COVID-19 and Welfare in Nigeria: New Evidence for Policy[1]

World Bank Poverty Team – October 2020

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Key Messages

- The COVID-19 crisis is affecting all Nigerians, but different groups face different impacts on their health, welfare, and livelihoods. Welfare policies need to reflect these differences and deliver support aligned to communities' specific needs.
- To achieve this, Nigeria's policy makers need information on COVID-19 risks and vulnerabilities in specific population groups. However, available evidence is scant. This note uses original economic simulations and a new state pandemic risk index to provide fresh evidence for targeted policy solutions.
- Nigerians are experiencing widespread job and income losses and severe welfare impacts from COVID-19. Recent surveys suggest that many households are unable to meet their basic needs and are adopting negative coping strategies, such as reducing food intake. The pandemic is predicted to drive more than 10 million more Nigerians into extreme poverty by 2022.
- Nigerians newly impoverished by COVID-19 differ in important ways from those who were already poor before the pandemic. On average, Nigerians forced into poverty by COVID-19 are more southern, more urban, and more likely to work in the service sector.
- This brief presents a new state pandemic risk index that measures multiple dimensions of public-health and economic vulnerability in Nigerian states. The index generates state risk profiles that can be used to tailor COVID-19 policy packages to states' specific needs.
- Several states in northern Nigeria – especially Kebbi, Niger, and Sokoto – are particularly exposed to the effects of COVID-19 through their lack of infrastructure. These states may get outstanding benefits from water, sanitation, and hygiene programs to prevent disease spread.
- In contrast, in many southern states, health risks are amplified because populations are older and more urban, with more pre-existing health conditions. To combat COVID-19, these states may choose to prioritize health interventions such as testing and tracing, localized lockdowns, and providing prevention tools like soap and face masks.
- In some states in both the south and the north, incomes from non-farm, service-sector enterprises are vulnerable to disruption by COVID-19. To complement broader social protection measures, these states could benefit from support programs targeted at non-farm enterprise activities.
- The risk index shows that states' pre-crisis poverty levels do not predict their vulnerability to COVID-19. This means solely using pre-crisis poverty rates to target COVID-19 welfare policies may not work.
- Though high pre-crisis poverty does not automatically mean elevated COVID-19 vulnerability, some states face both. States where pre-crisis poverty and direct vulnerability to the COVID-19 crisis coincide may require special measures to protect communities in which lack of savings, reduced investments in human capital, or poor nutrition weaken resilience to COVID-19. Otherwise, poverty in such communities may deepen.

Abstract

The COVID-19 pandemic has spurred a dual crisis in Nigeria. The local spread of disease directly threatens lives and livelihoods, while the global economic slowdown has reduced international oil prices, depleting Nigerian government revenues, and caused the economy to contract. This crisis is having severe effects on Nigerian households' incomes and welfare, yet the impact is unlikely to be felt evenly across Nigeria. This brief considers how vulnerability to the COVID-19 crisis differs among Nigerian households from two angles, both of which can provide important new evidence to inform policy. First, a simple simulation model uses the latest macroeconomic forecasts in conjunction with new household survey data from the 2018/19 Nigerian Living Standards Survey (NLSS) to examine which households are likely to fall into poverty due the economic effects of the crisis. Results demonstrate that those working in services and living in urban areas will likely be disproportionately affected. The results of these simulations are reinforced by the initial findings of a high-frequency phone survey being carried out in Nigeria throughout the COVID-19 crisis. Second, since households' vulnerability to COVID-19 is inherently multidimensional, more detailed information on demographics and health, sources of income, and access to services and infrastructure can be used to assess which states may be more exposed to the crisis' different effects. The additional data needed are drawn from the 2018/19 NLSS and the 2018 Demographic and Health Survey (DHS). To facilitate cross-state comparisons and hence help guide countervailing interventions, multiple indicators can be combined to create a simple "state risk index" . Analyses generated using the risk index suggest directions for state-specific policies to protect Nigerians' welfare in the wake of COVID-19.

1. Introduction

The health and economic effects of COVID-19 are hitting Nigeria hard

The arrival of COVID-19 in Nigeria poses a public-health challenge for which the country was not fully prepared. On February 27, 2020, Nigeria reported its first confirmed case of COVID-19, making it one of the first countries in sub-Saharan Africa to be touched by the pandemic (NCDC, 2020). Since then, case numbers and deaths have steadily climbed, although they have not reached the figures witnessed in Europe and the Americas: as of October 7, 2020, Nigeria reported 59,583 confirmed cases of COVID-19 and 873 deaths (NCDC, 2020). It appears that Nigeria was underprepared for COVID-19, despite its relative success in containing the Ebola virus disease outbreak in 2013-2016 (Adepoju, 2020). In their 2017 assessment, the World Health Organization (WHO) suggested that Nigeria had limited capacity to prevent or respond to public-health risks (WHO, 2017). Indeed, Nigeria had only 350 ventilators and 350 intensive care beds before the outbreak of COVID-19 (Dixit, Ogundeji, & Onwujekwe, 2020). As such, the spread of COVID-19 threatens public health in the country.

The Government of Nigeria initially put in place strict lockdown measures, which have subsequently been partially eased, although testing for COVID-19 remains limited. Throughout March, April, and May 2020, travel bans, limits on mass gatherings, lockdown orders, mandatory masking in public, and even curfews were brought in to try and control the spread of COVID-19 in Nigeria (Dixit, Ogundeji, & Onwujekwe, 2020). Some measures were eased in May – for example, stay at home requirements have been relaxed and interstate travel is now possible – but many restrictions – including on public gatherings and on certain workplaces – still remain in force (Hale, Webster, Petherick, Phillips, & Kira, 2020). School will be resumed for many Nigerian children throughout September and October 2020, but for some grades and some states there are still no firm resumption plans (AllSchool, 2020). Notwithstanding the strictness of these measures, testing capacity still remains relatively low, with Nigeria currently having the capacity to test around 2,500 samples per day (Dixit, Ogundeji, & Onwujekwe, 2020). Thus, as of October 7, 2020, Nigeria had conducted 538,815 COVID-19 tests, while South Africa had conducted around 8 times more (4,294,931 tests), despite having a population less than one-third the size of Nigeria's (NCDC, 2020; Republic of South Africa Department of Health, 2020). Without a vast expansion in testing to track how the virus is spreading, easing lockdown measures safely may be more difficult.

As well as precipitating a public-health challenge in Nigeria itself, the COVID-19 outbreak has also triggered a decline in global oil prices, with severe implications for Nigeria's oil-dependent economy. Between January and April 2020, crude oil prices dropped by more than 60 percent and as of September 2020 remain more than 30 percent lower than at the start of the year. Nigeria's economy and public finances depend heavily on sales of crude oil, which over the past five years have represented more than 80 percent of exports and 50 percent of general government revenues. Thus, the drop in oil prices will drive Nigeria into recession in 2020, with real GDP projected to contract by at least 4 percent throughout the year. This is likely to have knock-on effects on Nigerian households' livelihoods, and hence welfare and poverty (World Bank, 2020).

This brief presents new evidence for policy makers on differential COVID-19 risks across Nigeria's population

There is growing evidence that neither the health nor the economic effects of the dual COVID-19 and oil price crisis will be felt evenly by all Nigerian households. On the health side, data from a wide range of countries suggest that older people and those with pre-existing health conditions have a higher mortality risk if they contract COVID-19 (WHO, 2020). On the economic side, occupations requiring face-to-face interactions and those in which only a small share of tasks can be done from home appear to be more susceptible to lockdown measures, which has particularly severe implications for those working in Nigeria's service sector and especially those engaged in commerce (retail and trade) activities (Avdiu & Nayyar, 2020; Adams-Prassl, Boneva, Golin, & Rauh, 2020). At the same time, access to services or government support – be it the infrastructure needed to practice effective handwashing, accessible and affordable local health facilities, or cash or in-kind social assistance – varies widely across Nigeria, especially between the north and south of the country.

This policy brief uses two main approaches to examine which Nigerian households may be more vulnerable to the COVID-19 crisis; firstly, a simple macro-micro simulation model combines new microdata with the latest macroeconomic forecasts to project increases in poverty. The macro-micro simulations make use of the 2018/19 Nigerian Living Standards Survey (NLSS), which was collected shortly prior to the outbreak of COVID-19. The simulations show not only how many Nigerians may fall into poverty, but also in which employment sectors and areas of the country. These predictions complement the initial results of an ongoing high-frequency phone survey being conducted by Nigeria's National Bureau of Statistics (NBS) in conjunction with the World Bank, the COVID-19 National Longitudinal Phone Survey (NLPS).[2] The NLPS provides a vital "pulse" on simple indicators of employment, access to basic needs, and the coping mechanisms being adopted by Nigerian households as the COVID-19 crisis advances, while the macro-micro simulations focus more directly on the path of monetary consumption and monetary poverty.

Secondly, the brief uses detailed pre-crisis data from the 2018/19 NLSS and the 2018 Demographic and Health Survey (DHS) to consider a wider array of dimensions that influence vulnerability to the health and economic effects of COVID-19; such information can be provided at the state level, offering more geographical disaggregation than is possible with the macro-micro simulations or the NLPS. This helps to tailor polices to combat COVID-19. For example, additional social distancing measures or direct provision of preventative hygiene products may require more emphasis in areas where the direct health effects of COVID-19 pose more of a threat, whereas measures to support monetary income or consumption may be more important in areas where jobs are likely to be hit harder by the crisis. To assess the overlaps of these different dimensions, a simple "state risk index" is constructed: this uses techniques similar to the multidimensional poverty indices (see Alkire and Foster (2011)) and builds on existing work undertaken by the World Bank in Uzbekistan and other countries (see Seitz, Purevjav, Tulyakov, and Khakimov (2020)).

[2] For details, see https://www.worldbank.org/en/country/nigeria/brief/monitoring-covid-19-impact-on-nigerian-households.

New findings in the brief can help tailor policies to specific risks in population groups and states

The macro-micro simulations suggest that households living in urban areas whose income depends on services face a disproportionately high risk of falling into poverty during the COVID-19 crisis. Before the COVID-19 crisis, poverty was concentrated among rural households – 84.1 percent of the pre-crisis poor were rural dwellers – many of which depended on agriculture. Yet many urban dwellers who depended on service-sector income had consumption levels only just above the poverty line, making them vulnerable to falling into poverty when shocks hit: while 18.0 percent of urban households were living below the poverty line, 25.7 percent of urban households had consumption levels between 1 and 1.5 times the poverty line. The macroeconomic forecasts suggest that services and industry will be hit hardest. Hence the simulation model shows that households depending on these sectors will be especially likely to fall into poverty. The simulations are consistent with the initial results of the NLPS, which indicate that job losses during lockdown were largest in the service and commerce sectors and were concentrated in urban areas. The NLPS also shows that households may be adopting negative coping strategies and struggling to meet their basic consumption needs as the COVID-19 crisis drags on.

The pre-pandemic data on differential vulnerabilities to the crisis suggests that different states need different mixes of health and economic policies to counteract COVID-19; simply looking at pre-crisis poverty rates may not be sufficient for targeting such policies. Several states in northern Nigeria – especially Kebbi, Niger, and Sokoto – appear to be particularly exposed to the effects of COVID-19 through their lack of infrastructure, motivating a particular emphasis on water, sanitation, and hygiene programs to prevent the spread of the virus. By contrast, in many southern Nigerian states, the health risks are mainly amplified by their older population, with pre-existing health conditions, living in denser, more urban areas. At the same time, a number of states in both the south and the north of the country have vulnerable incomes from non-farm enterprises in the service sector. As different vulnerabilities are scattered across different states, the brief underlines the importance of aligning specific policies with specific effects of COVID-19, rather than taking a broad-brush approach. Moreover, comparing the overall state risk index with pre-crisis monetary poverty demonstrates that targeting only the poor may neglect those who are vulnerable to the specific effects of the COVID-19 crisis. The targeting of countervailing measures therefore needs to build on and enhance pre-crisis mechanisms for targeting social protection.

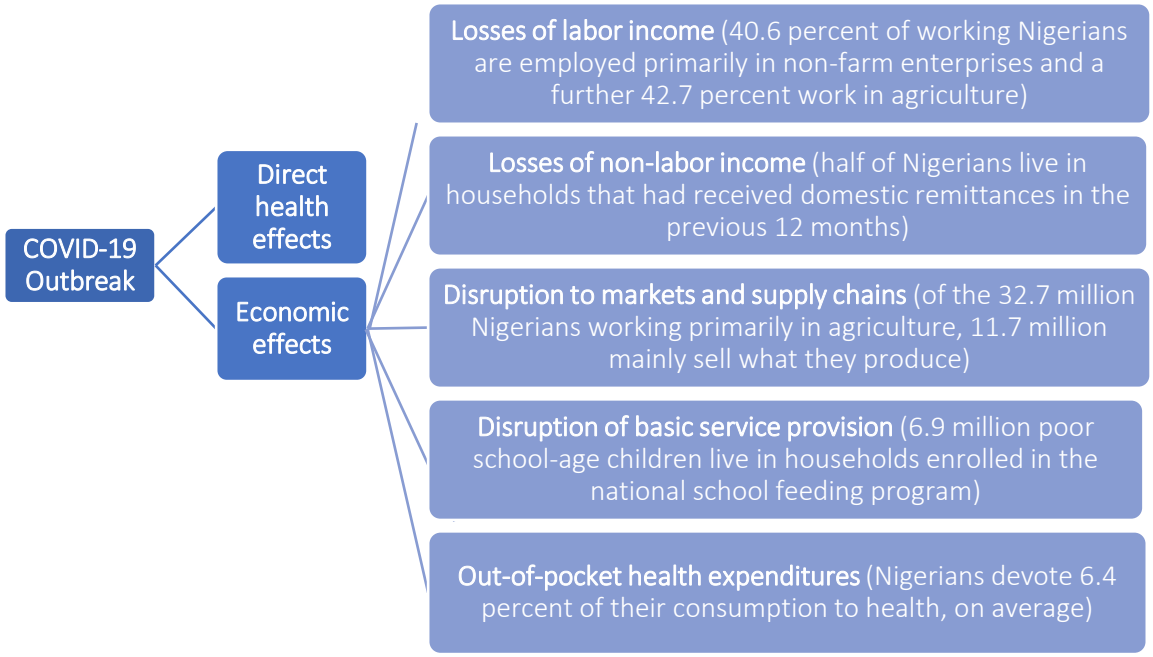
The policy brief is organized as follows. Section 2 briefly considers the channels through which the COVID-19 crisis might impact Nigerian households' welfare. Section 3 describes the basic macro-micro simulation results. Section 4 describes the initial results from a high-frequency phone survey showing the challenges that Nigerian households are already facing in the COVID-19 crisis. Section 5 presents the more detailed pre-crisis multidimensional information on vulnerability to COVID-19 impacts at the state level. Section 6 concludes and offers high-level directions for policy.

2. The COVID-19 crisis is affecting Nigerian households' welfare through multiple channels

Notwithstanding the effects of the oil price shock, the COVID-19 crisis threatens Nigerian households' welfare both through direct health channels – with the illness or death of family members – and at least five economic channels (Figure 1). First, households may lose *labor income* as vulnerable jobs – especially

those in non-farm enterprises, selling agricultural produce, and in informal wage work – suffer as demand contracts and work is disrupted by social-distancing measures. Household earnings will also be reduced if income-generating members contract the virus. Second, *non-labor income* sources may decline. For example, remittances will fall if sending households have lower income or if the infrastructure for effecting transfers is interrupted. Third, *disruptions to markets* could increase the prices of key food items, reducing households' purchasing power, while also preventing agricultural workers from selling their produce. Fourth, *service delivery* may be disrupted by social distancing measures, including the closure of schools. Finally, *direct out-of-pocket health expenditures* for those households whose members contract the virus will limit expenditure on other essential items.

Figure 1. The COVID-19 crisis may affect Nigerian households' welfare through several channels



Note: Diagram adapted from the World Bank Poverty and Equity Global Practice note on "Poverty and distributional impacts of COVID-19" (World Bank *(2020)*). The same diagram appears in the latest *Nigeria Development Update (World Bank, 2020)*. Domestic remittances for the household cover any in-kind or monetary assistance received by any household member from within Nigeria (including within the same community but from different households). Source: 2018/19 NLSS and World Bank estimates.

Losses of labor and non-labor income will be compounded by the drop in oil prices. The share of working Nigerians directly employed in the oil sector is relatively small: according to both the 2018/19 NLSS and the latest available NBS labor force survey data, extractive industries employ less than 0.2 percent of working Nigerians.[3] However, the broader effects of the oil shock on the economy are set to be severe, with real GDP projected to decline by 4.1 percent in 2020. With the economy contracting, firms' labor demand is also likely to decline, while demand for the output of those working in agriculture or in non-farm businesses will also fall. The decline in labor income will also place downward pressure on domestic

[3] The latest available labor force survey data with sectoral breakdowns are from Q3 2017.

remittances and transfers between households within Nigeria. Additionally, since oil sales account for around half of government revenues, pro-poor spending will be threatened by the oil shock. Overall, social protection is relatively underdeveloped in Nigeria – with just 1.6 percent of Nigerians living in a household enrolled in the National Social Safety Net Program (NASSP) – but around 1 in 5 school-age children live in households receiving in-kind support from the National School Feeding Program, which may not only suffer from reduced funding but be difficult to implement at all, as schools are closed to prevent the spread of COVID-19.

Given this variety of health and economic channels, vulnerability to the COVID-19 crisis is an inherently multidimensional concept. This motivates the approach taken in Section 4, which uses a wide range of indicators to assess households' susceptibility to the COVID-19 crisis across a number of different dimensions.

3. COVID-19 is projected to push some 10 million Nigerians into extreme poverty and deepen deprivation among those who are already poor

Methods used in the simulations

A simple macro-micro simulation model can be used to project how Nigerian households' consumption – and hence monetary poverty – may evolve through the COVID-19 crisis. The model used is summarized in Figure 2. Macroeconomic forecasts for sector-specific per capita real GDP growth are matched with each household observed in the 2018/19 NLSS according to the sector of the household head's primary job.[4,5] Per capita real GDP growth translates into per capita real household consumption growth according to some pass-through factor. The model therefore forecasts the *entire* consumption distribution in real terms, which can then be compared with the current poverty line to predict the poverty rate and the number of poor people.[6,7]

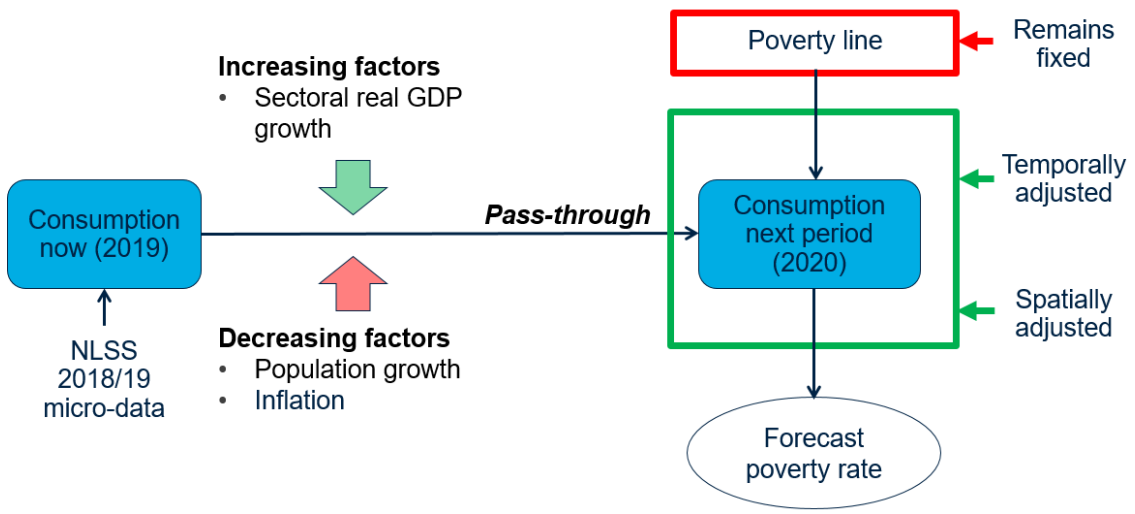
[4] The population weights are also adjusted according to the population projections. No further adjustments are made for prices, because the GDP forecasts are already deflated.

[5] Consumption is calculated at the household level, which motivates the focus on the employment of the household head (or some other household-level aggregate) when assigning sector-specific GDP group. This limitation is discussed in more detail in Annex A1.

[6] In principle, the model can also be augmented with poverty-reducing policies, including social protection measures, but such policies have not been included in the present version of the model.

[7] The simulations presented have many caveats, and the results are sensitive to different modelling assumptions (see Annex A1).

Figure 2. Modelling approach for simulating household welfare and poverty in Nigeria



Source: World Bank.

In order to isolate the impact of the COVID-19 crisis, two scenarios are compared. The main prediction draws on the latest available macroeconomic forecasts, which incorporate the downturn expected from the COVID-19 crisis and the shock to oil prices. A counterfactual scenario then uses the growth forecasts that were in place before the COVID-19 outbreak. The difference between these two scenarios can, in principle, be attributed to the COVID-19 crisis.

The crisis will affect all Nigerians, but not equally

The COVID-19 crisis most threatens GDP per capita in industry and services, according to the latest macroeconomic forecasts (see Table 1). Real GDP per capita was expected to decline slightly in industry and services even before the outbreak of COVID-19, as population growth was set to outstrip the relatively weak growth in real GDP. Yet with real GDP projected to fall in industry and services in the COVID-19 crisis (even without accounting for population growth), *per capita* real GDP is projected to drop dramatically in 2020, by 13.2 percent in industry and 6.6 percent services. Even in agriculture, population growth is projected to outstrip real GDP growth in 2020, leaving households in all sectors worse off.

Table 1. Macroeconomic forecasts used for simulation model

		Real GDP per capita growth (percent)			Absolute real GDP growth (percent)			Population growth
		Agriculture	*Industry*	*Services*	*Agriculture*	*Industry*	*Services*	
Counterfactual	2020	0.5	-0.7	-1.0	3.1	1.9	1.6	2.6
	2021	0.7	-1.1	-0.9	3.3	1.5	1.7	2.6
	2022	0.7	-1.1	-0.9	3.3	1.5	1.7	2.6
Main prediction	2020	-1.4	-13.2	-6.6	1.2	-10.6	-4.0	2.6
	2021	-0.8	-4.9	-2.1	1.8	-2.3	0.5	2.6
	2022	-0.5	-1.3	-2.0	2.1	1.3	0.6	2.6

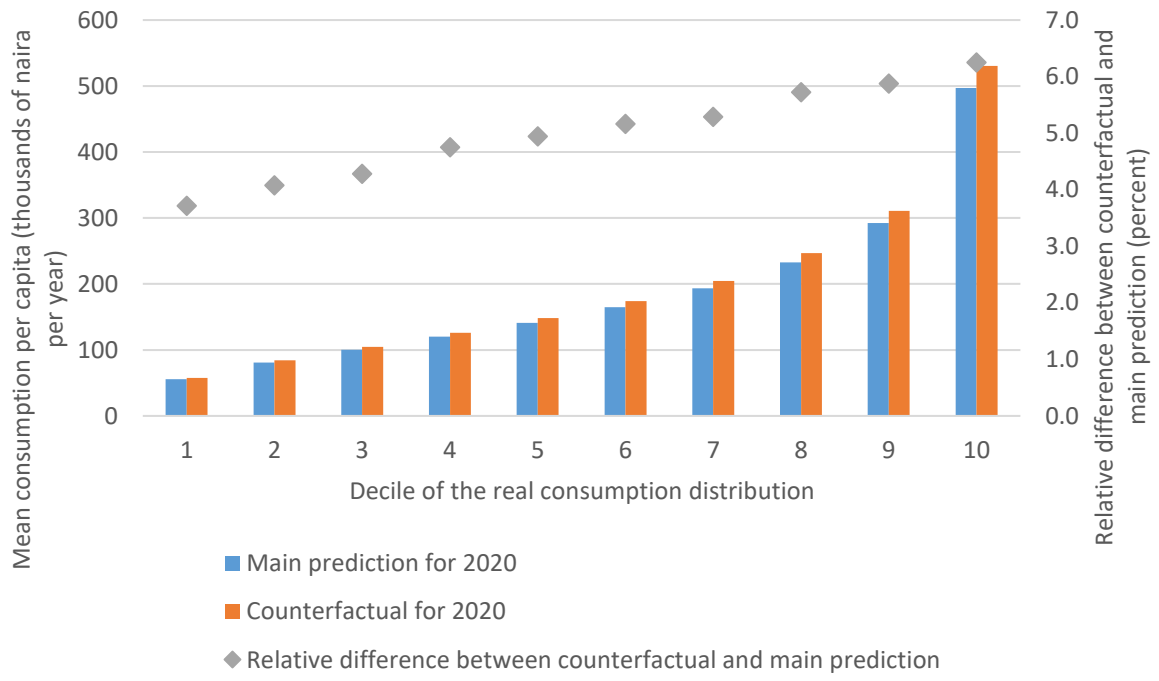
Note: For households whose heads work in multiple sectors that cannot be distinguished or who are not working, a weighted average of growth in agriculture, industry, and services is calculated. Source: United Nations population projections and World Bank.

The COVID-19 crisis will reduce consumption across the entire consumption distribution, including for the poor and vulnerable. Even before the COVID-19 crisis, around 4 in 10 Nigerians were living in poverty according to the national poverty line, yet millions more had consumption levels only just above the poverty line, making them susceptible to falling into poverty when shocks occur.[8] Those with consumption levels between the poverty line and 1.5 times the poverty line may be defined as vulnerable.[9] Indeed, while 40.1 percent of Nigerians (82.9 million people) lived below the poverty line prior to the COVID-19 outbreak, a further 25.4 percent (52.6 million people) were vulnerable by this definition. As Figure 3 shows, the COVID-19 crisis is projected to reduce consumption somewhat more – even in relative terms – for richer households, in part because richer households are more likely to depend on income from industry and services. Yet the losses incurred by those in the bottom seven deciles, which encompass the poor and vulnerable, are also substantial and could push vulnerable households below the poverty line.

[8] Nigeria's new poverty line was calculated by the NBS and the World Bank prior to the launch of the 2018/19 NLSS in May 2020. The poverty line is currently 137,430 naira per person per year.

[9] In the 2016 Nigeria World Bank Poverty Assessment, two vulnerability lines were used at 1.4 and 1.8 times the poverty line (World Bank, 2016). Panel data from other countries have shown that households between 1 and 1.5 times the poverty line are vulnerable in the sense that they have at least a 10 percent chance of falling back into poverty each year (see for example *Aspiring Indonesia – Expanding the Middle Class* (World Bank, 2019)). Additionally, the World Bank's "lower middle class" line of 3.20 USD 2011 PPP per day is around 1.7 times the World Bank's "extreme" poverty line of 1.90 USD 2011 PPP per day.

Figure 3. Consumption is projected to fall across the entire consumption distribution in 2020

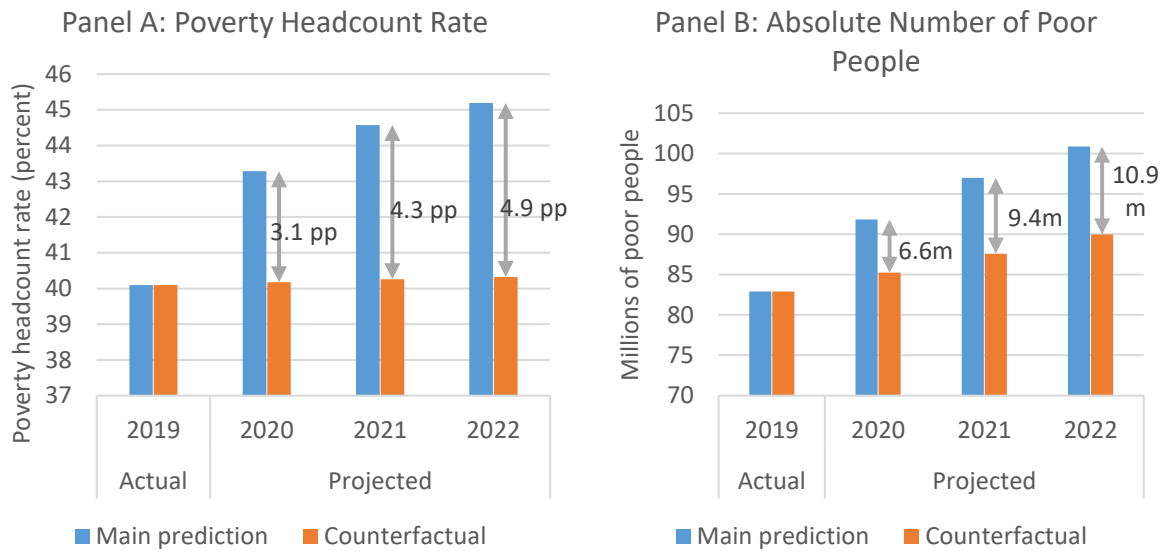


Note: Estimates exclude Borno. Projections focus only on 2020. Real consumption deflated temporally and spatially. Pass-through from per capita real GDP growth to household consumption set to 1. Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

COVID-19 will drive millions of Nigerians into poverty and substantially worsen welfare among those who are already poor

The COVID-19 crisis is predicted to drive up the poverty rate in Nigeria, pushing more than 10 million additional people into poverty by 2022. Were the crisis not to have hit (the counterfactual scenario), the poverty headcount rate would be forecast to remain virtually unchanged, with the number of poor people set to rise from 82.9 million in 2019 to 85.2 million in 2020 and 90.0 million in 2022 due to natural population growth (Figure 4). Yet with the economic effects of the COVID-19 crisis, the national poverty headcount rate is instead forecast to jump from 40.1 percent in 2019 to 43.3 percent in 2020 and 45.2 percent in 2022, implying that the number of poor people will be 91.8 million in 2020 and 100.9 million in 2022. Taking the difference between these two scenarios, the crisis is forecast to drive an additional 6.6 million people into poverty in 2020, with an additional 10.9 million people living in poverty by 2022.

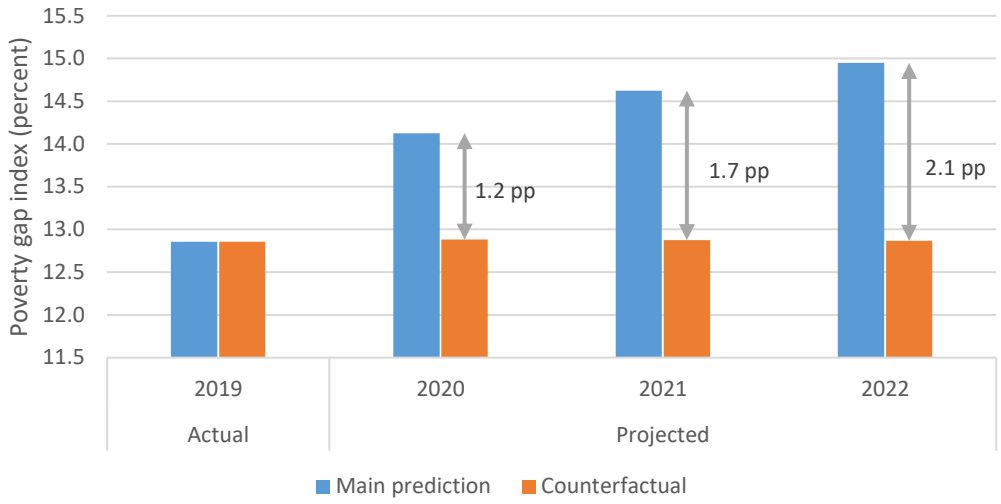
Figure 4. The COVID-19 crisis may push more than 10 million additional people into poverty by 2022



Note: Estimates exclude Borno. Real consumption deflated temporally and spatially to compare with the national poverty line. Pass-through from per capita real GDP growth to household consumption set to 1. Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

The poverty gap index, which measures the depth of poverty, is also projected to rise substantially by 2022, as the pre-crisis poor are pushed further below the poverty line. The poverty gap index is defined as the average difference between each poor person's consumption and the poverty line, as a percentage of the poverty line itself. In 2020, Nigeria's poverty gap index is projected to be 1.2 percentage points higher, given the effects of COVID-19, and 2.1 percentage points higher by 2022 (see Figure 5). This arises because the COVID-19 crisis is set to reduce consumption for those people who were already poor in 2019 (as Figure 3 demonstrates), pushing them deeper into poverty and potentially towards more extreme deprivation, especially as their coping mechanisms – such as savings on which to draw – are already limited. Thus, not only would countervailing policies need to reach more people to prevent poverty rising, but they must also increase the consumption of each poor Nigerian by a larger amount. This implies that both the coverage and the benefit levels of social protection programs would need to increase to combat poverty as the COVID-19 crisis advances.

Figure 5. The poverty gap index is also set to rise substantially by 2022



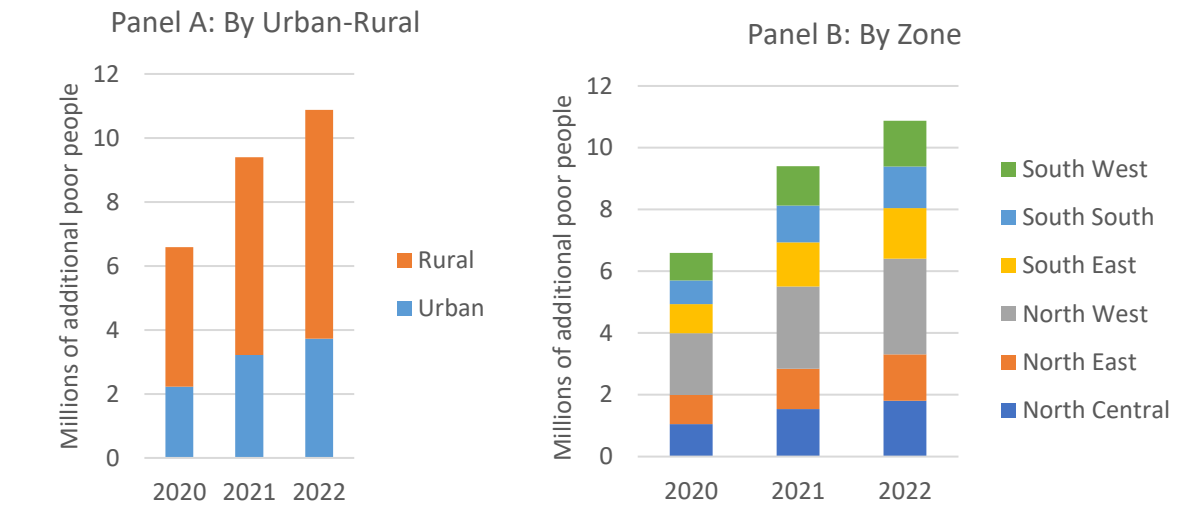
Note: Estimates exclude Borno. Real consumption deflated temporally and spatially to compare with the national poverty line. Pass-through from per capita real GDP growth to household consumption set to 1. Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

Nigerians newly impoverished by COVID-19 are more urban, more southern, and more likely to work in the service sector than those who were already poor

In line with the macroeconomic forecasts, a disproportionate share of those pushed into poverty by the COVID-19 crisis are predicted to live in households that depend on service-sector income. Prior to the COVID-19, 20.8 percent of poor Nigerians lived in households where the household head was primarily engaged in services, while 56.0 percent lived in households where the household head was primarily engaged in agriculture. However, among those Nigerians pushed into poverty by the COVID-19 crisis in 2020, 31.7 percent are predicted to be in service sector households compared to just 16.5 percent in agricultural households.

In turn, a disproportionate share of those pushed into poverty by the COVID-19 crisis are predicted to live in urban households in southern Nigeria, yet overall poverty is projected to remain concentrated in rural households in northern Nigeria (see Figure 6). Prior to the COVID-19 outbreak, just 15.9 percent of those living below the poverty line were urban dwellers, yet more than one-third of the additional poor people in 2020 are predicted to live in urban areas. Similarly, less than one-quarter of poor Nigerians lived in the country's South East, South South, or South West zones prior to the outbreak of COVID-19, yet around 39.4 percent of the additional poor people in 2020 are projected to live in these southern zones. The slight tilt towards southern, urban Nigeria among the additional poor emanates from the fact that services and industry are concentrated in cities in the south of the country. Nevertheless, despite this geographical profile of the additional poor, poverty is set to remain primarily a rural, northern phenomenon throughout the COVID-19 crisis. Indeed, as the discussion of the poverty gap index suggests, it is those people who were already in rural and northern areas of Nigeria who will face deeper poverty as the crisis takes hold, even if they are not newly poor.

Figure 6. A disproportionate share of those made poor by the COVID-19 crisis are predicted to be urban dwellers in southern Nigeria



Note: Estimates exclude Borno. The bars compare the main prediction to the counterfactual prediction for a non-COVID-19 scenario. Real consumption deflated temporally and spatially to compare with the national poverty line. Pass-through from per capita real GDP growth to household consumption set to 1. Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

Many other aspects of the profile of the additional poor appear to differ from the pre-crisis poor; this may alter the targeting strategies needed to reach those most affected by the COVID-19 crisis (see Table *2*). For example, in 2019, 35.7 percent of poor Nigerians lived in households that had access to electricity and 38.4 percent lived in households that had access to improved sanitation, but among the additional poor people in 2020, 64.4 percent and 57.3 percent are set to have access to electricity and improved sanitation respectively. Additionally, 47.4 percent of the additional poor in 2020 are projected to live in households whose heads primarily engage in non-farm household enterprises, compared to 25.7 percent of the original poor in 2019. This implies new policy tools may be needed to reach those individuals pushed into poverty by COVID-19.

Table 2. Profile of the poor in 2019 and of those pushed into poverty by the COVID-19 crisis in 2020, 2021, and 2022

		2019 poor	2020 additional poor	2021 additional poor	2022 additional poor
Household head characteristics (percent)	Male	91.8	91.2	91.3	90.1
	Education not known/Quaranic education	23.1	12.7	10.1	11.3
	No education	24.2	10.6	11.7	12.0
	Primary education (complete or incomplete)	25.1	25.3	25.4	26.0
	Secondary education (complete or incomplete)	20.6	38.1	39.5	38.1
	Tertiary education (complete or incomplete)	6.9	13.2	13.2	12.6
	Works primarily in wage-employment	10.7	23.2	21.8	20.8
	Works primarily in farming	54.4	16.0	20.7	24.5
	Works primarily in a non-farm household enterprise	25.7	47.4	44.0	41.2
Household characteristics (percent)	More than 5 members	79.5	71.7	71.1	69.8
	One or more members(s) with a mobile phone	73.5	87.6	89.2	89.6
	Has electricity access	35.7	64.4	65.6	64.0
	Improved water	59.5	75.0	76.3	75.1
	Improved sanitation	38.4	57.3	56.9	55.5

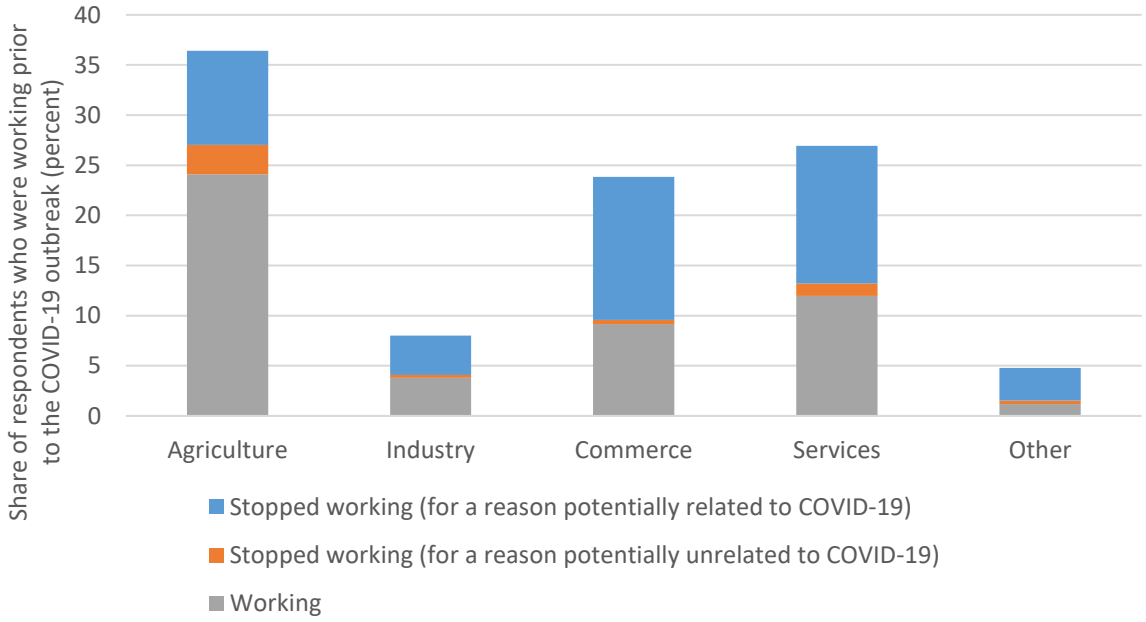
Note: Estimates exclude Borno. Real consumption deflated temporally and spatially to compare with the national poverty line. Pass-through from per capita real GDP growth to household consumption set to 1. Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

4. Nigerian households are already facing severe income and welfare impacts from COVID-19

Consistent with the macro-micro simulations, initial results from high-frequency data collected during the COVID-19 crisis suggest that jobs, especially in services, suffered at the height of lockdown; while many Nigerians appear to have subsequently returned to work, incomes remain precarious. Employment implicitly provides the link between the macroeconomic forecasts and the micro-level predictions in the simulation model above. The overall share of NLPS respondents who were working fell by almost 50 percent between mid-March and April/May 2020, when the first round of the NLPS survey

was carried out.[10] This coincided with the introduction of Nigeria's strictest lockdown measures. Of the 23.8 percent of NLPS respondents that were engaged in commerce (retail and trade activities) prior to the COVID-19 outbreak, 61.5 percent had stopped working by April/May 2020 when the first round of the survey was implemented (see Figure 7).[11] Meanwhile, of the 26.9 percent of respondents working in services (other than commerce), 55.5 percent had stopped working. Job losses were also more likely for urban respondents. Nevertheless, between April/May and July 2020, the overall share of NLPS respondents who were working rose from 42.6 percent to 80.7 percent, almost reaching the pre-crisis share of 84.8 percent. Yet many individuals also churned in and out of work, and output and revenues from agriculture and non-farm enterprises appear to be under threat. The June round of the NLPS demonstrated that 37.6 percent of households that engaged in agriculture had to change their planting activities due to COVID-19, of which 52.3 percent reduced the area they planted, 29.8 percent planted crops that take less time to mature, and 25.0 percent delayed planting. Similarly, 87.3 percent of households owning non-farm businesses reported they had difficulty raising money, 76.9 percent had difficulty buying and receiving supplies and inputs, and 69.2 percent had difficulty selling goods and services.

Figure 7. High-frequency data collected in April/May 2020 suggest that commerce and services were hardest hit by initial job losses



Note: Commerce and services would come under the services category in the macro-micro simulations. Sample restricted to those respondents who were working prior to the COVID-19 outbreak. "Other" category corresponds to public administration. Source: COVID-19 NLPS and World Bank estimates.

[10] Specifically, the first round of the COVID-19 NLPS was collected between April 20 and May 11, 2020. For further details, see https://www.worldbank.org/en/country/nigeria/brief/monitoring-covid-19-impact-on-nigerian-households.

[11] Commerce activities would come under services in the macro-micro simulations.

Many households are not able to meet basic consumption needs and are resorting to dangerous coping strategies

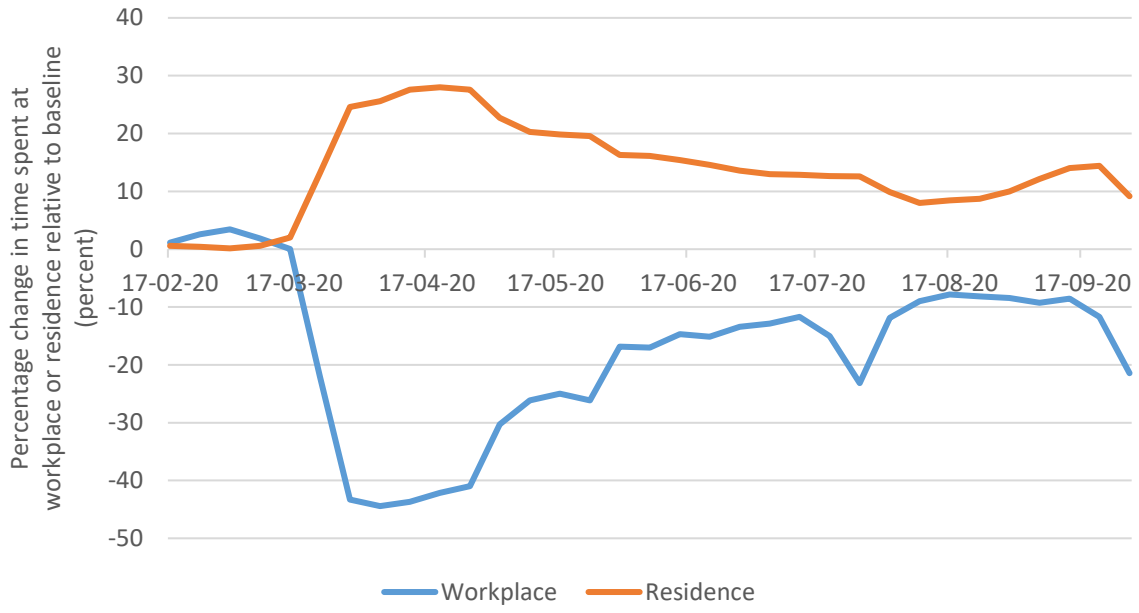
Given the precariousness of incomes, households are unable to access their basic consumption needs. In terms of staple foods, for example, 61.7 percent of households who needed yams were unable to purchase them, while 36.6 percent of households who needed rice were unable to purchase it in the July round of the NLPS. Vitally, households may also lack the resources to buy basic hygiene products, which could help prevent the spread of the virus. In June 2020, 24.9 percent of households reported having insufficient access to soap for handwashing. Among households lacking enough soap, around 4 out 5 households attributed this to being unable to afford it. Poorer households were less able to access staple crops, soap, and other basic goods than richer households: 37.0 percent of households in the poorest monetary consumption quintile had insufficient access to soap compared to 13.6 percent of households in the richest quintile.

Moreover, since social protection remains rare, households appear to be adopting negative coping strategies; as households also have restricted access to health and education, long-term household welfare may also be at risk. In July 2020, the shares of households receiving safety net assistance in the form of food, cash transfers, or in-kind transfers were just 5.6 percent, 1.7 percent, and 1.9 percent respectively. Given the sparsity of social protection, 69.4 percent of those households that experienced a shock between April/May and July 2020 reported reducing their food consumption in order to cope, while a further 29.0 percent reported drawing down their savings. School closures and displaced health services may have further knock-on effects on long-term human capital formation: in July 2020, 1 in 5 households with children 0-5 years old who needed or were due for immunizations were not able to get their children vaccinated.

Alongside the NLPS, "Big Data" sources reinforce the overall message that jobs, and hence household welfare, have been interrupted by the COVID-19 crisis. Google mobility data, which show how mobile phone users move between different pre-classified locations, demonstrate that Nigerians spent substantially less time at their place of work and more time at their residence as lockdown measures were introduced in the second half of March 2020, relative to the "baseline" of January-February 2020 (Google, 2020).[12,13] However, this deviation from the baseline has subsided somewhat, given the easing of lockdown measures in May 2020 (see Figure 8). These data are not without limitations and only capture a certain tranche of Nigerian workers, namely those with mobile phones whose workplaces and residences can be easily distinguished. However, the fact that Nigeria's lockdown shows up even in this selected sample indicates the potential effects of the COVID-19 crisis on labor incomes.

[12] Specifically, the baseline is the median value for the five-week period from January 3 to February 6, 2020.
[13] More detailed information on Google mobility trends in Nigeria can be found in Newhouse et al. (2020).

Figure 8. Variation in the time spent at workplaces and residences in Nigeria according to Google mobility data



Note: Baseline corresponds to the median value for the five-week period from January 3 to February 6, 2020. Estimates presented as weekly averages for the Monday of each week. Source: Google mobility data.

5. New analysis can inform tailored policies to address COVID-19 welfare risks

Additional evidence is needed to align post-pandemic welfare policies with the needs that exist in specific Nigerian states and communities

COVID-19 threatens households' welfare through a number of channels; countervailing policies need to be designed and targeted to tackle specific dimensions of the crisis. For example, for households that are most susceptible to the direct health effects of the crisis, social distancing measures or direct provision of preventative hygiene products such as masks or soap may be most important. Households that are most exposed to labor or non-labor income losses may benefit more from programs to support farm or non-farm enterprises or broader social protection programs. Yet the form such support takes depends on households' livelihoods as well as their access to government services, including whether they have mobile phones or formal identification.

Geographically disaggregated pre-crisis data can be used to ascertain which households – in which states – are vulnerable to different dimensions of the COVID-19 crisis, helping to tailor countervailing policies. Neither the NLPS nor the simulations can provide state-level information on which Nigerian households are currently suffering (or are projected to suffer) along *all* of the different channels through which COVID-19 may affect welfare (see Figure 1). However, detailed state-representative data collected shortly before the crisis by the 2018/19 NLSS and the 2018 DHS can inform policy makers about which countervailing measures would be most appropriate for different parts of Nigeria. This hinges on the growing evidence about which households are most susceptible to the health and economic effects of

COVID-19. Providing information at the state level is useful, given the extent of variation in socioeconomic outcomes across Nigeria and the country's federal structure.[14]

The following analysis considers five dimensions, capturing the direct risks of the COVID-19 crisis, which can be mapped to the channels of health and economic impact outlined earlier (Table 3). The five main dimensions comprise: (1) health and household demographics; (2) income sources; (3) local services; (4) infrastructure; and (5) density. A detailed description of the supporting evidence motivating each dimension is provided in Annex A2. Different indicators are employed to try and triangulate each dimension for each state (see Table 4).

Table 3. Mapping between the channels through which COVID-19 affects health and economic outcomes and the vulnerability dimensions considered

Channel		***Vulnerability dimension(s)***	***Explanation***
Direct health effects		(1) Health and household demographics; (3) local services; (4) infrastructure; and (5) density	Health and household demographics, as well as local services (such as medical facilities) determine the mortality risk of the virus. Infrastructure, especially access to water, determines whether households can take measures to prevent the spread of COVID-19. Density also determines the extent to which the virus can spread.
Economic effects	Losses of labor income	(2) Income sources	The types of labor income sources on which households rely – including the particular exposure of those working in services and retail and trade – influence labor income losses.
	Losses of non-labor income	(2) Income sources and (4) infrastructure	Households receiving remittances and certain in-kind government transfers (such as the National School Feeding Program) may be more affected by the pandemic.
	Disruption to markets and supply chains	(2) Income sources	Disruptions to markets will mainly affect income for those households working in non-farm household enterprises, who rely on interactions with other market participants to access inputs and sell outputs.
	Disruption of basic service provision	(2) Income sources and (4) local services	Beneficiaries of the National School Feeding Program will be affected if schools close. The COVID-19 response may displace other health services, if healthcare facilities are lacking.
	Out-of-pocket health expenditures	(1) Health and household demographics	Out-of-pocket health expenditures will be larger for households whose members suffer serious cases of COVID-19, which is more likely for the elderly or those who have pre-existing conditions.

Note: Channels initially outlined in Figure 1.

While using information for each dimension helps to tailor specific policies to specific vulnerabilities, it may also be helpful to examine where *all* the vulnerabilities to COVID-19 overlap. Considering each dimension separately – like a dashboard – avoids the many challenges associated with trying to aggregate up to create a multidimensional index (Ravallion, 2011). Providing dimension-specific information also allows the interactions between different dimensions to be considered, capturing the potential tradeoffs

[14] Ongoing efforts to improve small-area poverty maps for Nigeria may allow for even more geographical disaggregation in future work.

that policy makers face in responding to the COVID-19 crisis (Atkinson, Marlier, Montaigne, & Reinstadler, 2010; Atkinson & Lugo, 2010).[15] However, combining information from across the different dimensions may provide some guidance for the overall allocation of resources to combat the COVID-19 crisis. Moreover, looking at how the different vulnerabilities overlap emphasizes that some states need both health and economic policies to counteract the crisis.

A state-level risk index condenses key information for policy use

Constructing a simple index (a state risk index) provides one way of combing information from across these multiple dimensions of vulnerability to COVID-19. Specifically, a multidimensional index is constructed using all of the indicators and dimensions shown in Table 4.[16] In the absence of additional information about how to weight the indicators and dimensions within the index, each dimension is weighted equally within the overall index, and each indicator is given equal weight within its dimension.[17] Policy makers can weight indicators and dimensions differently according to their priorities, but applying equal weight provides at least an initial illustration of "overall" vulnerability to COVID-19.[18] Each indicator is also first converted into a binary variable to ensure that no single indicator dominates the index.[19] The index is created directly at the state level rather than the household level: this sacrifices granularity, but allows information from the NLSS and the DHS to be straightforwardly combined.[20]

The state risk index can also be compared with the pre-crisis rate of monetary poverty in each state. This helps to check whether those states most vulnerable to COVID-19 contain households that would typically be targeted by social protection measures, at least prior to the crisis. Pre-crisis monetary poverty also represents an additional indirect (yet important) aspect of vulnerability to COVID-19. By definition, the poor have low consumption levels, which stand to be pushed even lower by losses of labor and non-labor incomes. Moreover, poor households are also less likely to have access to savings, credit, or insurance on which to draw when shocks arrive, further deepening the potential effects of the crisis. Finally, monetarily poor households are more food insecure and have lower levels of educational

[15] This paper does not construct Venn Diagrams or copula functions – as recommended by Ferreira and Lugo (2013) – to review the joint distributions, but it allows for pairwise correlations between different dimensions.

[16] This follows similar work on vulnerability to COVID-19 in Uzbekistan by Seitz, Purevjav, Tulyakov, and Khakimov (2020).

[17] In trying to triangulate information for each dimension, indicators that are highly correlated are included under the same dimension. For example, under the local services dimension, the share of the population living in a community lacking a hospital is positively correlated with the share of the population living in a community lacking a private doctor. This effectively places more weight on the implicit sub-dimension captured by two such variables in the measure of the overall dimension. However, the effect on the overall state risk index is muted because each dimension is given equal weight.

[18] As Decancq and Lugo (2013) show, applying equal weights is not a truly "agnostic" approach, as doing so has implications for the importance and substitutability between different dimensions and indicators (building on the critiques outlined in Ravallion (2011)). However, equal weights are applied here to ensure each dimension is given sufficient representation in the overall index.

[19] This is done by classifying the top 15 states for each vulnerability indicator, which approximately corresponds to the top 40 percent, as "at risk".

[20] Constructing a state-level index of this type is also similar to the World Bank Project Targeting Index used in South Sudan (World Bank, 2019).

enrolment and attainment; this intensifies the threat of the COVID-19 crisis to human capital accumulation.[21]

Table 4. Dimensions and indicators for the COVID-19 state risk index

Dimension	*Indicator (at risk if in the top 15 states)*	*Indicator weight*	*Dimension weight*	*Data source*
Health and household demographics	Share of population aged 60 or more	0.040	1/5	NLSS
	Share of births delivered outside a health facility	0.040		DHS
	Share of children aged 12-23 months that have not received all 8 basic vaccinations	0.040		DHS
	Share of men who smoke	0.040		DHS
	Share of women who are overweight or obese	0.040		DHS
Income sources	Share of workers whose main job is in non-farm household enterprises	0.040	1/5	NLSS
	Share of workers whose main job is in retail and trade	0.040		NLSS
	Share of workers whose main job is in all services	0.040		NLSS
	Share of population living in a household that receives domestic remittances	0.040		NLSS
	Share of school-age population in a household receiving national school feeding program	0.040		NLSS
Local services	Share of population living in a community lacking a health center	0.067	1/5	NLSS
	Share of population living in a community lacking a hospital	0.067		NLSS
	Share of population living in a community lacking a private doctor	0.067		NLSS
Infrastructure	Share of population living in a household lacking limited-standard drinking water	0.040	1/5	NLSS
	Share of population living in households lacking a basic handwashing facility that has soap and water available	0.040		DHS
	Share of population living in a household lacking limited-standard sanitation	0.040		NLSS
	Share of population living in a household without a mobile phone	0.040		NLSS
	Share of population aged 15+ without a National Identification Number/Identity Card	0.040		NLSS
Density	Share of population that is classified as urban	0.100	1/5	NLSS
	Share of population living in mostly urban LGAs	0.100		*

Note: LGA = Local Government Area. NLSS refers to the 2018/19 NLSS. DHS refers to the 2018 DHS. "Retail and trade" is a strict subset of "all services." *The share of the population living in mostly urban LGAs is calculated using the new poverty map created using geospatial data and machine learning.

Risk index findings: Prioritizing health-sector action may benefit southern states

Starting with the dimension-by-dimension analysis, it appears that Nigeria's southern states are more vulnerable in terms of health and household demographics as well as density; these areas may need to prioritize health interventions to combat COVID-19 (see Panels A and E of Figure 9). The two states with the most vulnerable scores on the health and household demographics dimension – Bayelsa and Ogun –

[21] The relationship between monetary and non-monetary poverty will be covered by a forthcoming policy brief from the World Bank Nigeria poverty team.

have among the highest prevalence of smoking and obesity, but they also have large shares of children who are not vaccinated (see Annex A3 for a full breakdown of all the indicators). With the notable exceptions of FCT Abuja and Kano, it is mainly southern states that appear to have the highest concentrations of dense, urban populations, through which the virus may be more likely to spread. Tackling the direct health effects of COVID-19 is vital across Nigeria, but given these particular vulnerabilities, testing and tracing, localized city-specific lockdowns, and the provision of preventative hygiene items will be particularly important for these southern states.

Risk index findings: Infrastructure gaps are key for northern states

The infrastructure on which combatting the COVID-19 crisis depends appears to be weaker in northern Nigeria (see Panel D of Figure 9). The three most vulnerable states according to the infrastructure dimension – Kebbi, Niger, and Sokoto – have poor access to water and sanitation, and they also have higher shares of the population lacking mobile phones or formal identification (see Annex A3). The inadequate access to water and sanitation implies that additional support is needed to ensure that households have the items they need to wash their hands to avoid contracting and spreading COVID-19. Furthermore, policy instruments – including social protection to combat the economic effects of the COVID-19 crisis – may need to be adapted to ensure that those lacking mobile phones and formal identification can be reached. Using mobile phones alone to disseminate information or make monetary transfers may exclude large sections of the population in such states.

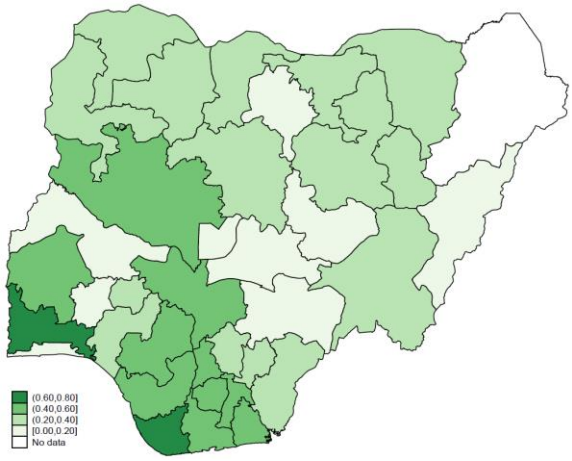
Risk index findings: Both southern and northern states need to protect non-farm incomes and improve access to local services

Exposure to the effects of the COVID-19 crisis on income sources afflicts states in both the north and the south of Nigeria (see Panel B of Figure 9). The northern states that appear most vulnerable along this dimension – Kano, Kebbi, and Zamfara – all have among the highest shares of workers in non-farm enterprises and in services, while Kano and Kebbi also have relatively large shares of school-age children receiving support from the national school feeding program. The southern states that appear most vulnerable along this dimension – Abia, Lagos, Ogun, and Osun – not only depend on labor income from non-farm enterprises and services, but many households in these states also receive domestic remittances, the flow of which may be threatened by the COVID-19 crisis. These areas could benefit from programs directly targeted at non-farm enterprise activities to complement broader social protection measures.

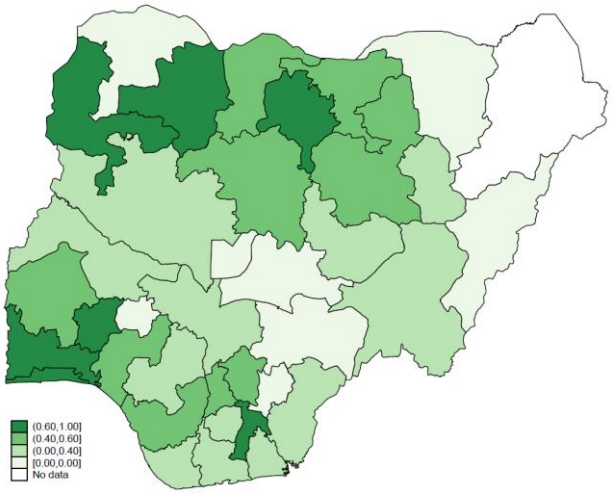
Similarly, states where access to local services is limited are present in both northern and southern Nigeria (see Panel C of Figure 9). Six states lack access jointly to health clinics, hospitals, and private doctors – namely Ebonyi, Ekiti, Jigawa, Katsina, Osun, Plateau, and Rivers – but these are distributed across the country. Places where health services are more limited may not only require additional support to combat the spread of the pandemic but may also need programs to support other health services that are displaced by COVID-19.

Figure 9. Variation in each vulnerability dimension across Nigeria's states

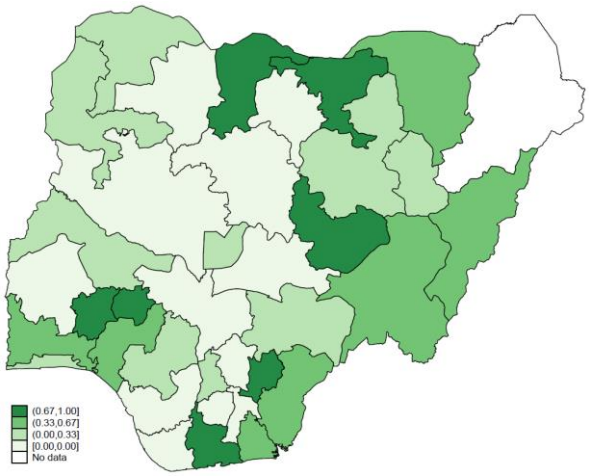
Panel A: Health and household demographics



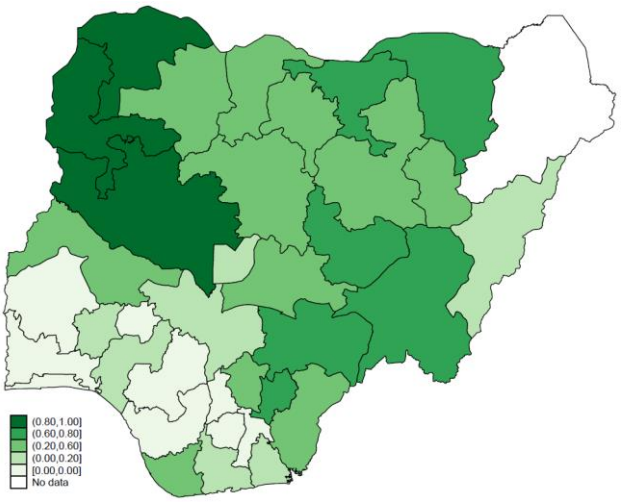
Panel B: Income sources



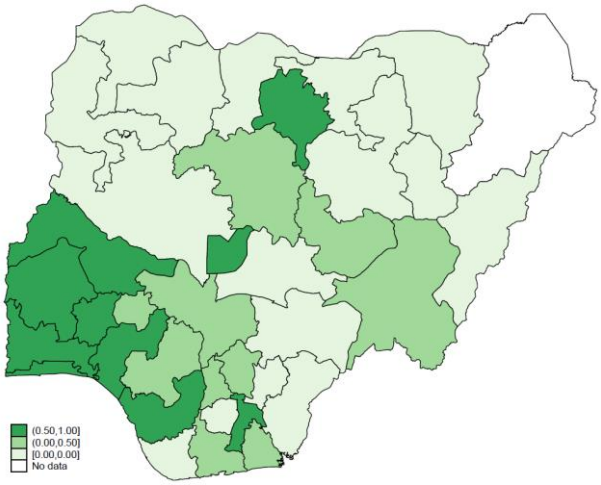
Panel C: Local services



Panel D: Infrastructure



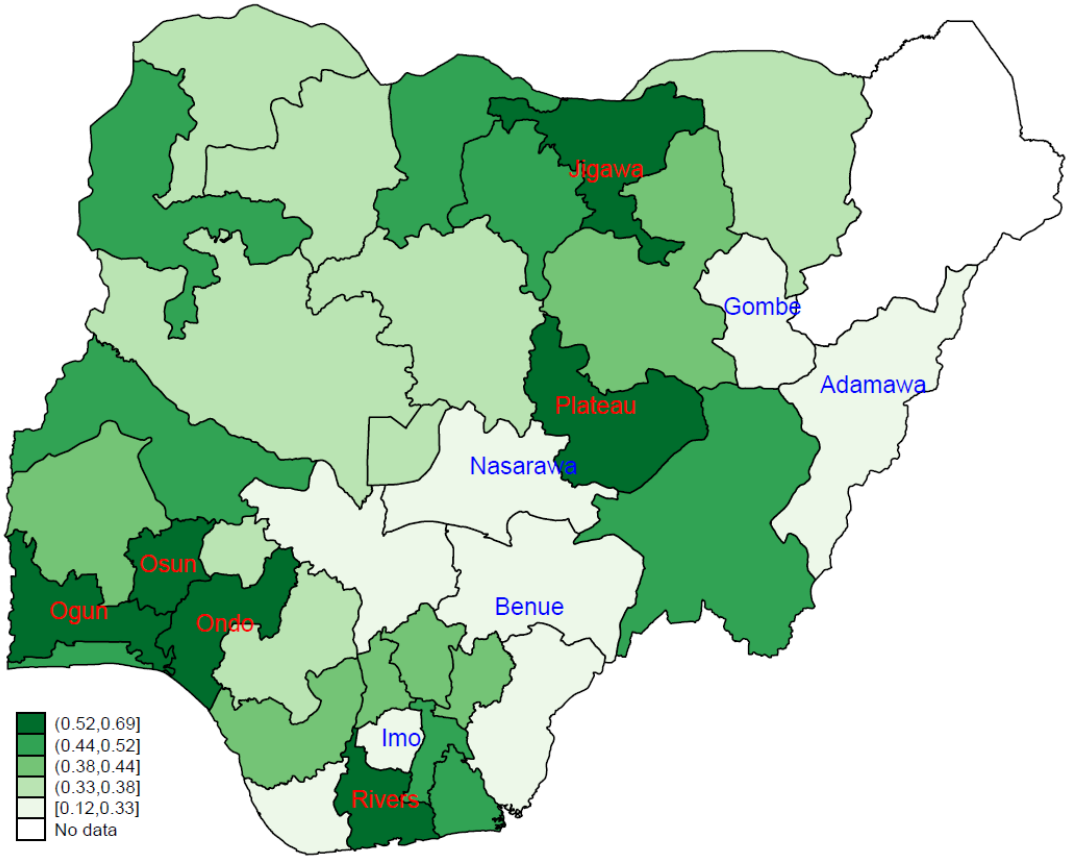
Panel E: Density



Note: Estimates exclude Borno. Colors correspond to the value of the dimension risk index. Source: 2018/19 NLSS, 2018 DHS, and World Bank estimates.

Notwithstanding the challenges associated with combining different dimensions, creating the state risk index demonstrates that states in both southern and northern Nigeria have overlapping vulnerabilities to the COVID-19 crisis. The five most vulnerable states according to the state risk index (shown in red in Figure 10) are Jigawa, Ogun, Ondo, Osun, with Plateau and Rivers being joint fifth. The southern states among these five (Ogun, Ondo, Osun, and Rivers) are mainly characterized by being vulnerable in terms of health and household demographics, income sources, and local services. The northern states among these five (Jigawa and Plateau) are characterized mainly by having vulnerable infrastructure and local services. The fact that the profiles of these five states partly differ motivates the dimension-by-dimension approach presented above; ensuring that policies to combat the COVID-19 crisis are tailored to the particular health or economic channels to which particular areas are most exposed is vital.

Figure 10. Overall vulnerability to COVID-19 across Nigeria according to the state risk index



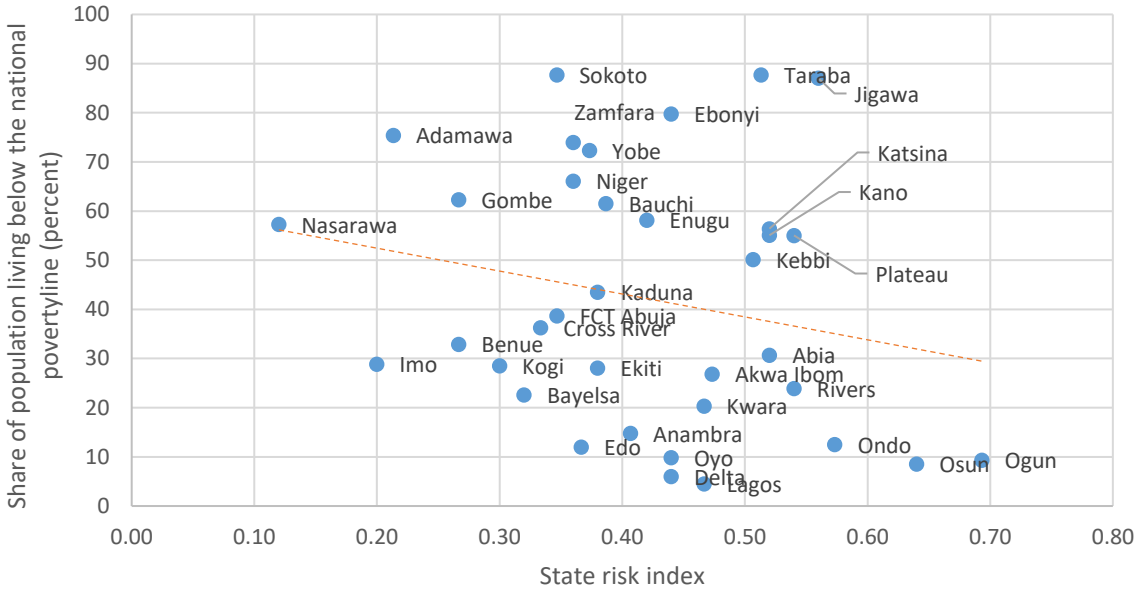
Note: Estimates exclude Borno. Area colors correspond to the value of the state risk index. Red label color indicates the five most vulnerable states (Plateau and Rivers are joint fifth). Blue label color indicates the five least vulnerable states. Source: 2018/19 NLSS, 2018 DHS, and World Bank estimates.

States' pre-crisis poverty rates do not predict their COVID-19 vulnerability

Creating the state risk index helps to emphasize a crucial point: vulnerability to COVID-19 and pre-crisis poverty are not the same. Indeed, as Figure 11 demonstrates, there is a slight negative correlation between the state risk index and the poverty headcount rate for each state. Targeting policies to counter the COVID-19 crisis – both its health and economic effects – using the same targeting mechanisms as traditional social protection measures may, therefore, be inappropriate. This echoes the findings of the

macro-micro simulations, which suggest that the profile of the additional poor resulting from the COVID-19 crisis would differ from the profile of the pre-crisis poor.

Figure 11. Correlation between the state risk index and state-level monetary poverty rates



Note: Estimates exclude Borno. Source: 2018/19 NLSS, 2018 DHS, and World Bank estimates.

States where pre-crisis poverty and direct vulnerability to the COVID-19 crisis overlap may require particular attention. Despite the negative correlation between the state risk index and the pre-crisis poverty headcount rate, some states suffer high values of both. This includes those states in the top right portion of Figure 11, such as Jigawa, Kano, Katsina, Kebbi, Plateau, and Taraba. Since their pre-crisis poverty was higher than average, households in these states may be even less resilient to the effects of the COVID-19 crisis, due to lack of savings, lower investments in human capital, or weakened nutrition.

6. Conclusion

Six main policy messages emerge from this paper. The macro-micro simulations, initial NLPS results, and the examination of pre-crisis state-level information on vulnerability to the COVID-19 crisis yield relatively similar findings.

First, COVID-19 threatens Nigerian households' welfare through several different channels. The crisis threatens to have direct health effects on household members as well as a series of economic effects, including losses of labor income, losses of non-labor income, disruption of markets, disruption of basic services, and out-of-pocket health expenses.

Second, the effects of the COVID-19 crisis are unlikely to be felt evenly across Nigeria. Even in simple macro-micro simulations, it emerges that a disproportionate share of those pushed into poverty by the COVID-19 crisis are likely to be from households depending on service sector incomes, living in urban areas in southern Nigeria. This is a direct consequence of the sectoral GDP forecasts, which project the

largest losses from the current crisis to be in services and industry. The relatively large and disproportionate impacts on services and industry – in terms of job losses and precariousness of incomes – have already been observed in high-frequency data collected during the first stages of the COVID-19 crisis.

Third, households' vulnerability to the crisis varies across multiple dimensions. Since COVID-19 threatens households' welfare through several health and economic channels, a number of factors influence households' vulnerability to the crisis. For example, data from a wide range of countries emphasize the health characteristics that increase the risk of serious or fatal COVID-19 cases, be it age or pre-existing conditions. Growing evidence also demonstrates that labor market activities relying on face-to-face interaction, which cannot be undertaken at home, are most vulnerable to lockdown measures as well as the contraction in demand precipitated by COVID-19.

Fourth, specific policies should be targeted to specific Nigerian states, depending on the particular vulnerabilities they face. For example, several northern Nigerian states appear to suffer more from lack of infrastructure needed to take preventative measures (such as handwashing) to counteract the spread of COVID-19, requiring extra emphasis on programs to support water, sanitation, and hygiene. In many states, special support programs may also be needed for the large shares of workers reliant on non-farm enterprises, whose activities are particularly under threat. In practice, further disaggregation below the state level may be necessary to help target specific households with the specific mix of policies needed to counteract the economic and health effects of the COVID-19 crisis.

Fifth, vulnerability to COVID-19 and pre-crisis poverty are not the same, yet some parts of Nigeria suffer from both. As the macro-micro simulations demonstrate, the profile of those pushed into poverty by the COVID-19 crisis is not the same as the profile of those who were poor in 2018/19. Even if poverty is set to remain a largely rural, northern phenomenon, the additional poor in urban or southern areas should not be excluded from support as they fall into poverty. Equally, the negative correlation between the state risk index and the state-level poverty headcount rate demonstrates that health and economic programs to fight the effects of COVID-19 should not simply target the pre-crisis poor. Nevertheless, some states are both vulnerable to the health and economic effects of COVID-19 (according to the state risk index) and have relatively high pre-crisis poverty rates: these areas may require particular attention in the design of countervailing policies.

Sixth, targeting COVID-19 responses in Nigeria would benefit from more data and an improved understanding of the factors that determine vulnerability to the crisis. Limitations to testing capacity may not be distributed evenly across Nigeria, so using reported COVID-19 case numbers to determine how to allocate resources could introduce bias into targeting. Additionally, *state-level* data on employment and other economic outcomes collected *during* the pandemic, which could dramatically improve the design and targeting of countervailing policies, is relatively sparse. Moreover, since the COVID-19 pandemic is without precedent, the evidence describing the factors that leave households more or less vulnerable to the crisis remains patchy. For example, the evidence on the health characteristics (age and pre-existing conditions) that increase the mortality risk for the virus is primarily based on data from high- and upper-middle-income countries. Less is known about how health conditions in developing countries – including low vaccination rates and the presence of other communicable diseases – interact with COVID-19. Thus, while this policy brief has attempted to shed light on a series of plausible dimensions of vulnerability to COVID-19, such analysis will need to be updated as new evidence becomes available.

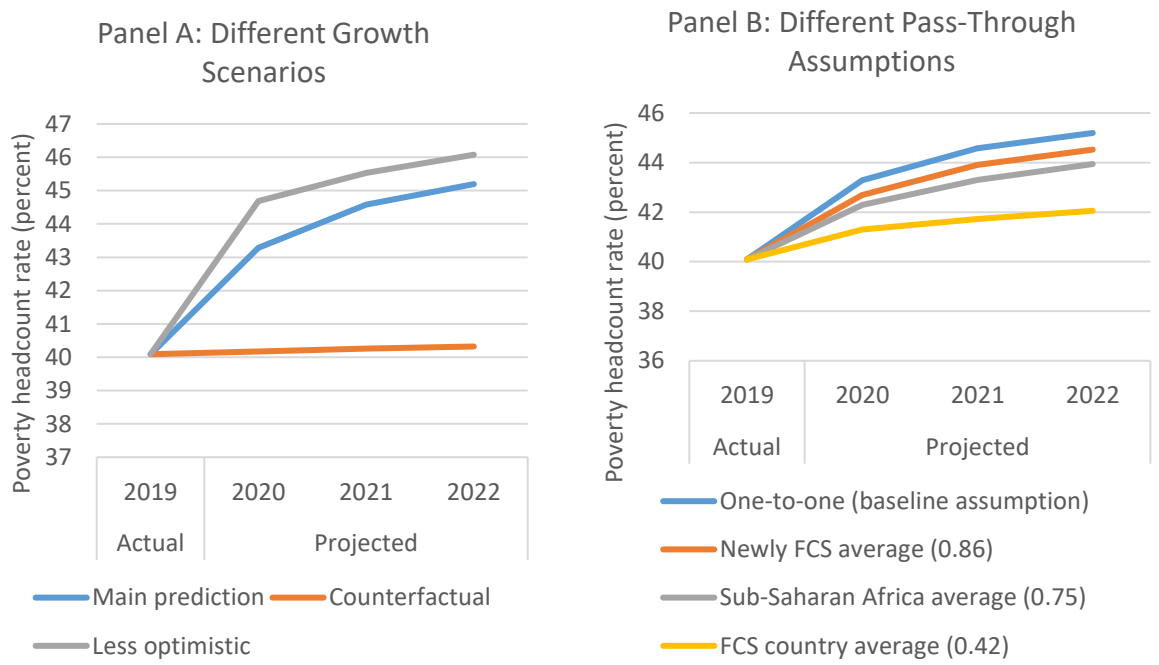
Annexes

Annex A1. Sensitivity and caveats for the macro-micro simulations

The simulation results are highly sensitive to the macroeconomic forecasts and the modelling assumptions used. Under less optimistic macroeconomic forecasts, the predicted increase in poverty would be even more severe. Panel A of Figure 12 shows how the poverty headcount rate in the main prediction and counterfactual scenarios discussed above compares with a less optimistic growth scenario where real GDP drops by 7.4 percent in 2020, then rises by just 0.9 percent in 2021 and 1.90 percent in 2022. In this scenario, the poverty headcount rate would jump to 44.7 percent in 2020 and would reach 46.1 percent in 2022. Changing the modelling assumptions also alters the poverty predictions: assuming a weaker pass-through from per capita real GDP growth to household consumption growth would dampen the effects of the recession on poverty (see Panel B of Figure 12). While it is not possible to calculate a pass-through rate for Nigeria, the pass-through rates for other countries in Sub-Saharan Africa and for fragile and conflicted affected situations (FCS) are estimated to be below 1.[22] Indeed, if the average FCS pass-through rate of 0.42 is applied, the increase in the poverty headcount rate is forecast to be far more muted, rising to 41.3 percent in 2020 and 42.1 percent by 2022.

[22] A pass-through rate cannot be calculated for Nigeria because the 2018/19 NLSS adopted a new and improved methodology for measuring consumption, such that it cannot be straightforwardly compared to previous household surveys in Nigeria.

Figure 12. The predicted poverty rate depends on the underlying macroeconomic forecasts and the modelling assumptions used



Note: Estimates exclude Borno. Real consumption deflated temporally and spatially to compare with national poverty line. 'FCS' means fragile and conflicted-affected situations. Pass-through estimates for FCS settings taken from 'On the Front Lines of the Fight Against Poverty' (Corral, Irwin, Krishnan, Mahler, & Vishwanath, 2020). Pass through estimates for sub-Saharan Africa taken from the World Bank Poverty and Shared Prosperity Report 2018 (World Bank, 2018). In Panel A, pass-through is set to 1. In Panel B, the main prediction growth scenarios are used.
Source: 2018/19 NLSS, United Nations population projections, and World Bank estimates.

The model has at least five key caveats, which should be borne in mind when interpreting the results. First, and most crucially, the model focuses entirely on the economic effects on households coming from the COVID-19 crisis via the contraction of GDP: the health effects that households may suffer are not captured. Second, the mapping of the sector-level per capita real GDP growth forecasts into the micro-data is very coarse. By focusing only on the household head's primary job, the income-generating activities of other household members are ignored. Third, the model does not allow household heads to switch sectors. In reality, workers in industry and services may switch into agriculture to mitigate the effects of the crisis.[23] Fourth, the assumption that pass-through from real GDP per capita growth to household consumption growth is the same for all households – regardless of whether they are rich or poor – is very strong. Fifth, the model does not capture the possibility that purchasing power may be further threatened if prices for food and other basic goods rise faster – perhaps due to market disruptions – than the GDP deflator used to place GDP growth in real terms.

[23] In principle, sectoral switches can be estimated using the techniques outlined in Inchauste et al. (2014), but doing this without microdata from the labor force survey – which are currently lacking in Nigeria – is more challenging.

Annex A2. Description of dimensions used in the state risk index

Health and household demographics

Elderly people and those with pre-existing health conditions have a higher risk of mortality after contracting COVID-19, while the crisis may also displace other important health interventions. Data from many different countries have shown that older people – especially those over the age of 60 – have increased mortality risk from COVID-19 (WHO, 2020). There is also growing evidence that pre-existing health conditions – including cardiovascular disease, diabetes, and chronic lung disease –increase individuals' risk of being hospitalized and of death after contracting the virus (Stokes, et al., 2020). The most up-to-date information on households' age structure is captured by the 2018/19 NLSS, and while the 2018 DHS does not directly measure all the relevant pre-existing health conditions, they can be proxied by the prevalence of smoking and obesity. The COVID-19 crisis also threatens essential health services, as resources are diverted towards tackling the pandemic (Ismail, et al., 2020). As such, it is also helpful to consider which households currently lack access to vaccinations or maternal health facilities – both of which are captured in the 2018 DHS – to ascertain which households may be more affected by the displacement of these essential health services.

Income sources

Both cross-country evidence and data from Nigeria suggest that services and commerce activities are most threatened by lockdown measures used to combat COVID-19: this has knock-on effects on internal transfers between households within Nigeria. There is growing evidence from developed countries to suggest that jobs reliant on face-to-face interaction or jobs that cannot be easily undertaken at home – which are typically concentrated in services and especially in commerce or retail and trade activities – are more likely to be interrupted by lockdown measures (Avdiu & Nayyar, 2020; Adams-Prassl, Boneva, Golin, & Rauh, 2020). In the Nigerian context, this is confirmed by the job losses in services and commerce recorded by the NLPS and described above. The NLPS also shows that non-farm household businesses – which rely on interactions with consumers, suppliers of inputs, and other market participants – have suffered large income losses since the COVID-19 outbreak (Siwatu, et al., 2020). The share of workers in each industry, as well as the share working primarily in non-farm household businesses, is recorded directly in the 2018/29 NLSS. Additionally, around half of Nigerians live in households that receive domestic remittances (World Bank, 2020). Such domestic remittances are likely to drop during the COVID-19 crisis, as sending households' own incomes suffer.[24] The 2018/19 NLSS directly records the prevalence of remittances among Nigerian households.

Furthermore, households depending on transfers from the government may also be disproportionately threatened by the current crisis. According to the 2018/19 NLSS, around 1 in 5 school-age children live in a household receiving food from the National School Feeding Program, but since schools were closed in Nigeria on March 19, 2020, this source of support may be disrupted (Dixit, Ogundeji, & Onwujekwe, 2020; World Bank, 2020). Since food security appears to be under threat during the pandemic, as the NLPS shows, households relying on the National School Feeding Program may be more susceptible than others (Siwatu, et al., 2020).

[24] *International* remittances are forecast to drop by more than 25 percent in 2020, given the interruption of economic activity in the main destinations of Nigerian emigrants, the US and the UK (World Bank, 2020).

Local services

The presence of local health services both enables people to receive treatment if they become ill and spreads information about how to prevent the spread of COVID-19. Community health workers proved to be crucial in fighting the Ebola virus disease, not only by ensuring that non-Ebola regular health services continued to be provided, but also by sensitizing the community to the spread of the disease and serving as contact tracers and active case finders (Ajisegiri, Odusanya, & Joshi, 2020). A similar principle may apply for COVID-19. While not a perfect proxy for the presence of community health workers, the 2018/19 NLSS records whether health centers, hospitals, and doctors are present in the community.[25,26]

Infrastructure

Access to water, sanitation, and hygiene facilities is vital in controlling the spread of the virus. Even relatively early in the pandemic, priority recommendations from policy makers and public-health authorities, including WHO, included encouraging people to wash their hands and to maintain social distancing (WHO, 2020). The 2018/19 NLSS captures the drinking water sources and toilet facilities to which people have access, while the 2018 DHS directly captures whether households have access to basic handwashing facilities, including with soap and water. The NLPS suggests that, while the majority of Nigerians are practicing handwashing with soap and water, around 1 in 5 people are doing so half of the time, some of the time, or none of the time (Siwatu, et al., 2020).

Expanding social protection programs relies on identifying households most in need of support and disseminating information about enrolment. As such, households lacking formal identification and a mobile phone – information which is directly captured by the 2018/19 NLSS – may be excluded from government support.

Density

Proximity to potential carriers of COVID-19 determines how the virus spreads. The virus purportedly spreads more rapidly in urban settings. To triangulate urbanicity, the urban classifications from the 2018/19 NLSS can be used in conjunction with the share of the population living in an urban local government area (LGA), according to information from the poverty map. This poverty map uses geospatial data and machine learning, with LGA-level populations being calculated with Facebook Artificial Intelligence (AI) data.

[25] The 2018 DHS contains a question asking women whether distance was seen as a major problem "for seeking medical advice or treatment when they are sick," but this does not seem to provide a simple objective measure of whether or not medical services were available.

[26] At the state level, the share of the population living in a community containing a health center according to the 2018/19 NLSS is positively correlated with the number of clinics per capita taken from Nigerian Ministry of Health data.

Annex A3. Summary tables for indicators included in the state risk index

Table 5. Full ranking of states according to the state risk index

Zone	State	State risk index	Dimensions					
			Health and household demographics	Income sources	Local services	Infrastructure	Density	Poverty headcount rate
SW	**Ogun**	0.69	0.80	1.00	0.67	0.00	1.00	9.3
SW	**Osun**	0.64	0.20	0.80	1.00	0.20	1.00	8.5
SW	**Ondo**	0.57	0.40	0.60	0.67	0.20	1.00	12.5
NW	**Jigawa**	0.56	0.40	0.60	1.00	0.80	0.00	87.0
NC	**Plateau**	0.54	0.00	0.40	1.00	0.80	0.50	55.0
SS	**Rivers**	0.54	0.60	0.40	1.00	0.20	0.50	23.9
NW	**Kano**	0.52	0.20	0.80	0.00	0.60	1.00	55.1
NW	**Katsina**	0.52	0.40	0.60	1.00	0.60	0.00	56.4
SE	**Abia**	0.52	0.60	1.00	0.00	0.00	1.00	30.7
NE	**Taraba**	0.51	0.40	0.20	0.67	0.80	0.50	87.7
NW	**Kebbi**	0.51	0.40	0.80	0.33	1.00	0.00	50.2
SS	**Akwa Ibom**	0.47	0.60	0.40	0.67	0.20	0.50	26.8
NC	**Kwara**	0.47	0.20	0.40	0.33	0.40	1.00	20.4
SW	**Lagos**	0.47	0.20	0.80	0.33	0.00	1.00	4.5
SE	**Enugu**	0.46	0.60	0.60	0.00	0.60	0.50	58.1
SE	**Ebonyi**	0.44	0.40	0.00	1.00	0.80	0.00	79.8
SS	**Delta**	0.44	0.60	0.60	0.00	0.00	1.00	6.0
SW	**Oyo**	0.44	0.60	0.60	0.00	0.00	1.00	9.8
SE	**Anambra**	0.41	0.60	0.60	0.33	0.00	0.50	14.8
NE	**Bauchi**	0.39	0.40	0.60	0.33	0.60	0.00	61.5
SW	**Ekiti**	0.38	0.40	0.00	1.00	0.00	0.50	28.0
NW	**Kaduna**	0.38	0.40	0.60	0.00	0.40	0.50	43.5
NE	**Yobe**	0.37	0.40	0.00	0.67	0.80	0.00	72.3
SS	**Edo**	0.37	0.60	0.40	0.33	0.00	0.50	12.0
NW	**Zamfara**	0.36	0.40	0.80	0.00	0.60	0.00	74.0
NC	**Niger**	0.36	0.60	0.20	0.00	1.00	0.00	66.1
NW	**Sokoto**	0.35	0.40	0.00	0.33	1.00	0.00	87.7
NC	**FCT Abuja**	0.35	0.20	0.00	0.33	0.20	1.00	38.7
SS	**Cross River**	0.33	0.40	0.20	0.67	0.40	0.00	36.3
SS	**Bayelsa**	0.32	0.80	0.20	0.00	0.60	0.00	22.6
NC	**Kogi**	0.30	0.60	0.20	0.00	0.20	0.50	28.5
NE	**Gombe**	0.27	0.40	0.20	0.33	0.40	0.00	62.3
NC	**Benue**	0.27	0.20	0.00	0.33	0.80	0.00	32.9
NE	**Adamawa**	0.21	0.20	0.00	0.67	0.20	0.00	75.4
SE	**Imo**	0.16	0.40	0.40	0.00	0.00	0.00	28.9
NC	**Nasarawa**	0.12	0.00	0.00	0.00	0.60	0.00	57.3

Note: Estimates exclude Borno. NC = North Central. NE = North East. NW = North West. SE = South East. SS = South South. SW = South West. Source: 2018/19 NLSS, 2018 DHS, and World Bank estimates.

Table 6. State-level indicators under the health and household demographics dimension

	Share of population aged 60 or more	Share of births delivered outside a health facility	Share of children aged 12-23 months that have not received all 8 basic vaccinations	Share of men who smoke	Share of women who are overweight or obese	Health and household demographics dimension
Abia	12.6	8.0	61.0	9.3	34.9	0.60
Adamawa	5.6	61.1	63.2	4.7	20.4	0.20
Akwa Ibom	6.4	65.3	58.0	8.5	42.0	0.60
Anambra	9.8	9.6	24.2	15.4	53.1	0.60
Bauchi	4.8	78.2	80.4	3.2	14.2	0.40
Bayelsa	4.1	77.1	82.0	9.2	36.2	0.80
Benue	7.3	32.9	72.6	8.8	22.3	0.20
Cross River	7.0	47.4	54.0	8.6	34.8	0.40
Delta	7.3	45.1	55.6	13.7	44.6	0.60
Ebonyi	9.1	43.5	55.2	7.6	20.7	0.40
Edo	9.6	19.9	43.7	12.2	38.6	0.60
Ekiti	10.2	28.2	58.9	4.8	31.7	0.40
Enugu	13.8	20.5	63.6	7.0	36.5	0.60
Gombe	5.2	72.3	81.8	1.8	16.9	0.40
Imo	14.7	5.5	37.4	7.0	43.9	0.40
Jigawa	4.3	79.9	76.2	4.7	7.7	0.40
Kaduna	4.0	82.4	78.2	3.9	25.1	0.40
Kano	5.5	80.8	65.7	3.5	16.6	0.20
Katsina	6.5	83.5	78.8	5.5	17.8	0.40
Kebbi	4.7	92.6	93.7	5.4	13.7	0.40
Kogi	9.3	27.6	73.8	8.2	26.7	0.60
Kwara	7.6	44.9	70.7	6.0	26.0	0.20
Lagos	7.1	24.3	37.6	1.6	49.4	0.20
Nasarawa	3.1	50.2	60.9	5.4	28.8	0.00
Niger	3.8	74.2	76.7	7.4	22.7	0.60
Ogun	8.8	26.6	76.9	7.0	35.7	0.80
Ondo	8.3	19.3	49.5	8.9	28.0	0.40
Osun	11.9	8.4	66.2	5.3	28.0	0.20
Oyo	10.2	29.9	76.7	6.3	32.0	0.60
Plateau	6.2	56.1	52.2	1.0	28.7	0.00
Rivers	7.3	51.8	60.8	10.2	47.7	0.60
Sokoto	4.2	92.2	95.4	6.1	7.2	0.40
Taraba	4.4	70.0	75.9	4.0	23.7	0.40
Yobe	4.6	83.8	79.4	3.9	8.1	0.40
Zamfara	4.1	89.2	92.6	2.6	12.7	0.40
FCT Abuja	3.4	36.8	50.4	4.2	37.5	0.20
TOTAL	7.1	60.6	68.7	5.8	28.2	

Note: Estimates exclude Borno. Green cells show states classed as "at risk" for that indicator (top 15 states). Source: 2018/19 NLSS, 2018 DHS, and World Bank estimates.

Table 7. State-level indicators under the income sources dimension

	Share of workers whose main job is in non-farm household enterprises	Share of workers whose main job is in retail and trade	Share of workers whose main job is in all services	Share of population living in a household that receives domestic remittances	Share of school-age population in a household receiving national school feeding program	Income sources dimension
Abia	44.6	38.3	21.4	69.4	30.1	1.00
Adamawa	13.9	12.7	5.6	26.6	0.2	0.00
Akwa Ibom	39.5	30.0	15.3	49.8	35.1	0.40
Anambra	54.1	43.1	23.5	43.5	13.5	0.60
Bauchi	44.4	17.6	10.5	72.3	47.7	0.60
Bayelsa	23.0	39.7	13.2	40.1	0.0	0.20
Benue	9.9	12.1	4.5	46.7	12.0	0.00
Cross River	14.9	17.2	5.6	43.5	18.8	0.20
Delta	35.3	41.3	16.1	68.9	26.1	0.60
Ebonyi	25.5	19.3	9.6	44.8	10.4	0.00
Edo	32.9	31.5	16.3	73.5	0.0	0.40
Ekiti	39.1	34.3	15.8	44.9	0.4	0.00
Enugu	36.5	34.7	16.8	60.6	15.5	0.60
Gombe	21.4	23.7	10.4	22.5	18.9	0.20
Imo	39.3	28.6	14.1	70.4	29.4	0.40
Jigawa	40.4	28.6	17.9	22.3	61.0	0.60
Kaduna	39.1	34.4	23.2	31.2	40.7	0.60
Kano	57.9	38.5	23.8	47.7	42.8	0.80
Katsina	63.4	41.4	30.5	46.2	13.2	0.60
Kebbi	47.4	25.5	20.3	80.7	22.1	0.80
Kogi	33.6	27.6	13.9	75.7	2.4	0.20
Kwara	43.7	29.2	16.0	59.4	0.0	0.40
Lagos	59.3	52.9	25.5	57.9	0.0	0.80
Nasarawa	24.1	21.2	10.8	40.3	9.5	0.00
Niger	22.0	23.9	11.1	12.5	38.3	0.20
Ogun	55.2	43.1	22.6	73.2	24.9	1.00
Ondo	40.8	35.7	19.1	37.1	14.0	0.60
Osun	56.9	38.7	24.9	57.3	7.7	0.80
Oyo	58.2	42.0	23.0	57.3	6.5	0.60
Plateau	28.4	26.8	10.1	58.2	26.7	0.40
Rivers	36.0	37.0	15.5	59.4	0.0	0.40
Sokoto	19.9	21.2	12.4	5.7	0.1	0.00
Taraba	24.4	17.9	12.1	24.5	26.9	0.20
Yobe	37.0	25.9	15.5	51.0	0.3	0.00
Zamfara	54.6	43.3	40.2	70.2	17.6	0.80
FCT Abuja	20.4	24.8	10.5	28.5	0.5	0.00
TOTAL	40.6	32.7	17.8	49.9	20.1	

Note: Estimates exclude Borno. Green cells show states classed as "at risk" for that indicator (top 15 states). Source: 2018/19 NLSS and World Bank estimates.

Table 8. State-level indicators under the local services dimension

	Share of population living in a community lacking a health center	Share of population living in a community lacking a hospital	Share of population living in a community lacking a private doctor	Local services dimension
Abia	23.7	59.2	54.4	0.00
Adamawa	72.1	97.9	74.5	0.67
Akwa Ibom	75.2	92.5	81.5	0.67
Anambra	57.3	59.0	97.9	0.33
Bauchi	53.2	100.0	87.1	0.33
Bayelsa	17.0	64.6	66.6	0.00
Benue	61.5	76.7	83.2	0.33
Cross River	21.6	100.0	93.3	0.67
Delta	53.9	74.3	66.6	0.00
Ebonyi	72.1	93.0	100.0	1.00
Edo	55.0	91.4	92.2	0.33
Ekiti	64.0	93.6	100.0	1.00
Enugu	33.5	57.1	80.4	0.00
Gombe	50.9	82.1	93.0	0.33
Imo	35.5	64.6	87.6	0.00
Jigawa	100.0	100.0	100.0	1.00
Kaduna	46.7	73.4	65.1	0.00
Kano	43.8	78.6	67.2	0.00
Katsina	83.4	97.4	100.0	1.00
Kebbi	53.0	84.0	98.2	0.33
Kogi	33.2	65.8	67.2	0.00
Kwara	62.4	58.3	93.0	0.33
Lagos	81.8	15.9	70.1	0.33
Nasarawa	30.8	66.9	80.6	0.00
Niger	18.5	83.0	90.1	0.00
Ogun	88.8	50.9	100.0	0.67
Ondo	61.8	84.2	85.9	0.67
Osun	69.1	91.1	95.9	1.00
Oyo	56.7	72.6	91.7	0.00
Plateau	80.3	84.9	93.2	1.00
Rivers	84.2	85.6	98.0	1.00
Sokoto	44.6	82.1	93.3	0.33
Taraba	57.8	93.3	95.3	0.67
Yobe	59.1	86.3	91.7	0.67
Zamfara	21.4	67.8	87.5	0.00
FCT Abuja	42.4	58.2	98.9	0.33
TOTAL	56.9	75.2	85.2	

Note: Estimates exclude Borno. Green cells show states classed as “at risk” for that indicator (top 15 states). Source: 2018/19 NLSS and World Bank estimates.

Table 9. State-level indicators under the infrastructure dimension

	Share of population living in a household lacking limited-standard drinking water	Share of population living in households lacking a basic handwashing facility that has soap and water available	Share of population living in a household lacking limited-standard sanitation	Share of population living in a household without a mobile phone	Share of population aged 15+ without a National Identification Number/Identity Card	Infrastructure dimension
Abia	9.4	24.3	20.0	5.4	60.6	0.00
Adamawa	26.8	97.1	38.7	15.8	44.4	0.20
Akwa Ibom	12.4	89.6	26.0	7.3	53.7	0.20
Anambra	8.8	3.3	11.6	4.0	51.8	0.00
Bauchi	28.9	96.1	52.6	22.6	65.1	0.60
Bayelsa	29.9	85.9	73.5	19.9	55.6	0.60
Benue	33.0	98.8	58.8	18.2	62.7	0.80
Cross River	45.4	37.4	40.0	15.4	66.7	0.40
Delta	18.6	39.6	38.6	5.4	50.0	0.00
Ebonyi	22.0	94.1	79.8	23.9	83.0	0.80
Edo	22.7	68.6	30.0	2.1	58.3	0.00
Ekiti	18.4	83.5	53.0	6.2	40.0	0.00
Enugu	40.0	74.7	49.0	29.9	64.3	0.60
Gombe	56.6	55.0	47.1	26.4	49.8	0.40
Imo	8.1	52.1	18.6	4.3	59.5	0.00
Jigawa	7.4	95.9	63.7	21.6	65.4	0.80
Kaduna	42.9	94.9	44.4	11.3	59.1	0.40
Kano	45.5	76.1	55.7	16.5	64.1	0.60
Katsina	42.1	9.8	60.1	23.8	61.3	0.60
Kebbi	37.8	98.0	63.3	35.3	68.7	1.00
Kogi	26.4	55.9	60.5	5.3	51.0	0.20
Kwara	15.2	95.7	60.8	7.6	60.4	0.40
Lagos	2.2	38.6	10.8	4.0	54.8	0.00
Nasarawa	47.8	76.9	76.0	6.2	78.8	0.60
Niger	55.8	93.8	66.9	35.9	73.6	1.00
Ogun	10.1	65.7	25.3	5.0	51.4	0.00
Ondo	27.4	97.1	46.5	10.6	54.4	0.20
Osun	9.8	6.4	36.8	4.8	65.0	0.20
Oyo	10.1	38.3	39.1	2.8	59.1	0.00
Plateau	36.5	75.8	64.1	19.1	67.4	0.80
Rivers	4.6	43.4	31.0	5.6	72.5	0.20
Sokoto	61.9	96.1	68.2	47.1	77.5	1.00
Taraba	58.2	94.8	55.4	39.7	53.8	0.80
Yobe	20.4	91.8	69.7	16.9	67.3	0.80
Zamfara	39.4	95.2	29.5	49.3	25.8	0.60
FCT Abuja	21.8	64.0	47.2	4.6	63.8	0.20
TOTAL	26.8	68.6	44.9	15.2	59.8	

Note: Estimates exclude Borno. Green cells show states classed as “at risk” for that indicator (top 15 states). Source: 2018/19 NLSS and World Bank estimates.

Table 10. State-level indicators under the density dimension

	Share of population that is urban (as per NLSS)	Share of population living in urban LGA (as per poverty map)	Density dimension
Abia	34.5	30.3	1.00
Adamawa	8.8	11.9	0.00
Akwa Ibom	14.8	25.7	0.50
Anambra	59.6	5.6	0.50
Bauchi	13.9	10.6	0.00
Bayelsa	23.8	21.3	0.00
Benue	21.1	7.2	0.00
Cross River	14.6	12.4	0.00
Delta	32.4	23.5	1.00
Ebonyi	6.0	7.2	0.00
Edo	45.4	0.0	0.50
Ekiti	75.1	19.5	0.50
Enugu	21.0	31.5	0.50
Gombe	18.2	16.4	0.00
Imo	9.7	12.7	0.00
Jigawa	16.3	7.7	0.00
Kaduna	38.0	18.5	0.50
Kano	30.0	29.9	1.00
Katsina	18.3	12.9	0.00
Kebbi	10.9	11.3	0.00
Kogi	33.7	18.8	0.50
Kwara	41.4	40.7	1.00
Lagos	92.0	100.0	1.00
Nasarawa	22.4	18.0	0.00
Niger	21.0	15.9	0.00
Ogun	56.8	31.6	1.00
Ondo	57.3	41.6	1.00
Osun	76.2	33.3	1.00
Oyo	74.8	35.0	1.00
Plateau	29.0	34.2	0.50
Rivers	27.1	26.2	0.50
Sokoto	19.7	10.1	0.00
Taraba	8.9	21.6	0.50
Yobe	24.1	12.1	0.00
Zamfara	17.4	11.7	0.00
FCT Abuja	41.8	72.2	1.00
TOTAL	35.3	26.0	

Note: Estimates exclude Borno. Green cells show states classed as “at risk” for that indicator (top 15 states). Source: 2018/19 NLSS, latest Nigeria poverty map, and World Bank estimates.

Annex A4. Correlation between and breakdown of different dimensions of the state risk index

Table 11. Correlation matrix for each dimension of the state risk index

	Health and household demographics	Income sources	Local services	Infrastructure	Density
Health and household demographics	1.00				
Income sources	0.22	1.00			
Local services	-0.20	-0.14	1.00		
Infrastructure	-0.32	-0.29	0.08	1.00	
Density	0.02	0.49	-0.07	-0.61	1.00

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