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ORIGINAL ARTICLE

Covid-19-induced Shocks, Access to Basic Needs and Coping Strategies

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Abstract

We examine the association between the Covid-19 pandemic and and access to basic needs, and how households respond using various coping strategies in the context of Nigeria. We use data from the Covid-19 National Longitudinal Phone Surveys (Covid-19 NLPS-2020) conducted during the Covid-19 lockdown. Our findings reveal that the Covid-19 pandemic is associated with households' exposure to shocks such as illness or injury, disruption of farming, job losses, non-farm business closure, and increase in price of food items and farming inputs. These negative shocks have severe consequences on access to basic needs of households, and the outcomes are heterogeneous across gender of household head and rural–urban residence. Households adopt a number of coping strategies, both formal and informal to mitigate the effects of the shocks on access to basic needs. The findings of this paper lend credence to the growing evidence on need to support households exposed to negative shocks and the role of formal coping mechanisms for households in developing countries.

Keywords COVID-19 · Income shocks · Access to basic needs

Résumé

Nous examinons le lien entre les chocs provoqués par la Covid-19 et l'accès aux services répondant aux besoins fondamentaux, et la façon dont les ménages ont réagi

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en utilisant diverses stratégies d'adaptation au Nigeria. Nous utilisons les données d'enquêtes téléphoniques longitudinales nationales Covid-19 (Covid-19 NLPS-2020) menées pendant le confinement lié à la Covid-19. Nos résultats révèlent que la pandémie de Covid-19 est associée à l'exposition des ménages à des chocs tels que la maladie ou les blessures, la perturbation de l'agriculture, les pertes d'emplois, la fermeture d'entreprises non agricoles et l'augmentation des prix des denrées alimentaires et des intrants agricoles. Ces chocs négatifs affectent gravement l'accès aux besoins fondamentaux des ménages, et les résultats sont hétérogènes selon le sexe des chefs de famille et selon le lieu de résidence rural ou urbain des ménages. Les ménages adoptent diverses stratégies d'adaptation formelles et informelles pour atténuer les effets des chocs sur l'accès aux besoins fondamentaux. Les conclusions de ce document donnent du crédit aux preuves de plus en plus nombreuses de la nécessité de soutenir les ménages exposés aux chocs négatifs et du rôle des mécanismes d'adaptation formels pour les ménages dans les pays en développement.

Introduction

As of early 2020, the world witnessed an upsurge in spread of the Covid-19 virus, which was declared a global pandemic by the World Health Organisation (WHO) in March 2020. To halt the spread of the virus, response by governments around the world led to measures that involved lockdowns across the globe. One consequence of the lockdown is the disruption of economic activities, which had severe implications of livelihoods of households. The impact of the Covid-19 pandemic is likely to be dire in developing countries due to the presence of incomplete or missing credit and insurance markets, and huge dependence on informal source of livelihoods (Bell 1988; Besley 1994; IMF 2020a, b).

To mitigate the effects of the Covid-19 shock, many households in developing countries rely on a variety of informal mechanisms and institutions such as loans and transfers from friends and relatives, selling of assets, credit purchases reduce food and non-food consumption, increasing labour supply and using savings and credit (Besley 1995; Rosenzweig 1988; Rosenzweig and Stark 1989; Morduch 1995; Dercon 2002; Fafchamps and Lund 2003; Fafchamps and Gubert 2007).[1] However, a few studies reveal that the effectiveness of informal risk-sharing could be hindered during covariate or community-wide shocks such as the Covid-19 shock. Thus far, there has been limited evidence and policy discussions on the impact of covid-19 on households' access to basic needs, and the role of coping mechanisms in mitigating the impact of the Covid-19 shock.

[1] Shocks refer to unexpected occurrence of a certain that could impact on household welfare. In addition, shocks can be referred to as adverse events that lead to reduction in income, consumption, or loss of assets (see Dercon et al. 2005; Yilma et al. 2014; Ajefu 2017). The Covid-19 pandemic is an income shock because its effects on household income, consumption, or loss of assets, and job losses, among others.

In light of above, it is imperative to understand how households in developing countries exposed to shocks during lockdown respond or mitigate the effects of shocks. This paper aims to examine how households in Nigeria cope with shocks associated with the Covid-19 pandemic, and its implications on access to basic needs of the households. Further, we investigate the heterogeneous effects of income shocks due to Covid-19 on household's basic needs across urban–rural spectrum as well as by gender of the head of households. This objective stems from the understanding that the effect of the Covid-19 pandemic is likely to differ by location and nature of the households (Amjath-Babu et. al. 2020; Béné 2020; Devereux et al. 2020; Ravallion 2020; Mobarak and Barnett-Howell 2020).

This study focuses on Nigeria because it provides a compelling context to examine the nexus among the Covid-19 pandemic, access to basic needs, and coping strategies due to the following reasons. First, the first Covid-19 case in Nigeria was reported on February 27, 2020, and Nigeria was among the few African countries that first reported the incident a, and in a few months later witnessed significant economic disruptions because of the pandemic (Amare et al. 2020). Moreover, as part of the measures to prevent the spread of coronavirus, the federal government directed the closure of all schools in mid-March 2020, and some states and local government areas responded by introducing bans on public and social gatherings (Amare et al. 2020). To adopt strict measures and contain the Covid-19 virus, on March 29, 2020, the federal government announced lockdown control and strict movement for Abuja-FCT, Lagos, and Ogun states, from March 30 to May 4, 2020. There was another announcement by the federal government to introduce lockdown procedures in Kano state, in mid-April. Further lockdowns were introduced in Akwa-Ibom, Borno, Osun, and Rivers. These actions restricted mobility of residents and led to the closure of business activities and closure of regional borders linking the lockdown areas with the rest of the country (Amare et al. 2020).

Second, significant number of Nigerians live below the poverty-line, and exposure the Covid-19 pandemic is likely to aggravate the existing deprivation and lack. For instance, about 83 million people are below the national poverty line, and Covid-19 related shocks could result in further 5 million Nigerians added to the poverty figure (World Bank 2020; IMF 2020a, b). Third, because of the large informal sector in Nigeria, many households depend on daily earnings or wages subsistence, lockdowns or disruptions of the informal sector may have dire consequences on households' access to basic needs (Devereux et al. 2020; Barrett 2020).

The relevance of this study is underscored in the consequences of the Covid-19 pandemic on welfare globally. For example, the World Bank's recent evidence reveal that the pandemic may result in about 49 million people pushed into extreme poverty, and sub-Saharan Africa is likely to be the worst hit, with extreme poverty expected to increase (World Bank 2020). Further, there is the tendency for acute food insecurity to double due to losses in come and remittances, and disruption of food supply chains, which will have deleterious consequences on household welfare (WFP 2020). These consequences are likely to impede on achieving the sustainable development goals (SDGs).

This paper contributes to three strands of literature. First, the findings of this paper add to growing evidence on the effects of Covid-19 pandemic on household

outcomes (Brodeur et al. 2021; Dang and Nguyen 2021; Mahmud and Riley 2021). For example, Mahmud and Riley (2021) examine the economic and well-being impact of covid-19 lockdown on rural households in Uganda. The study finds a large decline in household non-farm income due to household enterprise profits and labour income being wiped-out due to lockdown. Households adopt coping measures such as decrease in food expenditure per adult equivalent, use up of their savings and borrowing and increase total household labour supply to household farm.

Second, this paper contributes to the broad literature on determinants of informal coping strategies among households in developing countries (Gathergood and Wylie 2018; Aiyagari 1994; Attanasio et al. 2005; Yilma et al. 2014; Khan et al. 2015). For example, Yilma et al. (2014) uses survey data and event history in Ethiopia to investigate how income shocks trigger coping responses among households The study finds covariate natural and economic shocks trigger reductions in savings and in food consumption, while relatively idiosyncratic health shocks prompt reductions in savings and a reliance on borrowing.

Third, our paper is related to studies that focus on the consequences of the Covid-19 pandemic such as mental health and psychological well-being. Concerning mental health, Covid-19 has contributed to the rise in anxiety, depression, insomnia, drug use and suicidal ideation, especially among vulnerable people who are elderly or with underlying health conditions (Olaseni et al 2020). In Nigeria's context, the lockdown measures have contributed to several activities related to human right violations, degrading treatments, extortion and unlawful arrests and illegal confiscation of properties (Olaseni et al 2020). Moreover, several incidences related to rape and domestic abuse and gender-based violence have been reported (Njoku et al. 2020; Olaseni et al. 2020).

The remainder of this paper proceeds as follows. "Background" section discusses background of the Covid-19 pandemic and the Nigerian economy. "Data Sources and Descriptive Statistics" section presents data sources and descriptive statistics. "Empirical Methodology" section discusses empirical methodology of the study. "Results and Discussions" section presents the results and discussions of the findings of the paper, and "Conclusion" section concludes the paper.

Background

Covid-19 Pandemic and Nigerian Economy

The Covid-19 pandemic presented several health, economic and social challenges for many countries across the globe and it has generated a significant negative impact to the world economy leading to a worldwide lockdown, isolation, and closure of public facilities, among others. (Ajide et al 2020). As of September 2021, World Meter (2021) reveals that over 130 million people have been affected by the virus and over 2 million deaths have been recorded. Moreover, for a country such as Nigeria that heavily rely on external borrowing for financial expenditure, the Covid-19 pandemic generated a significant economic challenge which are likely to result in a negative impact on the GDP growth.

Further, Nigeria is monolithic economy and is heavily dependent on crude oil as a key source of source of government revenue and inflow of foreign exchange (Oladipo and Fabayo 2012). The shock due to Covid-19 had a significant negative effect on oil price leading to a significant challenge for the budge 2020 in Nigeria, requiring the government to make significant changes to meet the current expenditure (Maijama'a et al. 2020). As an import dependent economy, Nigeria also suffered from shortage of essential consumer and industrial supplies and key supplies such as food, pharmaceuticals, and spare parts from countries such as China making it extremely difficult to satisfy the basic needs of Nigerian population (PWC 2020). Poor infrastructure, weak under -developed digital economy and lack or limited access to social welfare systems/programmes also made it extremely difficult for Nigeria to recover from the challenges posed by the Covid-19 pandemic (PWC 2020).

Access to Basic Needs

In comparison to high income and industrialised countries, for low- and middle-income countries, the Covid-19 pandemic presented significant challenges on access to basic needs such as food, medicine. In Nigeria's, it is expected that Covid-19 will have significant negative effect on food security and nutrition. Recent studies indicate that inflation, fall in income and adverse financial well-being amongst Nigerians, especially those in the low -and middle-income stratum experienced significant food insecurity during the pandemic (Ozili 2020; Akynliyw et al. 2020).

Moreover, despite the increase in demand for food, it was found that disruptions in food supply chain was eminent and the effects are likely to be high in economies with significant restrictions on food imports (Akynliyw et al. 2020). Social distancing and other related lockdown measures which led to loss of jobs and a decline in income made it difficult for many households in Nigeria have access to nutritious and healthy food (Akynliyw et al. 2020).

Lie et al. (2020) argue that limited access to basic supplies such as food, water, and other basic needs can hinder or impede on the overall well-being of the population. Lack of adequate infrastructure, and access well-designed social welfare system contributed in hindering access to basic needs among Nigerian households Nigerians (Ohia et al. 2020; Ozili 2020).

The Covid-19 pandemic resulted in a significant decrease in production and exportation of key ingredients required for production of drugs, limiting the access to the essential medicines that are required to satisfy the key healthcare needs of the population (Ohia et al. 2020). Specifically, such decrease in production of drugs created a significant negative effect for consumers who require them either for treating acute ailments or for the management of chronic diseases (Ozili 2020). For example, Nigeria heavily rely on imported raw materials for drug production and imported drugs from countries such as China and India due to the underdeveloped state of the pharmaceutical sector and the inefficient management of drug supply chain in Nigeria (Ibrahim et al. 2020).

Moreover, the poor healthcare system and infrastructure also present a significant challenge for Nigeria to effectively manage the growing number of penitents with

Covid19 (Ohia et al. 2020). Also, insufficient emergency services, ambulance and first aid services, poor national insurance scheme, lack of sufficient number of health care workers further contributed to higher mortality rates especially amongst infant and maternal groups (Ibrahim et al. 2020).

Data Sources and Descriptive Statistics

This study uses data from the Covid-19 National Longitudinal Phone Surveys (NLPS) 2020, which are part of the World Bank's Living Standard Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA). The data for the Covid-19 NLPS 2020 were collected in collaboration with the National Bureau of Statistics (NBS) using a representative sample of 1950 households. We use the baseline survey of the Covid-19 NLPS 2020 because it captures the period of national lockdown in Nigeria and information on access to basic need are provided in this wave. The baseline survey, which was conducted between April 20 and May 11, 2020, coincided with a federally mandated lockdown that was initiated in March 30, 2020. The COVID-19 NLPS households were drawn from the sample of households interviewed in 2018/2019 for Wave 4 of the General Household Survey—Panel (GHS-Panel).

The Covid-19 NLPS 2020 provides information on access to basic services or needs such as access to medicine, access to soap, access to cleaning supplies, access to rice, access to beans, access to cassava, access to yam, access to sorghum, access to medical treatment, and access to financial institution. Moreover, we also utilised information on households' characteristics, sources of livelihoods, households affected by shocks, and coping strategies adopted by households.

Table 1 presents the descriptive statistics of selected variables used in our analysis. For access to basic needs or services, households were asked whether in the past-7 days they were able to buys items that provide that satisfy households basic needs or services. The descriptive statistics reveal that, on average, about 87% reported that they had access to medicine/medication, 90% reported they had access to soap, 82% reported having access to cleaning supplies, 60% reported having access to rice, 65% reported having access to beans, 66% reported access to cassava, 42% reported having access to yam, 68% having reported access to sorghum, 76% reported access to medical treatment, 87% reported access to finance/ATM. For household's characteristics, the average age of household head is 50 years, 81% of household head in the sample are male, and 39% of the respondents are urban residents. Households reported exposure to shocks triggered by the Covid-19 pandemic during the lockdown. On average, 85% of the households reported increase in price of food items, 44% reported increase in price of farming inputs, 14% had illness, injury, or death, 28% reported disruption in farming, livestock, or fishing activities, 35% were exposed to non-farm business closure, and 14% experienced job losses.

Table 2 reports descriptive statistic of households' exposure to shocks during Covid-19 lockdown and the coping strategies adopted by households. Households reported the following shocks during lockdown due to Covid-19 pandemic: illness, injury, or death; disruption in farming, livestock, or fishing activities; job losses; non-farm business

Table 1 Summary Statistics

Variable	Mean	Standard dev	Minimum	Maximum
Had access to medicine	0.871	0.335	0	1
Had access to soap	0.904	0.294	0	1
Had access to cleaning supplies	0.821	0.383	0	1
Had access to rice	0.602	0.489	0	1
Had access to beans	0.647	0.478	0	1
Had access to cassava	0.663	0.473	0	1
Had access to yam	0.419	0.493	0	1
Had access to sorghum	0.675	0.468	0	1
Had access to medical treatment	0.760	0.427	0	1
Had access to finance	0.868	0.338	0	1
Household's sources of livelihood in the last 12-month				
Remittances from abroad	0.042	0.201	0	1
Remittances within the country	0.225	0.417	0	1
Wage employment	0.337	0.472	0	1
Non-farm activities	0.635	0.481	0	1
Farming	0.766	0.423	0	1
Pension	0.056	0.230	0	1
Properties	0.133	0.339	0	1
Properties	0.133	0.339	0	1
Households affected by shocks				
Increase in price of food items	0.853	0.353	0	1
Increase in price of farming/business inputs	0.437	0.496	0	1
Illness, injury or death of income earning member HH	0.137	0.344	0	1
Disruption of farming, livestock, fishing activities	0.279	0.448	0	1
Non-farm business closure	0.354	0.478	0	1
Job loss	0.143	0.349	0	1
Household's characteristics				
Age of household head	50.22	14.513	19	99
Male household head	0.817	0.386	0	1
Urban residence	0.387	0.487	0	1

Number of observations is 1954

closure; increase in price of food items; and increase in price of farming inputs. We show the mean (average) of households that adopt the various coping strategies across the different shock exposure. For example, 6% of households that experienced illness or injury during the Covid-19 pandemic adopted sale of assets a coping strategy. See Table 2 for details of the results between shocks and coping strategies (averages).

Table 2 Descriptive of Covid-19 shocks by coping strategies

Variable	Illness or injury	Farming disruption	Job loss	Non-farm business closure	increase in food prices	Increase price of farming inputs
Sale of assets	0.066	0.610	0.430	0.080	0.060	0.030
Engaged in income generating activities	0.096	0.180	0.120	0.060	0.070	0.050
Received assistance	0.105	0.150	0.140	0.030	0.100	0.100
Borrowed from friends	0.1000	0.140	0.100	0.050	0.110	0.080
Take a loan	0.007	0.007	0.003	0.000	0.009	0.002
Credit purchases	0.042	0.065	0.004	0.015	0.050	0.060
Delayed payments	0.026	0.040	0.017	0.005	0.018	0.011
Sold harvest in adv	0.048	0.040	0.042	0.080	0.060	0.035
Reduced food cons	0.244	0.330	0.240	0.120	0.183	0.570
Reduced non-food	0.222	0.270	1.450	0.070	0.181	0.210
Relied on savings	0.240	0.420	0.313	0.190	0.250	0.200
Received assist. NGO	0.090	0.011	0.030	0.030	0.040	0.040
Advanced payment from employer	0.002	0.004	0.014	0.000	0.001	0.006
Received assist. govt	0.013	0.011	0.006	0.000	0.011	0.008
Insurance cover	0.000	0.000	0.000	0.000	0.000	0.000
Did nothing	0.252	0.011	0.130	0.320	0.210	0.001

Number of observations is 1954

Empirical Methodology

Our empirical analysis assesses (i) the association between shocks experienced due to Covid-19 pandemic and household's access to basic services, (ii) the coping strategies adopted to deal with shocks that results from the Covid-19 pandemic.

To examine the effect of shocks experienced due to the Covid-19 pandemic on household's access to basic services, we estimate the model below:

$$Y_i = \beta_0 + \theta Shocks_i + \gamma X_i + \varepsilon_i, \tag{1}$$

where θ captures the association between shocks from Covid-19 pandemic and household's access to basic services. Moreover, the shocks dummy equals to 1 if a household experienced at least one of the following shocks during Covid-19: (illness or injury, farming disruption, job loss, non-farm business closure, increase in food price, increase in price of farming inputs), and 0 if otherwise. Y_i denotes our outcome variables, which is access to basic services, X is household's covariates and state dummies, and ε_i is error term for household i. Equation (1) is estimated for separate outcome variable using probit model because the dependent variable is binary (dummy), which is equal to 1 if a household had access to basic in the past 7-days before the survey, and 0 if otherwise. The basic needs considered are reported in Table 1. The reported coefficients reflect the marginal effects of shocks experienced due to the Covid-19 pandemic and access to basic services. The standard errors are clustered in the enumeration area and are in parentheses.

In the second aspect our analysis, we examine the probability of adopting coping strategy as a function of shocks and household characteristics.

$$Prob\left(S_i^m = 1\right) = F\left(\alpha + \beta S_i + \theta X_i + \varepsilon_i\right). \tag{2}$$

For Eq. (2), we estimate a series of probit models for each coping strategy, m, that household i could adopt due to shocks experienced during the Covid-19 pandemic. Our main coefficient of interest is β, which captures shock variables, S. The specification controls for household characteristics, X, and state dummies.

One major limitation of our analysis is that, even though in both Eqs. (1) and (2) we use a number of control variables in the analysis, the error term, ε, could be correlated unobserved household-specific heterogeneity that may influence both the incidence of shocks, access to basic services and the choice of coping strategy, thereby potentially confounding the results. Because we cannot deal with this issue directly, we are unable to claim causal effects of the findings, hence the analysis establishes patterns of association between shocks during Covid-19 pandemic and access to basic services and coping strategies.

Results and Discussions

Table 3 presents the results of the relationship between Covid-91-induced shocks and the likelihood of having access to basic needs using probit model regressions.

Table 3 Aggregate shocks and access to basic needs (probit marginal effects)

Variable	Medicine	Soap	Cleaning supplies	Rice	Beans	Cassava	Yam	Sorghum	Med. treat	Bank/ATM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shocks (=1)	− 0.037	− 0.044**	− 0.071**	− 0.135**	− 0.076	− 0.226	− 0.161**	− 0.181***	− 0.107**	− 0.041
	(0.034)	(0.018)	(0.032)	(0.055)	(0.056)	(0.184)	(0.071)	(0.054)	(0.052)	(0.035)
Age of household head	− 0.000	0.001*** (0.001)	0.001 (0.001)	− 0.001	− 0.001	− 0.004	0.001	0.001	− 0.000	− 0.001
	(0.001)			(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Male household head	0.013	0.054**	− 0.004	− 0.080**	− 0.068*	− 0.149	− 0.032	− 0.076*	0.096*	− 0.042*
	(0.030)	(0.024)	(0.031)	(0.039)	(0.039)	(0.128)	(0.046)	(0.051)	(0.052)	(0.029)
Urban residence	− 0.004	0.035**	0.048*	0.093***	0.062*	0.145	0.089**	0.045	− 0.023	0.066***
	(0.025)	(0.016)	(0.025)	(0.035)	(0.034)	(0.111)	(0.039)	(0.044)	(0.043)	(0.024)
Remittance from abroad	0.001	0.001	− 0.031	0.154*	0.115	0.807**	0.219**	0.032*	0.058	0.003
	(0.059)	(0.050)	(0.071)	(0.084)	(0.083)	(0.366)	(0.092)	(0.120)	(0.090)	(0.046)
Remittance within country	− 0.020	0.009	0.017	0.042	0.049	0.140	− 0.049	0.080	0.069*	0.013
	(0.027)	(0.017)	(0.026)	(0.036)	(0.035)	(0.115)	(0.042)	(0.044)	(0.038)	(0.024)
Wage employment	0.056***	0.024*	0.063***	0.054*	0.089***	− 0.014	0.086**	0.029	0.061*	0.054**
	(0.021)	(0.014)	(0.022)	(0.032)	(0.031)	(0.100)	(0.036)	(0.041)	(0.036)	(0.021)
Farming	− 0.001	− 0.035**	0.003	− 0.103**	− 0.049	− 0.059	− 0.020	0.090*	0.032	− 0.059**
	(0.030)	(0.016)	(0.031)	(0.041)	(0.039)	(0.124)	(0.045)	(0.056)	(0.049)	(0.024)
Pension	− 0.056	− 0.048	− 0.073	0.026	0.098*	− − 0.003	0.014	− 0.014	− 0.063	− 0.002
	(0.059)	(0.045)	(0.063)	(0.071)	(0.067)	(0.227)	(0.080)	(0.096)	(0.081)	(0.037)
Properties	0.096***	0.050***	0.083***	0.119***	0.048	0.330**	0.145***	0.102**	0.035	0.027
	(0.019)	(0.015)	(0.025)	(0.042)	(0.045)	(0.150)	(0.050)	(0.051)	(0.046)	(0.026)
Region = North-East	− 0.035	0.027*	0.034	− 0.128**	− 0.067	− 0.228*	− 0.143***	0.137***	0.193***	− − 0.091*
	(0.038)	(0.017)	(0.031)	(0.051)	(0.052)	(0.153)	(0.052)	(0.048)	(0.038)	(0.050)
Region = North-West	− 0.012	0.021	0.067**	− 0.084*	− 0.001	0.047	− 0.122**	0.221***	0.176***	− 0.095*
	(0.036)	(0.018)	(0.029)	(0.053)	(0.050)	(0.155)	(0.057)	(0.045)	(0.038)	(0.054)
Region = South-East	0.070***	0.089***	0.170***	0.090*	0.106**	0.818***	0.244***	− 0.005	− 0.008	− − 0.041
	(0.027)	(0.011)	(0.019)	(0.053)	(0.049)	(0.190)	(0.061)	(0.094)	(0.061)	(0.042)
Region = South-South	− 0.021	0.036**	0.049*	0.041	0.084**	0.573***	0.027	− 0.200**	− 0.016	0.022
	(0.044)	(0.017)	(0.033)	(0.053)	(0.049)	(0.168)	(0.061)	(0.093)	(0.063)	(0.034)

Table 3 (continued)

Variable	Medicine (1)	Soap (2)	Cleaning supplies (3)	Rice (4)	Beans (5)	Cassava (6)	Yam (7)	Sorghum (8)	Med. treat (9)	Bank/ATM (10)
Region = South West	0.066**	0.045**	− 0.047	− 0.001	0.069	0.458***	− 0.122**	− 0.065	0.092*	0.007
	(0.029)	(0.018)	(0.044)	(0.054)	(0.049)	(0.163)	(0.056)	(0.069)	(0.051)	(0.039)

Number of observations is 1954. Standard errors clustered by enumeration area in parentheses

*$p < 0{:}10$; **$p < 0{:}05$; ***$p < 0{:}01$

We generate a binary indicator for shocks from the reported cases of income shocks (illness or injury, farming disruption, job loss, non-farm business closure, increase in food price, increase in price of farming inputs), and it is equal to one for households that reports at least one kind of shock during the Covid-19 pandemic, and zero if otherwise. The results reveal that exposure to any kind is associated with 4% less likely of access to soap, 7% less likely of access to supplies, 14% less likely to have access to rice, 16% less likely to have access to yam, 18% less likely to have access to sorghum, and 11% less likely to have access to medical treatment. These findings speak to existing evidence on the nexus between Covid-19 and household well-being in other countries in sub-Saharan Africa (Mahmud and Riley 2021; Amare et al. 2021).

In Table 4, we use disaggregated shocks in the analysis instead of aggregated shocks as reported in Table 3. We consider the following shocks: illness or injury to any household member, farming disruption, job loss, non-farm closure, increase in food prices, and increase in price of farming inputs. We find that illness or injury is associated with 10% decline in the probability of access to medicine, and food prices increase is associated with 9% decline in the probability of access to medicine/medication. Shocks such as illness or injury and disruption to farming are associated with 7% and 3% decline in the probability of access to soap. Further, we find illness or injury shock is associated with 11% and 14% decline the likelihood of having access to cleaning supplies and access to rice, respectively. Shock due to illness or injury, job losses and food price increase are associated with 10%, 9%, and 6% decline in probability of having access to beans. Decline in the likelihood of access to cassava associated with illness (16%), farming disruption (8%), and non-farm business closure (7%).

Table 5 shows the marginal effects of coping strategies adopted by households exposed to shocks during the Covid-19 pandemic. The results reveal that the probabilities of adopting each or a combination of coping strategies on household's exposure to shocks such as injury or illness, farming disruption, job losses, non-farm business closure, increase in food prices, and increase in price of farming inputs. From column (1) of Table 5, income shocks such as injury or illness, disruption of farming, job losses, non-farm business closure, and increase in price of farm inputs are positively associated with the likelihood of adoption of reduction of food consumption as a coping strategy. Further, column (2) shows that income shocks such as injury or illness, disruption of farming, job losses, non-farm business closure, increase in food prices, and increase in price of farm inputs are positively associated with the likelihood of adopting non-reduction of food consumption as a coping strategy. See column (3) to column (14) of Table 5 for the patterns of association between income shocks and coping strategies adopted by households during Covid-19 pandemic.

Tables 6 and 7 present the heterogeneity of income shocks during Covid-19 pandemic on access to basic services by gender of household heads and rural–urban residence. From Panel A of Table 6, the results reveal the association of income shocks

Table 4 Disaggregated shocks and access to basic needs (probit marginal effects)

Variable	Medicine	Soap	Cleaning supplies	Rice	Beans	Sorghum	Cassava	Yam	Med. treat	Bank or ATM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Illness or injury (shock = 1)	− 0.099***	− 0.068***	− 0.109***	− 0.140***	− 0.098**	− 0.028	− 0.160***	− 0.167***	− 0.044	− 0.038
	(0.031)	(0.024)	(0.037)	(0.042)	(0.043)	(0.045)	(0.054)	(0.040)	(0.039)	(0.031)
Farming disruption (shock = 1)	− 0.032	− 0.028*	− 0.035	− 0.009	− 0.009	− 0.051	− 0.079*	0.039	0.077**	− 0.016
	(0.024)	(0.018)	(0.026)	(0.036)	(0.037)	(0.043)	(0.045)	(0.048)	(0.039)	(0.025)
Job loss (shock = 1)	0.022	− 0.017	0.036	0.017	− 0.085*	0.012	− 0.066	− 0.009	0.023	− 0.038
	(0.027)	(0.023)	(0.029)	(0.045)	(0.051)	(0.050)	(0.051)	(0.056)	(0.050)	(0.036)
Non-farm business closure (shock = 1)	0.008	0.012	− 0.020	− 0.047	− 0.016	− 0.061*	− 0.069**	− 0.125***	− 0.012	0.012
	(0.023)	(0.014)	(0.022)	(0.035)	(0.032)	(0.040)	(0.034)	(0.034)	(0.038)	(0.022)
Increase in food prices (shock = 1)	− 0.093***	− 0.017	0.008	− 0.026	− 0.057*	− 0.050	0.011	0.011	− 0.058	0.014
	(0.027)	(0.018)	(0.028)	(0.034)	(0.036)	(0.045)	(0.045)	(0.041)	(0.043)	(0.025)
Increase in price farming inputs (shock = 1)	0.005	− 0.011	− 0.021	− 0.047	0.037	− 0.086*	0.065	− 0.074	− 0.093**	− 0.049*
	(0.035)	(0.022)	(0.035)	(0.053)	(0.063)	(0.056)	(0.058)	(0.056)	(0.042)	(0.028)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Number of observations is 1954. Standard errors clustered by enumeration area in parentheses

*$p < 0{:}10$; **$p < 0{:}05$; ***$p < 0{:}01$. Control variables include age of household head, male household head, urban residence, received remittance from abroad, received remittances within the country, wage employment, farming, pension, and properties

Table 5 Probability of coping strategies and shocks during COVID-19 (probit marginal effects)

Variable	Reduced food cons	Reduced non-food	Relied on saving	Received assist. NGO	Advanced payment Employer	Received assist Govt	Sold assets	Engaged income activities	Borrowed from friends	Received assistance Friends	Took loan	Credit purchases	Delayed payments	Sold harvest in advance
	(1)	(2)	(3)	(4)	(5)a	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Injury or illness	0.077** (0.036)	0.132*** (0.026)	0.020 (0.036)	0.000 (0.000)	0.012 (0.009)	0.008* (0.005)	0.038*** (0.013)	− 0.002 (0.016)	0.099*** (0.025)	0.148*** (0.028)	0.001 (0.004)	0.046*** (0.017)	0.021** (0.008)	0.043*** (0.016)
Farming disruption	0.116*** (0.031)	0.132*** (0.023)	0.029 (0.026)	0.000 (0.000)	0.005 (0.006)	0.014*** (0.004)	0.006 (0.005)	0.006 (0.013)	0.009 (0.015)	0.010 (0.019)	0.001 (0.003)	− 0.0138116 0.011	0.011*** (0.005)	− 0.005 (0.007)
Job loss	0.064* (0.039)	0.067** (0.032)	0.152*** (0.034)	0.000 (0.000)	0.002 (0.003)	− 0.002 (0.003)	− 0.005 (0.004)	0.034* (0.020)	0.053** (0.023)	0.015 (0.026)	0.007 (0.005)	0.046** (0.022)	0.004 (0.005)	0.011 (0.012)
Non-farm business closure	0.154** (0.072)	− 0.040** (0.020)	0.096*** (0.024)	− 0.000 (0.000)	− 0.001 (0.001)	− 0.001 (0.003)	− 0.001 (0.004)	0.034*** (0.013)	0.054*** (0.016)	0.058*** (0.019)	0.001 (0.002)	− 0.001 (0.011)	0.001 (0.003)	0.007 (0.008)
Increase in food prices	0.090 (0.071)	0.077*** (0.022)	0.127*** (0.025)	− 0.000 (0.000)	0.004 (0.003)	0.006 (0.005)	0.015*** (0.006)	0.071*** (0.015)	0.017 (0.014)	0.027 (0.019)	0.012*** (0.004)	0.032*** (0.012)	0.008** (0.004)	0.012 (0.008)
Increase in price of farm inputs	1.695*** (0.143)	0.148*** (0.017)	0.153*** (0.023)	0.000 (0.000)	0.002 (0.002)	0.001 (0.005)	0.008* (0.005)	0.030 (0.015)	0.043** (0.014)	0.085*** (0.017)	0.001 (0.005)	0.046*** (0.010)	0.001 (0.006)	0.026*** (0.007)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Number of observations is 1954. Standard errors clustered by enumeration area in parentheses

*$p<0:10$; **$p<0:05$; ***$p<0:01$. Control variables include age of household head, male household head, urban residence, received remittance from abroad, received remittances within the country, wage employment, farming, pension, and properties

and access to basic services for male head of household, while Panel B shows result of female head of household. In column (1), we find that injury or illness, farming disruption and increase in food prices are negatively associated with the likelihood of access to medicine/medication for male headed households, while for female headed households, we find only increase in food prices to be statistically significant with the decline in the likelihood of access to medicine/medication. Across the different household's basic services between column (2) and column (10), there exists discrepancies in the association between income shocks and access to basic services by male–female household head.

Table 7 presents the heterogeneity of income shocks on access to basic services by urban–rural residence. From column (1) of Table 7, we find that injury or illness, farming disruption and job losses are negatively associated with the likelihood of access to medicine/medication for urban households, while for rural households, we find only injury or illness and increase in food prices to be statistically significant with the decline in the likelihood of access to medicine/medication. In sum, the results in Table 7 reveal that discrepancies in the association between income shocks and household's access to basic services for urban and rural areas, respectively. It is imperative to note that there is no claim about causality from the results presented. Rather, we are only interested in the pattern of association between the variables in our analysis.

Heterogenous Effects

Table 6 Heterogeneous analysis of disaggregated shocks and access to basic needs (probit marginal effects)

Variable	Medicine	Soap	Cleaning supplies	Rice	Beans	Sorghum	Cassava	Yam	Med. Treat	Bank or ATM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: male head household										
Illness or injury (shock = 1)	− 0.086***	− 0.043*	− 0.079**	− 0.139***	− 0.095**	− 0.040	− 0.115*	− 0.172***	− 0.002	− 0.043
	(0.031)	(0.023)	(0.037)	(0.050)	(0.047)	(0.050)	(0.060)	(0.043)	(0.039)	(0.033)
Farming disruption (shock = 1)	− 0.038*	− 0.025	− 0.050*	− 0.037	− 0.019	− 0.055	− 0.108**	0.032	0.051	− 0.011
	(0.025)	(0.019)	(0.029)	(0.040)	(0.040)	(0.048)	(0.051)	(0.051)	(0.039)	(0.028)
Job loss (shock = 1)	0.014	− 0.031	0.044	0.013	− 0.098	− 0.014	− 0.072	0.017	0.021	− 0.045
	(0.028)	(0.024)	(0.030)	(0.048)	(0.055)	(0.056)	(0.056)	(0.060)	(0.053)	(0.040)
Non-farm closure (shock = 1)	− 0.009	0.008	− 0.035*	− 0.044	− 0.022	− 0.0577	− 0.069*	− 0.128	− 0.024	0.008
	(0.023)	(0.015)	(0.024)	(0.037)	(0.036)	(0.045)	(0.038)	(0.039)	(0.039)	(0.026)
Increase in prices food (shock = 1)	− 0.087***	− 0.026	− 0.010	− 0.021	− 0.038	− 0.051	− 0.005	0.000	− 0.057	0.005
	(0.027)	(0.019)	(0.030)	(0.036)	(0.038)	(0.048)	(0.049)	(0.044)	(0.044)	(0.028)
Increase in price farming inputs (shock = 1)	0.003	− 0.008	− 0.020	− 0.079	0.014	− 0.064	0.097	− 0.076	− 0.089**	− 0.037
	(0.037)	(0.024)	(0.038)	(0.056)	(0.069)	(0.062)	(0.065)	(0.058)	(0.044)	(0.035)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: female head household										
Illness or injury (shock = 1)	− 0.058	− 0.189**	− 0.222**	− 0.058	− 0.059	0.101	− 0.271**	− 0.076	− 0.380***	− 0.010
	(0.085)	(0.078)	(0.105)	(0.099)	(0.097)	(0.111)	(0.124)	(0.124)	(0.127)	(0.057)
Farming disruption (shock = 1)	− 0.008	− 0.039	− 0.000	0.115	0.019	− 0.218*	− 0.105	− 0.037	0.116	− 0.203
	(0.056)	(0.046)	(0.063)	(0.078)	(0.090)	(0.148)	(0.112)	(0.127)	(0.163)	(0.163)
Job loss (shock = 1)	0.079	− 0.065**	0.069	0.094	0.035	− 0.227**	− 0.057	− 0.147	0.081	0.021
	(0.055)	(0.028)	(0.071)	(0.110)	(0.130)	(0.092)	(0.145)	(0.151)	(0.121)	(0.040)
Non-farm closure (shock = 1)	0.086	0.018	0.051	− 0.134*	0.049	− 0.166*	− 0.108	− 0.187**	− 0.088	0.032
	(0.060)	(0.036)	(0.056)	(0.077)	(0.077)	(0.109)	(0.081)	(0.089)	(0.138)	(0.040)
Increase in prices food (shock = 1)	− 0.122*	0.041	− 0.125*	− 0.018	− 0.156*	0.038	0.072	0.045	− 0.153	− 0.010*
	(0.068)	(0.045)	(0.070)	(0.094)	(0.097)	(0.146)	(0.108)	(0.104)	(0.128)	(0.059)

Table 6 (continued)

Variable	Medicine (1)	Soap (2)	Cleaning supplies (3)	Rice (4)	Beans (5)	Sorghum (6)	Cassava (7)	Yam (8)	Med. Treat (9)	Bank or ATM (10)
Increase in price farming inputs (shock = 1)	0.014 (0.087)	− 0.017 (0.048)	− 0.024 (0.083)	0.083 (0.128)	0.199 (0.151)	− 0.234*** (0.078)	− 0.088 (0.101)	− 0.061 (0.146)	− 0.004 (0.003)	− 0.003* (0.002)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Number of observations is 1954. Standard errors clustered by enumeration area in parentheses

*$p < 0{:}10$; **$p < 0{:}05$; ***$p < 0{:}01$. Control variables include age of household head, urban residence, received remittance from abroad, received remittances within the country, wage employment, farming, pension, and properties

Table 7 eterogeneous analysis of disaggregated shocks and access to basic needs (probit marginal effects)

Variable	Medicine	Soap	Cleaning supplies	Rice	Beans	Sorghum	Cassava	Yam	Med. Treat	Bank /ATM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: urban										
Illness or injury (shock = 1)	− 0.111** (0.051)	− 0.050 (0.036)	− 0.099* (0.069)	− 0.045 (0.073)	− 0.146* (0.077)	0.042 (0.109)	− 0.188** (0.084)	− 0.143** (0.065)	− 0.097 (0.088)	− 0.027 (0.035)
Farming disruption (shock = 1)	− 0.080* (0.056)	− 0.071* (0.048)	− 0.039 (0.060)	− 0.046 (0.064)	0.002 (0.061)	− 0.112 (0.096)	− 0.057 (0.069)	0.121 (0.081)	0.078 (0.081)	0.0325485 0.021
Job loss (shock = 1)	− 0.054** (0.025)	− 0.030 (0.034)	0.075 (0.052)	0.038 (0.058)	0.015 (0.071)	− 0.002 (0.108)	− 0.075 (0.075)	− 0.049 (0.087)	0.069 (0.094)	− 0.084* (0.050)
Non-farm closure (shock = 1)	− 0.036 (0.033)	− 0.020 (0.021)	− 0.067* (0.045)	− 0.124** (0.055)	− 0.047 (0.053)	− 0.149** (0.074)	− 0.072 (0.051)	− 0.163*** (0.055)	− 0.126* (0.068)	− 0.005 (0.023)
Increase in prices food (shock = 1)	− 0.066 (0.045)	− 0.000 (0.028)	− 0.006 (0.060)	− 0.073 (0.059)	− 0.060 (0.068)	− 0.063 (0.093)	− 0.079 (0.068)	− 0.005 (0.071)	− 0.211** (0.103)	0.017 (0.024)
Increase in price farming inputs (shock = 1)	0.016 (0.045)	0.017 (0.041)	− 0.043 (0.062)	0.079 (0.091)	0.080 (0.104)	− 0.055 (0.108)	0.143 (0.090)	− 0.043 (0.094)	− 0.016 (0.098)	− 0.032 (0.026)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: Rural										
Illness or injury (shock = 1)	− 0.058* (0.033)	− 0.067** (0.029)	− 0.106** (0.047)	− 0.157*** (0.051)	− 0.070 (0.053)	− 0.025 (0.048)	− 0.101* (0.069)	− 0.175*** (0.053)	− 0.019 (0.041)	− 0.040 (0.048)
Farming disruption (shock = 1)	− 0.027 (0.028)	− 0.024 (0.022)	− 0.051* (0.032)	− 0.003 (0.045)	− 0.016 (0.045)	− 0.065 (0.052)	− 0.136** (0.057)	− 0.010 (0.054)	− 0.074* (0.043)	− 0.049 (0.041)
Job loss (shock = 1)	− 0.001 (0.036)	− 0.011 (0.029)	0.015 (0.036)	− 0.011 (0.058)	− 0.132** (0.064)	0.013 (0.057)	− 0.107* (0.068)	0.004 (0.071)	0.025 (0.045)	0.000 (0.052)
Non-farm closure (shock = 1)	0.031 (0.028)	0.022 (0.020)	− 0.008 (0.029)	− 0.011 (0.043)	0.008 (0.042)	− 0.039 (0.049)	− 0.068* (0.046)	− 0.114* (0.044)	− 0.003 (0.045)	0.021 (0.036)
Increase in prices food (shock = 1)	− 0.100*** (0.030)	− 0.027 (0.024)	0.015 (0.035)	0.001 0.045	− 0.060 (0.045)	− 0.037 (0.053)	0.052 (0.059)	0.013 (0.050)	− 0.010 (0.060)	− 0.016 (0.043)

Table 7 (continued)

Variable	Medicine (1)	Soap (2)	Cleaning supplies (3)	Rice (4)	Beans (5)	Sorghum (6)	Cassava (7)	Yam (8)	Med. Treat (9)	Bank /ATM (10)
Increase in price farming inputs (shock = 1)	− 0.008 (0.040)	− 0.028 (0.026)	− 0.013 (0.046)	− 0.118* (0.063)	0.007 (0.072)	− 0.092 (0.066)	0.007 (0.078)	− 0.090 (0.070)	− 0.116*** (0.041)	− 0.071* (0.041)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Number of observations is 1954. Standard errors clustered by enumeration area in parentheses

*$p < 0{:}10$; **$p < 0{:}05$, ***$p < 0{:}01$. Control variables include age of household head, male household head, received remittance from abroad, received remittances within the country, wage employment, farming, pension, and properties

Conclusion

The Covid-19 pandemic was a large and unexpected global shock that resulted in significant loss of income, livelihoods, and lives. However, the Covid-19 induced shocks are likely to have severe impact on households in developing countries compared to households developed countries. The relative difference in the consequences from Covid-19 induced shocks stem from the limited capacity of households in developing countries to mitigate the income shocks through formal mechanisms. Many households rely on informal coping mechanisms to smooth shocks, which include but not limited to selling assets and livestock, increasing labour supply, cutting back on non-food expenditures, and using savings and credit.

In light of the above, it is therefore imperative to understand how Covid-19 induced shocks affect households' access to basic services and the coping strategies adopted to mitigate the effects of the shocks.. The findings of this paper reveal that households are exposed to different kinds of income shocks during the Covid-19 pandemic. The shocks have negative consequences on households' access to basic services such as access to medicine/medication, rice, beans, sorghum, cassava, among others. There are heterogeneous effects of Covid-19 shocks on access to basic needs by gender of the household head as well place of residence (urban–rural residence).

Further, the findings of this paper reveal that lend credence to the growing evidence that the Covid-19 pandemic significantly erode household welfare through negative shocks on households which are likely to resulted from job losses, non-farm business failures, disruption of farming activities, illnesses, increase in food prices and farm inputs, among others (Mahmud and Riley 2021; Amare et al. 2021). These findings provide useful insights into some of the consequences the Covid-19 pandemic for countries in similar context like Nigeria (e.g., countries in sub-Saharan Africa). Understanding how the Covid-19 pandemic triggered negative income shocks and the implications for basic needs of household as well as informal coping strategies are imperative for designing policies and programmes for the poor and vulnerable groups in developing countries. In addition, policies and programmes to mitigate the shocks should take into consideration heterogeneity differences in households such as gender of the household head and rural–urban location. Notwithstanding patterns of association between Covid-19 induced shocks and access to basic needs as well the coping strategies, we are unable generalize the findings of this paper to other countries and context. Hence, there is need for future research. Hence, future research should consider the causal effect of the Covid-19 pandemic on access to basic needs as well as the long-run effects of the pandemic on welfare.

Data availability The data used to support the findings of this study are available from the corresponding author upon request.

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