Cultural Change, 71(2), 373-402. doi: https://doi.org/10.1086/715831
2. Abiodun, T. C., Olutumise, A. I. and Ojo, S. O. (2019). Evaluation of choices of livelihood strategy and livelihood diversity of rural households in Ondo State, Nigeria. Journal of Social Sciences and Humanities, 5(1), 17-24.
3. Aborisade, B., & Bach, C. (2014). Assessing the pillars of sustainable food security. European International Journal of Science and Technology, 3(4), 117-125.
4. Adeoti, S., & Akintunde, T. B. (2014). Poverty implications on natural disasters occurrence in Nigeria. The International Journal of Engineering And Science, 3(10), 8-14.
5. Adeyonu, A., Akerele, D., Kehinde, M.O., Ologbon, O.A.C., Akintayo, O., & Kolawole, R. (2024). Nexus between participation in nonfarm enterprises and poverty among rural farm households: evidence from Nigeria. International Journal of Social Economics, 51(11), 1402-1419. doi: https://doi.org/10.1108/IJSE-06-2023-0493
6. Aikaeli, J., Garcés□Urzainqui, D., & Mdadila, K. (2021). Understanding poverty dynamics and vulnerability in Tanzania: 2012–2018. Review of Development Economics, 25(4), 1869-1894. doi: https://doi.org/10.1111/rode.12829
7. Akinyetun, T. S. (2022). Torn between Two pandemics: poverty pandemic and coronavirus pandemic in Nigeria. Southern African Journal of Policy and Development, 6(1), 7.
8. Akter, S., & Basher, S. A. (2014). The impacts of food price and income shocks on household food security and economic well-being: Evidence from rural Bangladesh. Global Environmental Change, 25, 150-162. doi: https://doi.org/10.1016/j.gloenvcha.2014.02.003

9. Alam, S. A., Liu, S. X., & Pörtner, C. C. (2024). Navigating food price shocks in a pandemic: Food insecurity and coping mechanisms in Burkina Faso. World Development, 182, 106714. doi: https://doi.org/10.1016/j.worlddev.2024.106714

10. Ali, M. A., Abdellah, I. M., & Eletmany, M. R. (2023). Towards sustainable management of insect pests: Protecting food security through Ecological Intensification. International Journal of Chemical and Biochemical Sciences, 24(4), 386-394.

11. Amare, M., Abay, K. A., Tiberti, L., & Chamberlin, J. (2021). COVID-19 and food security: Panel data evidence from Nigeria. Food Policy, 101, 102099. doi: https://doi.org/10.1016/j.foodpol.2021.102099

12. Amusan, L., & Agunyai, S. C. (2021). The COVID-19 pandemic and the crisis of lockdowns in Nigeria: The household food security perspective. Africa's Public Service Delivery & Performance Review, 9(1), 10. doi: https://doi.org/10.4102/apsdpr.v9i1.484

13. Anjos, D.V., Tena, A., Viana-Junior, A.B., Carvalho, R.L., Torezan-Silingardi, H., Del-Claro, K., & Perfecto, I. (2022). The effects of ants on pest control: a meta-analysis. Proceedings of the Royal Society B, 289(1981), 20221316.

14. Ansah, I. G. K., Gardebroek, C., & Ihle, R. (2021). Shock interactions, coping strategy choices and household food security. Climate and Development, 13(5), 414-426. doi: https://doi.org/10.1080/17565529.2020.1785832

15. Ashagidigbi, W. M., Orilua, O. O., Olagunju, K. A., Omotayo, A. O. (2022). Gender, empowerment and food security status of households in Nigeria. Agriculture, 12(7), 956. doi: https://doi.org/10.3390/agriculture12070956

16. Ayo-Lawal, R. A., Ilevbare, O. E., Omotoso, K. O., Omimakinde, E. A., & Ukwuoma, O. (2022). Social assistance and food security during covid-19 pandemic lock-down: insights from Nigeria. Future of Food: Journal on Food, Agriculture and Society, 10(1). doi: https://doi.org/10.17170/kobra-202110144902

17. Balana, B. B., Ogunniyi, A., Oyeyemi, M., Fasoranti, A., Edeh, H., & Andam, K. (2023). COVID-19, food insecurity and dietary diversity of households: Survey evidence from Nigeria. Food Security, 15(1), 219-241. doi: https://doi.org/10.1007/s12571-022-01312-w

18. Batal, M., Chan, H.M., Fediuk, K., Ing, A., Berti, P.R., Mercille, G., Sadik, T., & Johnson-Down, L. (2021). First Nations households living on-reserve experience food insecurity: prevalence and predictors among ninety-two First Nations communities across Canada. Canadian Journal of Public Health, 112(Suppl 1), 52-63. doi: https://doi.org/10.17269/s41997-021-00491-x

19. Bellinger, N., & Kattelman, K. T. (2021). Domestic terrorism in the developing world: role of food security. Journal of International Relations and Development, 24, 306-332. doi: https://doi.org/10.1057/s41268-020-00191-y

20. Béné, C., Bakker, D., Chavarro, M. J., Even, B., Melo, J., & Sonneveld, A. (2021). Global assessment of the impacts of COVID-19 on food security. Global Food Security, 31, 100575. doi: https://doi.org/10.1016/j.gfs.2021.100575

21. Bizikova, L., Jungcurt, S., McDougal, K., & Tyler, S. (2020). How can agricultural interventions enhance contribution to food security and SDG 2.1?. Global Food Security, 26, 100450. doi: https://doi.org/10.1016/j.gfs.2020.100450

22. Brown, C., & Van de Walle, D. (2021). Headship and poverty in Africa. The World Bank Economic Review, 35(4), 1038-

9. Alam, S. A., Liu, S. X., & Pörtner, C. C. (2024). Navigating food price shocks in a pandemic: Food insecurity and coping mechanisms in Burkina Faso. World Development, 182, 106714. doi: https://doi.org/10.1016/j.worlddev.2024.106714

10. Ali, M. A., Abdellah, I. M., & Eletmany, M. R. (2023). Towards sustainable management of insect pests: Protecting food security through Ecological Intensification. International Journal of Chemical and Biochemical Sciences, 24(4), 386-394.

11. Amare, M., Abay, K. A., Tiberti, L., & Chamberlin, J. (2021). COVID-19 and food security: Panel data evidence from Nigeria. Food Policy, 101, 102099. doi: https://doi.org/10.1016/j.foodpol.2021.102099

12. Amusan, L., & Agunyai, S. C. (2021). The COVID-19 pandemic and the crisis of lockdowns in Nigeria: The household food security perspective. Africa's Public Service Delivery & Performance Review, 9(1), 10. doi: https://doi.org/10.4102/apsdpr.v9i1.484

13. Anjos, D.V., Tena, A., Viana-Junior, A.B., Carvalho, R.L., Torezan-Silingardi, H., Del-Claro, K., & Perfecto, I. (2022). The effects of ants on pest control: a meta-analysis. Proceedings of the Royal Society B, 289(1981), 20221316.

14. Ansah, I. G. K., Gardebroek, C., & Ihle, R. (2021). Shock interactions, coping strategy choices and household food security. Climate and Development, 13(5), 414-426. doi: https://doi.org/10.1080/17565529.2020.1785832

15. Ashagidigbi, W. M., Orilua, O. O., Olagunju, K. A., Omotayo, A. O. (2022). Gender, empowerment and food security status of households in Nigeria. Agriculture, 12(7), 956. doi: https://doi.org/10.3390/agriculture12070956

16. Ayo-Lawal, R. A., Ilevbare, O. E., Omotoso, K. O., Omimakinde, E. A., & Ukwuoma, O. (2022). Social assistance and food security during covid-19 pandemic lock-down: insights from Nigeria. Future of Food: Journal on Food, Agriculture and Society, 10(1). doi: https://doi.org/10.17170/kobra-202110144902

17. Balana, B. B., Ogunniyi, A., Oyeyemi, M., Fasoranti, A., Edeh, H., & Andam, K. (2023). COVID-19, food insecurity and dietary diversity of households: Survey evidence from Nigeria. Food Security, 15(1), 219-241. doi: https://doi.org/10.1007/s12571-022-01312-w

18. Batal, M., Chan, H.M., Fediuk, K., Ing, A., Berti, P.R., Mercille, G., Sadik, T., & Johnson-Down, L. (2021). First Nations households living on-reserve experience food insecurity: prevalence and predictors among ninety-two First Nations communities across Canada. Canadian Journal of Public Health, 112(Suppl 1), 52-63. doi: https://doi.org/10.17269/s41997-021-00491-x

19. Bellinger, N., & Kattelman, K. T. (2021). Domestic terrorism in the developing world: role of food security. Journal of International Relations and Development, 24, 306-332. doi: https://doi.org/10.1057/s41268-020-00191-y

20. Béné, C., Bakker, D., Chavarro, M. J., Even, B., Melo, J., & Sonneveld, A. (2021). Global assessment of the impacts of COVID-19 on food security. Global Food Security, 31, 100575. doi: https://doi.org/10.1016/j.gfs.2021.100575

21. Bizikova, L., Jungcurt, S., McDougal, K., & Tyler, S. (2020). How can agricultural interventions enhance contribution to food security and SDG 2.1?. Global Food Security, 26, 100450. doi: https://doi.org/10.1016/j.gfs.2020.100450

22. Brown, C., & Van de Walle, D. (2021). Headship and poverty in Africa. The World Bank Economic Review, 35(4), 1038-

1056. doi: https://doi.org/10.1093/wber/lhaa024

23. Brown, P. R., & Henry, S. (2022). Impacts of house mice on sustainable fodder storage in Australia. Agronomy, 12(2), 254. doi: https://doi.org/10.3390/agronomy12020254
24. Bukari, C., Aning-Agyei, M. A., Kyeremeh, C., Essilfie, G., Amuquandoh, K. F., Owusu, A.A., Otoo, I. C., & Bukari, K.I. (2022). Effect of COVID-19 on household food insecurity and poverty: Evidence from Ghana. Social indicators research, 159(3), 991-1015. doi: https://doi.org/10.1007/s11205-021-02766-9
25. Bwala, D. G., Otekunrin, O. A., Adebowale, O. O., Fasina, M. M., Odetokun, I. A., & Fasina, F. O. (2023). COVID-19 pandemic impacted food security and caused psychosocial stress in selected states of Nigeria. International Journal of Environmental Research and Public Health, 20(5), 4016. doi: https://doi.org/10.3390/ijerph20054016
26. Charity, O. K., Gabriel, O. M., & Joseph, O. (2021). Rural Household Income: Who's Educational Attainment Counts? Regional Economic Development Research, 2(1), 25-37. doi: https://doi.org/10.37256/redr.212021599
27. Clinton, A., & Chinago, A. B. (2021). Drought Occurrence in Northern Nigeria: It's Effects on the Developmental Efforts of the Sub-Region. Cross Current Int J Peer Reviewed J Human Soc Sci, 7(8), 155-158. doi: https://doi.org/10.36344/ccijhss.2021.v07i08.003
28. Dadap-Cantal, E. L., Fischer, A. M., & Ramos, C. G. (2021). Targeting versus social protection in cash transfers in the Philippines: Reassessing a celebrated case of social protection. Critical Social Policy, 41(3), 364-384. doi: https://doi.org/10.1177/02610183211009891
29. Dharmawan, L., Muljono, P., Hapsari, D. R., & Purwanto, B. P. (2021). Digital information development in agriculture extension in facing new normal era during COVID-19 pandemics. Journal of Hunan University Natural Sciences, 47(12). doi: https://doi.org/10.55463/issn.1674-2974.47.12.482
30. Dreger, C. (2022). Economic impact of the Corona pandemic: Costs and the recovery after the crisis. Asia and the Global Economy, 2(1), 100030. doi: https://doi.org/10.1016/j.asgeo.2021.100030
31. Filiptseva, A., Filler, G., & Odening, M. (2023). Compensation schemes for plant quarantine pest costs: A case study for Germany. Economic Analysis and Policy, 80, 1381–1395. doi: https://doi.org/10.1016/j.eap.2023.10.005
32. Grosh, M., Leite, P., Wai-Poi, M., & Tesliuc, E. (Eds.). (2022). Revisiting targeting in social assistance: A new look at old dilemmas. World Bank Publications. doi: https://doi.org/10.1596/978-1-4648-1814-1
33. Hidrobo, M., Hoddinott, J., Kumar, N., & Olivier, M. (2018). Social protection, food security, and asset formation. World Development, 101, 88–103. doi: https://doi.org/10.1016/j.worlddev.2017.08.014
34. Hirvonen, K., De Brauw, A., & Abate, G. T. (2021). Food consumption and food security during the COVID-19 pandemic in Addis Ababa. American Journal of Agricultural Economics, 103(3), 772–789. doi: https://doi.org/10.1111/ajae.12206
35. Ibrahim, H., Rahman, S. A., Envulus, E. E., & Oyewole, S. O. (2009). Income and crop diversification among farming households in a rural area of north central Nigeria. Agro-Science, 8(2), 84–89.
36. Ibukun, C. O., & Adebayo, A. A. (2021). Household food security and the COVID-19 pandemic in Nigeria. African

1056. doi: https://doi.org/10.1093/wber/lhaa024

23. Brown, P. R., & Henry, S. (2022). Impacts of house mice on sustainable fodder storage in Australia. Agronomy, 12(2), 254. doi: https://doi.org/10.3390/agronomy12020254
24. Bukari, C., Aning-Agyei, M. A., Kyeremeh, C., Essilfie, G., Amuquandoh, K. F., Owusu, A.A., Otoo, I. C., & Bukari, K.I. (2022). Effect of COVID-19 on household food insecurity and poverty: Evidence from Ghana. Social indicators research, 159(3), 991-1015. doi: https://doi.org/10.1007/s11205-021-02766-9
25. Bwala, D. G., Otekunrin, O. A., Adebowale, O. O., Fasina, M. M., Odetokun, I. A., & Fasina, F. O. (2023). COVID-19 pandemic impacted food security and caused psychosocial stress in selected states of Nigeria. International Journal of Environmental Research and Public Health, 20(5), 4016. doi: https://doi.org/10.3390/ijerph20054016
26. Charity, O. K., Gabriel, O. M., & Joseph, O. (2021). Rural Household Income: Who's Educational Attainment Counts? Regional Economic Development Research, 2(1), 25-37. doi: https://doi.org/10.37256/redr.212021599
27. Clinton, A., & Chinago, A. B. (2021). Drought Occurrence in Northern Nigeria: It's Effects on the Developmental Efforts of the Sub-Region. Cross Current Int J Peer Reviewed J Human Soc Sci, 7(8), 155-158. doi: https://doi.org/10.36344/ccijhss.2021.v07i08.003
28. Dadap-Cantal, E. L., Fischer, A. M., & Ramos, C. G. (2021). Targeting versus social protection in cash transfers in the Philippines: Reassessing a celebrated case of social protection. Critical Social Policy, 41(3), 364-384. doi: https://doi.org/10.1177/02610183211009891
29. Dharmawan, L., Muljono, P., Hapsari, D. R., & Purwanto, B. P. (2021). Digital information development in agriculture extension in facing new normal era during COVID-19 pandemics. Journal of Hunan University Natural Sciences, 47(12). doi: https://doi.org/10.55463/issn.1674-2974.47.12.482
30. Dreger, C. (2022). Economic impact of the Corona pandemic: Costs and the recovery after the crisis. Asia and the Global Economy, 2(1), 100030. doi: https://doi.org/10.1016/j.asgeo.2021.100030
31. Filiptseva, A., Filler, G., & Odening, M. (2023). Compensation schemes for plant quarantine pest costs: A case study for Germany. Economic Analysis and Policy, 80, 1381–1395. doi: https://doi.org/10.1016/j.eap.2023.10.005
32. Grosh, M., Leite, P., Wai-Poi, M., & Tesliuc, E. (Eds.). (2022). Revisiting targeting in social assistance: A new look at old dilemmas. World Bank Publications. doi: https://doi.org/10.1596/978-1-4648-1814-1
33. Hidrobo, M., Hoddinott, J., Kumar, N., & Olivier, M. (2018). Social protection, food security, and asset formation. World Development, 101, 88–103. doi: https://doi.org/10.1016/j.worlddev.2017.08.014
34. Hirvonen, K., De Brauw, A., & Abate, G. T. (2021). Food consumption and food security during the COVID-19 pandemic in Addis Ababa. American Journal of Agricultural Economics, 103(3), 772–789. doi: https://doi.org/10.1111/ajae.12206
35. Ibrahim, H., Rahman, S. A., Envulus, E. E., & Oyewole, S. O. (2009). Income and crop diversification among farming households in a rural area of north central Nigeria. Agro-Science, 8(2), 84–89.
36. Ibukun, C. O., & Adebayo, A. A. (2021). Household food security and the COVID-19 pandemic in Nigeria. African

Development Review, 33(S1), S75–S87. doi: https://doi.org/10.1111/1467-8268.12515

37. Jones, E. W. (1963). The forest outliers in the Guinea zone of northern Nigeria. The Journal of Ecology, 51(2), 415-434. doi: https://doi.org/10.2307/2257694

38. Kesar, S., Abraham, R., Lahoti, R., Nath, P., & Basole, A. (2021). Pandemic, informality, and vulnerability: Impact of COVID-19 on livelihoods in India. Canadian Journal of Development Studies / Revue canadienne d'études du développement, 42(1–2), 145–164. doi: https://doi.org/10.1080/02255189.2021.1890003

39. Kim, J., & Kwan, M. P. (2021). The impact of the COVID-19 pandemic on people's mobility: A longitudinal study of the US from March to September of 2020. Journal of Transport Geography, 93, 103039. doi: https://doi.org/10.1016/j.jtrangeo.2021.103039

40. King, C. (2017). Informal assistance to urban families and the risk of household food insecurity. Social Science & Medicine, 189, 105–113. doi: https://doi.org/10.1016/j.socscimed.2017.07.030

41. Kpodar, K., & Liu, B. (2022). The distributional implications of the impact of fuel price increases on inflation. Energy Economics, 108, 105909. doi: https://doi.org/10.1016/j.eneco.2022.105909

42. Laborde, D., Bizikova, L., Lallemant, T., & Smaller, C. (2016). Ending hunger: What would it cost? International Institute for Sustainable Development.

43. Ladan, S. I., & Matawalli, B. U. (2020). Impacts of banditry on food security in Katsina state, Nigeria. Direct Research Journal of Agriculture and Food Science, 8(12), 439–447. doi: https://doi.org/10.26765/DRJAFS278190136

44. Lain, J., & Vishwanath, T. (2021). The COVID-19 crisis in Nigeria: What's happening to welfare? New data call for expanded social protection in Africa's most populous country. World Bank Blogs. Retrieved from https://blogs.worldbank.org/en/africacan/covid-19-crisis-nigeria-whats-happening-welfare-new-data-call-expanded-social-protection#:~:text=Coverage%20of%20social%20protection%20programs,local%20government%20(Figure%202)

45. Lamichhane, J. R., & Reay-Jones, F. P. (2021). Impacts of COVID-19 on global plant health and crop protection and the resulting effect on global food security and safety. Crop Protection, 139, 105383. doi: https://doi.org/10.1016/j.cropro.2020.105383

46. Leete, L., & Bania, N. (2010). The effect of income shocks on food insufficiency. Review of Economics of the Household, 8(4), 505–526. doi: https://doi.org/10.1007/s11150-009-9075-4

47. Li, N., Dachner, N., & Tarasuk, V. (2016). The impact of changes in social policies on household food insecurity in British Columbia, 2005–2012. Preventive medicine, 93, 151-158. doi: https://doi.org/10.1016/j.ypmed.2016.10.002

48. Mazzotta, B., & Ng'weno, A. (2020). The glass ceiling, even at home: How a report on poverty in Nigeria reveals an enduring gender gap in household headship. Retrieved from https://bfaglobal.com/insights/the-enduring-gender-gap-in-nigerian-household-headship/

49. Metcalfe, J. S. (2001). Consumption, preferences, and the evolutionary agenda (pp. 43-64). Springer Berlin Heidelberg.

50. Miller, C. M., Tsoka, M., & Reichert, K. (2011). The impact of the Social Cash Transfer Scheme on food security in Malawi. Food Policy, 36(2), 230-238. doi: https://doi.org/10.1016/j.foodpol.2010.11.020

Development Review, 33(S1), S75–S87. doi: https://doi.org/10.1111/1467-8268.12515

37. Jones, E. W. (1963). The forest outliers in the Guinea zone of northern Nigeria. The Journal of Ecology, 51(2), 415-434. doi: https://doi.org/10.2307/2257694

38. Kesar, S., Abraham, R., Lahoti, R., Nath, P., & Basole, A. (2021). Pandemic, informality, and vulnerability: Impact of COVID-19 on livelihoods in India. Canadian Journal of Development Studies / Revue canadienne d'études du développement, 42(1–2), 145–164. doi: https://doi.org/10.1080/02255189.2021.1890003

39. Kim, J., & Kwan, M. P. (2021). The impact of the COVID-19 pandemic on people's mobility: A longitudinal study of the US from March to September of 2020. Journal of Transport Geography, 93, 103039. doi: https://doi.org/10.1016/j.jtrangeo.2021.103039

40. King, C. (2017). Informal assistance to urban families and the risk of household food insecurity. Social Science & Medicine, 189, 105–113. doi: https://doi.org/10.1016/j.socscimed.2017.07.030

41. Kpodar, K., & Liu, B. (2022). The distributional implications of the impact of fuel price increases on inflation. Energy Economics, 108, 105909. doi: https://doi.org/10.1016/j.eneco.2022.105909

42. Laborde, D., Bizikova, L., Lallemant, T., & Smaller, C. (2016). Ending hunger: What would it cost? International Institute for Sustainable Development.

43. Ladan, S. I., & Matawalli, B. U. (2020). Impacts of banditry on food security in Katsina state, Nigeria. Direct Research Journal of Agriculture and Food Science, 8(12), 439–447. doi: https://doi.org/10.26765/DRJAFS278190136

44. Lain, J., & Vishwanath, T. (2021). The COVID-19 crisis in Nigeria: What's happening to welfare? New data call for expanded social protection in Africa's most populous country. World Bank Blogs. Retrieved from https://blogs.worldbank.org/en/africacan/covid-19-crisis-nigeria-whats-happening-welfare-new-data-call-expanded-social-protection#:~:text=Coverage%20of%20social%20protection%20programs,local%20government%20(Figure%202)

45. Lamichhane, J. R., & Reay-Jones, F. P. (2021). Impacts of COVID-19 on global plant health and crop protection and the resulting effect on global food security and safety. Crop Protection, 139, 105383. doi: https://doi.org/10.1016/j.cropro.2020.105383

46. Leete, L., & Bania, N. (2010). The effect of income shocks on food insufficiency. Review of Economics of the Household, 8(4), 505–526. doi: https://doi.org/10.1007/s11150-009-9075-4

47. Li, N., Dachner, N., & Tarasuk, V. (2016). The impact of changes in social policies on household food insecurity in British Columbia, 2005–2012. Preventive medicine, 93, 151-158. doi: https://doi.org/10.1016/j.ypmed.2016.10.002

48. Mazzotta, B., & Ng'weno, A. (2020). The glass ceiling, even at home: How a report on poverty in Nigeria reveals an enduring gender gap in household headship. Retrieved from https://bfaglobal.com/insights/the-enduring-gender-gap-in-nigerian-household-headship/

49. Metcalfe, J. S. (2001). Consumption, preferences, and the evolutionary agenda (pp. 43-64). Springer Berlin Heidelberg.

50. Miller, C. M., Tsoka, M., & Reichert, K. (2011). The impact of the Social Cash Transfer Scheme on food security in Malawi. Food Policy, 36(2), 230-238. doi: https://doi.org/10.1016/j.foodpol.2010.11.020

51. Morris, A., Wu, H., & Morales, C. (2021). Barriers to care in veterinary services: Lessons learned from low-income pet guardians' experiences at private clinics and hospitals during COVID-19. Frontiers in Veterinary Science, 8, 764753. https://doi.org/10.3389/fvets.2021.764753

52. Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. Int J Surg., 78, 185-193. doi: https://doi.org/10.1016/j.ijsu.2020.04.018

53. Niles, M. T., & Salerno, J. D. (2018). A cross-country analysis of climate shocks and smallholder food insecurity. PloS one, 13(2), e0192928. doi: https://doi.org/10.1371/journal.pone.0192928

54. Nnaji, A., Ratna, N. N., & Renwick, A. (2022). Gendered access to land and household food insecurity: Evidence from Nigeria. Agricultural and Resource Economics Review, 51(1), 45–67. doi: https://doi.org/10.1017/age.2021.13

55. Ochogwu, J. (2024). The ruralisation of violence and the criminalisation of conflict in Nigeria. Retrieved from https://www.accord.org.za/conflict-trends/the-ruralisation-of-violence-and-the-criminalisation-of-conflict-in-nigeria/#:~:text=Presently%2C%20rural%20areas%20are%20multifunctional,banditry%2C%20insurgency%2C%20and%20kidnapping

56. Ojo, J. S., Oyewole, S., & Aina, F. (2023). Forces of terror: Armed banditry and insecurity in North-west Nigeria. Democracy and Security, 19(4), 319–346. doi: https://doi.org/10.1080/17419166.2023.2164924

57. Okafor, G., & Chikalipah, S. (2021). Estimating the effect of terrorism on agricultural production in Nigeria. African Development Review, 33(4), 703–714. doi: https://doi.org/10.1111/1467-8268.12607

58. Okoye, K. A. M., & Dike, A. I. (2024). Post COVID-19 recovery and coping methods among residents in Edo state. Sapientia Foundation Journal of Education, Sciences and Gender Studies, 6(3). Retrieved from https://www.sfjesgs.com/index.php/SFJESGS/article/view/589

59. Oladimeji, Y. U., Abdulsalam, Z., & Abdullahi, A. N. (2015). Determinants of participation of rural farm households in non-farm activities in Kwara State, Nigeria: A paradigm of poverty alleviation. Ethiopian Journal of Environmental Studies and Management, 8(6), 635–649. doi: https://doi.org/10.4314/ejesm.v8i6.3

60. Olubusoye, O. E., Akintande, O. J., Yaya, O. S., Ogbonna, A. E., & Adenikinju, A. F. (2021). Energy pricing during the COVID-19 pandemic: Predictive information-based uncertainty indexes with machine learning algorithm. Intelligent Systems with Applications, 12, 200050. doi: https://doi.org/10.1016/j.iswa.2021.200050

61. Omotayo, A. O., Omotoso, A. B., Daud, S. A., Omotayo, O. P., & Adeniyi, B. A. (2022). Rising food prices and farming households food insecurity during the COVID-19 pandemic: Policy implications from SouthWest Nigeria. Agriculture, 12(3), 363. doi: https://doi.org/10.3390/agriculture12030363

62. Oyelami, L. O., Edewor, S. E., Folorunso, J. O., & Abasilim, U. D. (2023). Climate change, institutional quality and food security: Sub-Saharan African experiences. Scientific African, 20, e01727. doi: https://doi.org/10.1016/j.sciaf.2023.e01727

63. Oyewunmi, O. F., & Obayelu, O. A. (2023). Poverty status of rural households in Nigeria: A gendered perspective. International Journal of Social Economics, 50(2), 260–278. doi: https://doi.org/10.1108/IJSE-02-2022-0083

51. Morris, A., Wu, H., & Morales, C. (2021). Barriers to care in veterinary services: Lessons learned from low-income pet guardians' experiences at private clinics and hospitals during COVID-19. Frontiers in Veterinary Science, 8, 764753. https://doi.org/10.3389/fvets.2021.764753

52. Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. Int J Surg., 78, 185-193. doi: https://doi.org/10.1016/j.ijsu.2020.04.018

53. Niles, M. T., & Salerno, J. D. (2018). A cross-country analysis of climate shocks and smallholder food insecurity. PloS one, 13(2), e0192928. doi: https://doi.org/10.1371/journal.pone.0192928

54. Nnaji, A., Ratna, N. N., & Renwick, A. (2022). Gendered access to land and household food insecurity: Evidence from Nigeria. Agricultural and Resource Economics Review, 51(1), 45–67. doi: https://doi.org/10.1017/age.2021.13

55. Ochogwu, J. (2024). The ruralisation of violence and the criminalisation of conflict in Nigeria. Retrieved from https://www.accord.org.za/conflict-trends/the-ruralisation-of-violence-and-the-criminalisation-of-conflict-in-nigeria/#:~:text=Presently%2C%20rural%20areas%20are%20multifunctional,banditry%2C%20insurgency%2C%20and%20kidnapping

56. Ojo, J. S., Oyewole, S., & Aina, F. (2023). Forces of terror: Armed banditry and insecurity in North-west Nigeria. Democracy and Security, 19(4), 319–346. doi: https://doi.org/10.1080/17419166.2023.2164924

57. Okafor, G., & Chikalipah, S. (2021). Estimating the effect of terrorism on agricultural production in Nigeria. African Development Review, 33(4), 703–714. doi: https://doi.org/10.1111/1467-8268.12607

58. Okoye, K. A. M., & Dike, A. I. (2024). Post COVID-19 recovery and coping methods among residents in Edo state. Sapientia Foundation Journal of Education, Sciences and Gender Studies, 6(3). Retrieved from https://www.sfjesgs.com/index.php/SFJESGS/article/view/589

59. Oladimeji, Y. U., Abdulsalam, Z., & Abdullahi, A. N. (2015). Determinants of participation of rural farm households in non-farm activities in Kwara State, Nigeria: A paradigm of poverty alleviation. Ethiopian Journal of Environmental Studies and Management, 8(6), 635–649. doi: https://doi.org/10.4314/ejesm.v8i6.3

60. Olubusoye, O. E., Akintande, O. J., Yaya, O. S., Ogbonna, A. E., & Adenikinju, A. F. (2021). Energy pricing during the COVID-19 pandemic: Predictive information-based uncertainty indexes with machine learning algorithm. Intelligent Systems with Applications, 12, 200050. doi: https://doi.org/10.1016/j.iswa.2021.200050

61. Omotayo, A. O., Omotoso, A. B., Daud, S. A., Omotayo, O. P., & Adeniyi, B. A. (2022). Rising food prices and farming households food insecurity during the COVID-19 pandemic: Policy implications from SouthWest Nigeria. Agriculture, 12(3), 363. doi: https://doi.org/10.3390/agriculture12030363

62. Oyelami, L. O., Edewor, S. E., Folorunso, J. O., & Abasilim, U. D. (2023). Climate change, institutional quality and food security: Sub-Saharan African experiences. Scientific African, 20, e01727. doi: https://doi.org/10.1016/j.sciaf.2023.e01727

63. Oyewunmi, O. F., & Obayelu, O. A. (2023). Poverty status of rural households in Nigeria: A gendered perspective. International Journal of Social Economics, 50(2), 260–278. doi: https://doi.org/10.1108/IJSE-02-2022-0083

64. Pailhé, A., Panico, L., & Solaz, A. (2021). Children's well-being and intra-household family relationships during the first COVID-19 lockdown in France. Journal of Family Research. doi: https://doi.org/10.20377/jfr-487

65. Peluffo, C., & Viollaz, M. (2021). Intra-household exposure to labor market risk in the time of COVID-19: Lessons from Mexico. Review of Economics of the Household, 19, 327–351. doi: https://doi.org/10.1007/s11150-020-09538-4

66. Pool, U., & Dooris, M. (2022). Prevalence of food security in the UK measured by the Food Insecurity Experience Scale. Journal of Public Health, 44(3), 634–641. doi: https://doi.org/10.1093/pubmed/fdab310

67. Santos, M. P., Brewer, J. D., Lopez, M. A., Paz-Soldan, V. A., & Chaparro, M. P. (2022). Determinants of food insecurity among households with children in Villa El Salvador, Lima, Peru: The role of gender and employment, a cross-sectional study. BMC Public Health, 22, Article 717. doi: https://doi.org/10.1186/s12889-022-13083-z

68. Sasu, D. D. (2024). Average petrol prices in Nigeria 2019-2024. Retrieved from https://www.statista.com/statistics/1166124/average-petrol-prices-in-nigeria/

69. Schroeder, K., & Smaldone, A. (2015). Food insecurity: A concept analysis. Nursing Forum, 50(4), 274–284. doi: https://doi.org/10.1111/nuf.12118

70. Shuvo, S. D., Hossain, M. S., Riazuddin, M., Mazumdar, S., & Roy, D. (2022). Factors influencing low-income households' food insecurity in Bangladesh during the COVID-19 lockdown. PLoS ONE, 17(5), e0267488. doi: https://doi.org/10.1371/journal.pone.0267488

71. Shiru, M. S., Shahid, S., Alias, N., & Chung, E. S. (2018). Trend analysis of droughts during crop growing seasons of Nigeria. Sustainability, 10(3), 871. https://doi.org/10.3390/su10030871

72. Tabor, S. R. (2002). Assisting the poor with cash: Design and implementation of social transfer programs. World Bank Social Protection Discussion Paper, 0223, 79–97. doi: https://doi.org/10.1596/1813-9450-223

73. Temple, J. B., Booth, S., & Pollard, C. M. (2019). Social Assistance Payments and Food Insecurity in Australia: Evidence from the Household Expenditure Survey. International Journal of Environmental Research and Public Health, 16(3), 455. doi: https://doi.org/10.3390/ijerph16030455

74. Tofa, A. I., Kamara, A. Y., Babaji, B. A., Akinseye, F. M., & Bebeley, J. F. (2021). Assessing the use of a drought-tolerant variety as adaptation strategy for maize production under climate change in the savannas of Nigeria. *Scientific Reports*, 11(1), 8983. doi: https://doi.org/10.1038/s41598-021-88277-6

75. Tonnang, H. E., Sokame, B. M., Abdel-Rahman, E. M., & Dubois, T. (2022). Measuring and modelling crop yield losses due to invasive insect pests under climate change. *Current Opinion in Insect Science*, 50, 100873. doi: https://doi.org/10.1016/j.cois.2022.100873

76. Vaccaro, A. R., Getz, C. L., Cohen, B. E., Cole, B. J., & Donnally III, C. J. (2020). Practice management during the COVID-19 pandemic. *JAAOS - Journal of the American Academy of Orthopaedic Surgeons*, 28(11), 464–470. doi: https://doi.org/10.5435/JAAOS-D-20-00379

77. Vu, K., Vuong, N. D. T., Vu-Thanh, T. A., & Nguyen, A. N. (2022). Income shock and food insecurity prediction Vietnam under the pandemic. World Development, 153, 105838. doi: https://doi.org/10.1016/j.worlddev.2022.105838

64. Pailhé, A., Panico, L., & Solaz, A. (2021). Children's well-being and intra-household family relationships during the first COVID-19 lockdown in France. Journal of Family Research. doi: https://doi.org/10.20377/jfr-487

65. Peluffo, C., & Viollaz, M. (2021). Intra-household exposure to labor market risk in the time of COVID-19: Lessons from Mexico. Review of Economics of the Household, 19, 327–351. doi: https://doi.org/10.1007/s11150-020-09538-4

66. Pool, U., & Dooris, M. (2022). Prevalence of food security in the UK measured by the Food Insecurity Experience Scale. Journal of Public Health, 44(3), 634–641. doi: https://doi.org/10.1093/pubmed/fdab310

67. Santos, M. P., Brewer, J. D., Lopez, M. A., Paz-Soldan, V. A., & Chaparro, M. P. (2022). Determinants of food insecurity among households with children in Villa El Salvador, Lima, Peru: The role of gender and employment, a cross-sectional study. BMC Public Health, 22, Article 717. doi: https://doi.org/10.1186/s12889-022-13083-z

68. Sasu, D. D. (2024). Average petrol prices in Nigeria 2019-2024. Retrieved from https://www.statista.com/statistics/1166124/average-petrol-prices-in-nigeria/

69. Schroeder, K., & Smaldone, A. (2015). Food insecurity: A concept analysis. Nursing Forum, 50(4), 274–284. doi: https://doi.org/10.1111/nuf.12118

70. Shuvo, S. D., Hossain, M. S., Riazuddin, M., Mazumdar, S., & Roy, D. (2022). Factors influencing low-income households' food insecurity in Bangladesh during the COVID-19 lockdown. PLoS ONE, 17(5), e0267488. doi: https://doi.org/10.1371/journal.pone.0267488

71. Shiru, M. S., Shahid, S., Alias, N., & Chung, E. S. (2018). Trend analysis of droughts during crop growing seasons of Nigeria. Sustainability, 10(3), 871. https://doi.org/10.3390/su10030871

72. Tabor, S. R. (2002). Assisting the poor with cash: Design and implementation of social transfer programs. World Bank Social Protection Discussion Paper, 0223, 79–97. doi: https://doi.org/10.1596/1813-9450-223

73. Temple, J. B., Booth, S., & Pollard, C. M. (2019). Social Assistance Payments and Food Insecurity in Australia: Evidence from the Household Expenditure Survey. International Journal of Environmental Research and Public Health, 16(3), 455. doi: https://doi.org/10.3390/ijerph16030455

74. Tofa, A. I., Kamara, A. Y., Babaji, B. A., Akinseye, F. M., & Bebeley, J. F. (2021). Assessing the use of a drought-tolerant variety as adaptation strategy for maize production under climate change in the savannas of Nigeria. *Scientific Reports*, 11(1), 8983. doi: https://doi.org/10.1038/s41598-021-88277-6

75. Tonnang, H. E., Sokame, B. M., Abdel-Rahman, E. M., & Dubois, T. (2022). Measuring and modelling crop yield losses due to invasive insect pests under climate change. *Current Opinion in Insect Science*, 50, 100873. doi: https://doi.org/10.1016/j.cois.2022.100873

76. Vaccaro, A. R., Getz, C. L., Cohen, B. E., Cole, B. J., & Donnally III, C. J. (2020). Practice management during the COVID-19 pandemic. *JAAOS - Journal of the American Academy of Orthopaedic Surgeons*, 28(11), 464–470. doi: https://doi.org/10.5435/JAAOS-D-20-00379

77. Vu, K., Vuong, N. D. T., Vu-Thanh, T. A., & Nguyen, A. N. (2022). Income shock and food insecurity prediction Vietnam under the pandemic. World Development, 153, 105838. doi: https://doi.org/10.1016/j.worlddev.2022.105838

78. Waidler, J., & Devereux, S. (2019). Social grants, remittances and food security: does the source of income matter?. Food Security, 11, 679-702. doi: https://doi.org/10.1007/s12571-019-00918-x,

79. Wudil, A. H., Ali, A., Aderinoye-Abdulwahab, S., Raza, H. A., Mehmood, H. Z., & Sannoh, A. B. (2023). Determinants of food security in Nigeria: Empirical evidence from beneficiaries and non-beneficiaries rice farmers of the Kano River Irrigation Project. Frontiers in Sustainable Food Systems, 7, 999932.

78. Waidler, J., & Devereux, S. (2019). Social grants, remittances and food security: does the source of income matter?. Food Security, 11, 679-702. doi: https://doi.org/10.1007/s12571-019-00918-x,

79. Wudil, A. H., Ali, A., Aderinoye-Abdulwahab, S., Raza, H. A., Mehmood, H. Z., & Sannoh, A. B. (2023). Determinants of food security in Nigeria: Empirical evidence from beneficiaries and non-beneficiaries rice farmers of the Kano River Irrigation Project. Frontiers in Sustainable Food Systems, 7, 999932.

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ВПЛИВ ШОКОВИХ ЗМІН ДОХОДІВ ТА СОЦІАЛЬНОГО ЗАХИСТУ НА ПРОДОВОЛЬЧУ БЕЗПЕКУ СІЛЬСЬКИХ ДОМОГОСПОДАРСТВ ПІД ЧАС ПАНДЕМІЇ COVID-19 У ПОСТРАЖДАЛИХ ВІД КОНФЛІКТУ ШТАТАХ НА ПІВНОЧІ НІГЕРІЇ

Соціальний захист є одним з основних інструментів політики, спрямованих на подолання вразливості домогосподарств до потрясінь з доходами та бідності в усьому світі. У Нігерії пандемія COVID-19 стала подвійною трагедією для сільських домогосподарств на півночі Нігерії через те, що до пандемії вони зазнали кількох шоків доходів та конфліктів. Тому в цьому дослідженні було проаналізовано вплив шокових змін у доходах та соціальному захисті на відчуття продовольчої незахищеності (ВПН). Дані були зібрані Продовольчою та сільськогосподарською організацією ООН (ФАО) в рамках моніторингу даних у надзвичайних ситуаціях (DIEM) від 4412 домогосподарств у двох раундах у 2021 та 2022 роках. Дані були проаналізовані за допомогою негативної біноміальної регресії та ефектів лікування за допомогою оцінювача регресії. Результати показали, що більшість респондентів є постійними мешканцями (94,88%), а найбільшими шоками для їхніх доходів були високі ціни на продукти харчування (34,00%), насильство (23,07%), високі ціни на паливо (20,24%) та втрата роботи (11,65%). Соціальну допомогу у вигляді продовольчих та грошових ваучерів отримали 5,92% та 2,61% відповідно. При легкому рівні продовольчої незахищеності 67,84% турбувалися про їжу, 71,48% їли менш здорову їжу і 71,62% їли мало їжі, тоді як при хронічному рівні 23,13% обходилися без їжі протягом цілого дня. Негативна біноміальна регресія показала, що рівень освіти, наявність чоловіка на чолі сім›ї, дохід та постійне місце проживання значно зменшують ($p<0,05$) очікувану кількість випадків ВПН. Середній ефект лікування (СЕЛ) показав, що втрата роботи, інші шоки для домогосподарств, високі ціни на продукти харчування, інші економічні шоки, хвороби тварин, насильство та незахищеність значно підвищили ($p<0,05$) ВПН, тоді як спалахи шкідників знизили його. Крім того, ті, хто отримував продовольство, мали значно вищі значення ВПН ($p<0,05$). Було зроблено висновок, що під час пандемії COVID-19 шокові зміни в доходах сприяли зростанню ВПН, тоді як соціальна допомога незначною мірою вирішила цю проблему. Рекомендовано, щоб зусилля, спрямовані на подолання продовольчої нестабільності, враховували гендерні аспекти, були спрямовані на захист життя та майна людей, а також сприяли просвітницькій роботі серед сільських домогосподарств.

Ключові слова: *шоки доходів, соціальний захист, продовольча безпека, COVID-19, конфлікт, Нігерія.*

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