Feed the Future Nigeria Agricultural Policy Activity

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PIVOTING IN NIGERIA'S FISH AND POULTRY VALUE CHAINS IN RESPONSE TO COVID-19 POLICIES AND IMPACTS

By

Lenis Saweda O. Liverpool-Tasie, Ben Belton, Oyinkan Tasie, Wellington Osawe, Charuta Parkhi, Thomas Reardon, Iveren Abagyeh-Igbudu, Aisha Muhammed, Balaraba Sule, Muhammad Ibrahim Hudu, Aisha Lawal Ibrahim, Grace Egbi Onu-Odey, Adejoh Emmanuel, U. and Elizabeth Yusuf James

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Authors

Lenis Saweda O. Liverpool-Tasie, Oyinkan Tasie and Thomas Reardon are members of the Agricultural, Food and Resource Economics Department (AFRE) at Michigan State University (MSU).

Ben Belton has a joint appointment with the Agricultural, Food and Resource Economics Department (AFRE) at Michigan State University (MSU) and with WorldFish, Malaysia.

Wellington Osawe is postdoctoral research fellow at the Economic and Social Research Institute (ESRI) and a visiting research fellow at Trinity College Dublin

Charuta Parkhi is a PhD candidate in the Agricultural, Food and Resource Economics Department (AFRE) at Michigan State University (MSU)

Iveren Abagyeh-Igbudu, Balaraba Sule, Aisha Muhammed, Muhammad Ibrahim Hudu, Aisha Lawal Ibrahim, Grace Egbi Onu-Odey, Adejoh E.U. and Elizabeth Yusuf James are all early career scholars participating in the NAPA collaborative research team training and mentoring program

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ACRONYMS

AFRE Department of Agricultural, Food, and Resource Economics

CRE Correlated Random Effects

DEC USAID Development Experience Clearing House

FCT Federal Capital Territory

FSP Food Security Group

GMI Google mobility indexes

ICT Information and Communications Technology

IFPRI International Food Policy Research Institute

MLOGIT Multinomial Logistical Regression

MSU Michigan State University

NAPA Nigeria Agricultural Policy Activity

NAPP Nigeria Agricultural Policy Project

PIM CGIAR Research Program on Policies, Institutions, and Markets

SMEs Small and Medium Enterprises

EXECUTIVE SUMMARY

This report uses a panel dataset from two phone surveys covering February–October 2020 and March–July 2021, with nearly 500 small and medium enterprises (SMEs) in the fish and poultry value chains of eight states in all six of Nigeria's geopolitical zones. We address three empirical gaps in the knowledge of the impacts of COVID-19 and containment policies on enterprises in these value chains.

- First, how did state level variations in COVID-19 containment policies affect the operation of businesses during 2020, and how did these effects vary by location (rural and urban; North and South), size of enterprise (small and non-small), value chain segment (lateral, upstream, midstream, and downstream), and gender of business owner?
- Second, what kinds of challenges did businesses confront during this period and how did that vary over time and across nodes?
- Third, what pivoting strategies did SMEs apply in response to COVID-19 challenges (in terms of, for instance, changes to marketing, procurement, technologies, and employment behaviors) and how did these vary by location, business scale, value chain segment, and gender of the enterprise?

Lockdown policies had direct and indirect impacts on SME business operations, but effects were disproportionally negative for small-scale enterprises and enterprises owned by women. Lockdowns negatively impacted the number of days SMEs in lateral supply chains (feed businesses and hatcheries) operated, but small lateral supply chain SMEs faced significantly larger negative impacts than non-small. Midstream and downstream SMEs (wholesalers and retailers) owned by women were significantly more negatively impacted by lockdowns than businesses owned by men.

Lockdowns were associated with significant negative impacts on the number of hired daily laborers and regular salaried workers employed by SMEs, with significant differences also apparent between male and female owned businesses in lateral supply chain segments, as well as between small and non-small businesses.

We find clear evidence of the effect of lockdown on difficulty accessing inputs, markets and transport. These challenges peaked in April and May (when the lockdown policies were implemented most fully) before declining gradually. The share of respondents reporting low demand and low sales prices as challenges followed a similar pattern. In contrast, the share of SMEs reporting high input prices as a challenge grew steadily in all months but increased especially sharply post-lockdown.

Small businesses tended to be disproportionately affected by these challenges, particularly difficulties associated with low demand and market access, which were more persistent during post-lockdown months for small enterprises than for non-small.

Surveyed SMEs adopted a range of pivoting behaviors in response to the challenges faced. Many of the strategies deployed seem consistent with improved resilience, but others could negatively affect long-term business sustainability.

Mobile phones were widely used to organize transactions prior to the pandemic, but their use for this purpose increased sharply during the pandemic, as reported by around half of respondents. Internet and social media use to search for suppliers and customers also increased significantly. However, this transition toward e-commerce was driven by informal use of social media platforms (e.g., WhatsApp, Facebook) rather than formal dedicated online marketplace platforms such as Jumia, Konga, or Agromint.

There was a big increase in the use of electronic payments (e.g., mobile money or mobile banking applications), with most respondents (60%) reporting having started (13%) or increased (47%) their use

in response to the pandemic, likely corresponding to the increase in remote transactions organized by phone or online, and possibly increased concern about the hygiene implications of handling cash.

Few respondents (2%) initiated any new form of contractual agreement in response to COVID-19, but 12% reported an increase in the use of pre-existing contracts, likely to instill greater predictability under volatile conditions. Informal agreements between actors were more common than formal contractual relations and their use was reported to have increased by around 20%of respondents.

As expected, reducing numbers of employees hired was a common cost saving strategy in the face of lower levels of business activity. Interestingly, a non-trivial share of businesses reported increasing wages for workers (initiated by 15% and increased by 18%). This may be interpreted as a response to worker shortages during periods when mobility restrictions and fear of contracting COVID-19 prevented businesses hiring sufficient labor.

We found a sharp increase in the introduction of "just in case" strategies (defined as "a strategy that can help you handle a shock to your input or output supply, such as stocking more inputs than normal or paying in advance for logistics services as a backup plan for procuring inputs or selling outputs). 40% of respondents reported having increased the use of these strategies, while 20% reported introducing them for the first time. This result appears indicative of behavioral change made in response to the experience of initial shocks associated with COVID-19, and thus perhaps indicates a tendency for supply chains to evolve toward greater resilience.

However, we also found evidence of behaviors with potentially negative impacts on SME operations. For example, COVID-19 containment policies such as movement restrictions and business closures created opportunities for rent seeking. One quarter of respondents began making informal payments (e.g., bribes) to facilitate transport for their business, and the same share paid bribes to facilitate continued business operations. In addition, provision of informal credit was widely used to facilitate business operations. About 10% of respondents reported lending cash to business partners – a high number given that many surveyed enterprises are operated by sole traders. Half of the respondents began (19%) or increased (31%) advancing goods as in-kind or trade credit. All these behaviors can be seen as responses to enable business operations to continue running. The long-term impacts of these strategies are uncertain as informal payments cut down already slim profit margins and repayment failures by clients could have major financial implications for SMEs.

Very few surveyed SMEs received any kind of formal support in response to COVID-19 crisis. Less than 1% of businesses reported receiving any form of government assistance. Assistance from other types of institution (e.g., business associations) was received by only 3% of businesses and 1% of households. In contrast, 40% of business owners started (11%) or increased (28%) lending money or food to employees in response to the COVID-19 crisis, and 30% started (11%) or increased (19%) donations of money or food to the communities in which they were located.

Finally, we explored the determinants of the probability of businesses ceasing operations between the final survey round in 2020 and the resurvey in 2021. Businesses operated by women were 15% more likely to close than those operated by men. Small businesses were 15% more likely to close than non-small businesses. Businesses in Northern Nigeria were 6% more likely to close than those in the South ($p<0.01$).

These results suggest strongly that COVID-19 and associated containment policies intensified underlying inequalities by causing higher levels of closures among businesses that were operated by women, small in scale, or located in the North where there are several relatively less economically developed and more insecure states. Conversely, businesses operated by men, non-small enterprises, or businesses in the more relatively prosperous and stable South have proven more resilient.

INTRODUCTION

Research on the impacts of the global COVID-19 pandemic on food systems has evolved over its course; from advancing hypotheses about possible future outcomes, to anecdotal case-based reporting of impacts, and then to cross-sectional surveys quantifying the magnitude of impacts on actors in different agri-food value chain nodes. To date, little research has tracked the evolution of challenges faced by businesses in food value chains over time using panel data. Fewer studies still have assessed how value chain actors have adapted their behavior to the new conditions they face (pivoting), how value chains are restructuring as a result, and with what welfare outcomes.

Prior to the onset of the COVID-19 pandemic, fish and poultry value chains in Nigeria were undergoing a period of dynamic growth and transformation. Fish farming has grown rapidly over the past two decades, making Nigeria the largest aquaculture producer in Sub-Saharan Africa. Inland and marine capture fisheries also play an important role in the country's fish supply (Subasinghe et al., 2021). Fish is the cheapest animal source food eaten in Nigeria. It accounts for about one third of consumption of animal-source food nationally (rising to half in the South) and 10% of food consumption expenditures. Changes in fish consumption therefore have important implications for Nigeria's food and nutrition security (Liverpool-Tasie et al, 2021).

Consumption of poultry products in Nigeria has grown alongside rapid urbanization, causing poultry production to grow by 25% over the past two decades (Padilla et al., 2019). In just one decade, the volume of feed used in Nigeria skyrocketed from 300,000 to 1.8 million tons – a 600% climb (Liverpool-Tasie et al, 2016). These trends have contributed to making the poultry industry one of the most commercialized sub-sectors of agriculture in Nigeria.

The fish and poultry sectors both display a high degree of spatial heterogeneity in terms of the structure of the value chain, and there is a brisk inter-regional and intra-regional domestic trade in fish and poultry products as well as production inputs. Trade in imported frozen fish and poultry is also significant (Gona et al, 2018; Liverpool-Tasie et al, 2021; Liverpool-Tasie et al, 2016).

A mix of federal and sub-national level policies were implemented in Nigeria in 2020 in the attempt to contain the spread of COVID-19. These varied widely between regions. Reported measures included border closures, a nationwide night-time curfew, mandatory wearing of facemasks, closure of markets, and a ban on "non-essential" travel between regions. Federal and regional policy objectives were frequently in conflict, and a lack of coordination and consistency intensified supply chain disruptions, such as where restrictions in one region blocked transport between producing zones and receiving markets in another location (Liverpool-Tasie et al, 2020). However, the extent to which stated policies were enforced remains unclear, and the nature and scale of any unintended negative consequences arising from them is still poorly understood.

Recent theoretical work on the economics of COVID-19 has explored how the shock of the pandemic may contribute to 'pivoting' (large shifts in the ways businesses operate, such as accelerated adoption of e-commerce) and 'co-pivoting' (complementary pivots by businesses in different supply chain segments), but little empirical research has been implemented to date to test these hypotheses (Reardon et al, 2021).

This report addresses three key empirical gaps in the knowledge of the impacts of COVID-19 and associated policies on fish and poultry value chains in Nigeria.

- First, how did state wise variations in COVID-19 containment policies affect the operation of businesses during 2020, and how did these effects vary by location (rural and urban; North and South), size of enterprise (small and non-small), value chain segment (lateral, upstream, midstream, and downstream), and gender of business owner.

- Second, what challenges did businesses confront during this period and how did that vary over time and across nodes.
- Third, what pivoting strategies did they apply in response to COVID-19 challenges (in terms of, for instance, changes to marketing, procurement, technologies, and employment behaviors) and how did these vary over, space, scale of operation, value chain segment, and gender of the enterprise owner.

We address these questions using a panel dataset derived from two phone surveys covering the periods February – October 2020 and March – July 2021, with close to 500 small and medium enterprises (SMEs) from eight states in all six of Nigeria's geopolitical zones.

METHODS AND DATA

MSU's USAID-funded Nigeria Agricultural Policy Project (NAPP) has trained and mentored scholars from Nigerian Universities on applied agrifood value chain research since 2016. We worked closely with a subset of this growing network of young Nigerian scholars in 2020 and 2021 to collect and analyze data and strengthen capacity for policy engagement.

This study combines data from two surveys, conducted in 2020, and 2021. The first survey was designed to track the impacts of the COVID-19 pandemic and related policy responses on fish and poultry supply chains in all six geopolitical zones of Nigeria and identify federal and state-specific recommendations on policies and actions for mitigating disruption and associated impacts on food and nutrition security. We conducted monthly interviews with 474 enterprises in fish and poultry supply chains.

Field visits were not possible due to movement restrictions and safety concerns, so enterprises were selected for survey using a modified snowballing approach. In some states, respondents were initially drawn from lists of contacts from previous fish and poultry value chains surveys. The study team also held discussions with state Ministries of Agriculture, which maintain records of operators in the agricultural sector, to obtain lists of potential respondents.

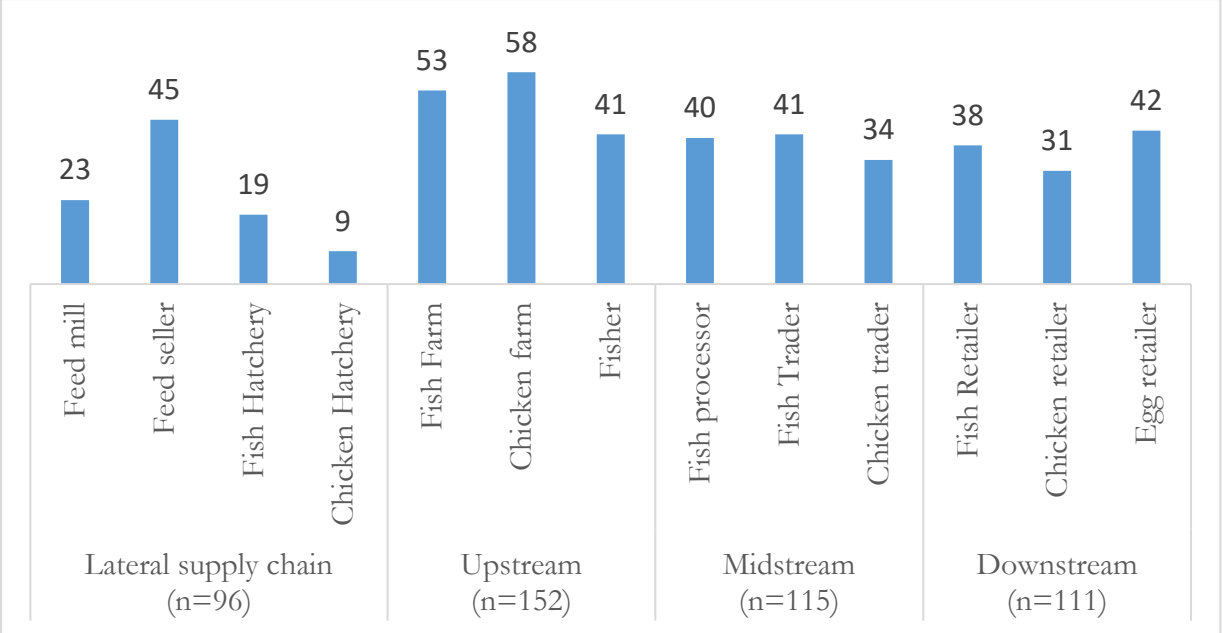
Respondents from the supply chain nodes present in each state were selected at random from these lists and approached by phone. After a brief introduction about the study purpose, respondents were asked for their consent to participate. Study participants were asked to suggest additional respondents engaged in their respective value chain or related nodes (e.g., as their input or product suppliers). Once respondents were confirmed to be engaged in the activity ascribed to them, and consented to be part of the study, the data collector made monthly calls to the respondents.

Interviews commenced in May 2020. The first round of interviews collected recall information on business activities during the months of February-April (corresponding to pre-pandemic and the onset of COVID-19 policy responses such as lockdowns). Interviews were subsequently conducted monthly, collecting recall information for the preceding month on each occasion, through November, giving a dataset covering nine months.

Respondents selected for interview included 232 actors in the fish value chain (fish hatcheries fishers, farms, processors, traders and retailers), 174 actors in the poultry value chains (chicken hatcheries, farms, traders, retailers, and egg retailers), and 68 actors providing services common to both value chains (feed mills and sellers) (total 474 actors).

For the purposes of analysis in this report, because of the relatively small sample sizes per value chain node, we aggregate actors by segment, following Liverpool-Tasie et al. (2021). Segments and their constituent nodes are as follows: Lateral (feed mills and sellers, and hatcheries) n=96; Upstream (farms, fishers) n=152; Midstream (traders, fish processors) n=115; Downstream (retailers) n=111 (Figure 1).

Figure 1. Distribution of SMEs in the 2020 sample by value chain node and segment.



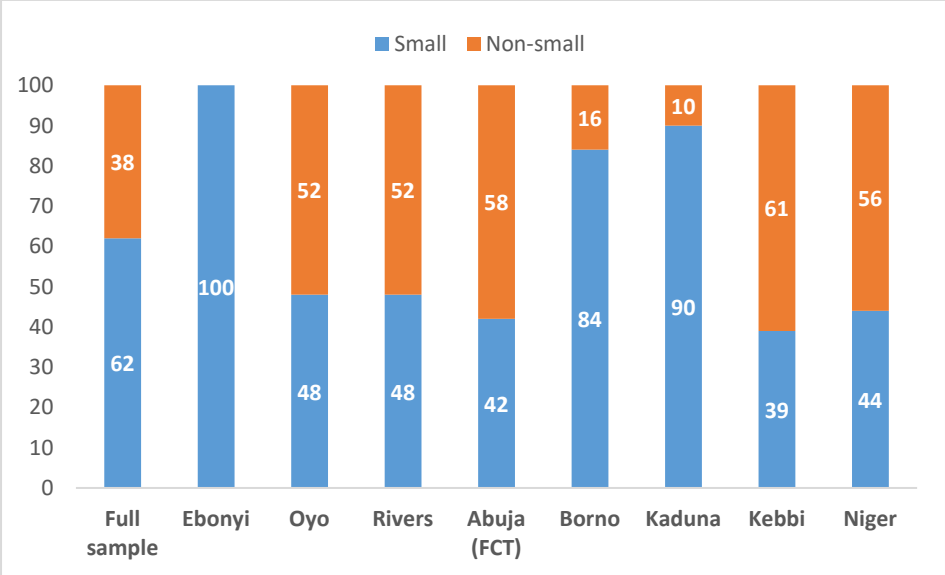
During 2021 we conducted a one-time follow up survey, during which we were able to contact and interview 435 of the original survey respondents (92%). Recall questions were asked, covering each month from February to June 2021. Questions during this round of interviews focused particularly on how businesses were able to work around COVID-19 containment policies and associated challenges, adapt, and pivot. Survey results are presented in sequence in the following sections.

DESCRIPTION OF SMES IN THE SURVEY

The survey covered three states in Southern Nigeria (Ebonyi, Oyo, and Rivers), four states in Northern Nigeria (Borno, Kaduna, Kebbi, Niger), and the Federal Capital Territory (FCT), Abuja, located in the center of the country. The selection of states was made to ensure coverage of a wide variety of geographies, economic conditions, and COVID-19 containment policies, and allow for state specific considerations and state-wise comparisons.

All survey respondents were asked to self-define the scale of their enterprise as 'small' or 'non-small'. Small businesses predominated, accounting for 62% of surveyed firms (Table 2). The share of small businesses in the sample varied widely by state, from only 39% in Kebbi state to about 90% in Kaduna, and 100% in Ebonyi.

Figure 2. Share of small and non-small businesses surveyed, by state.

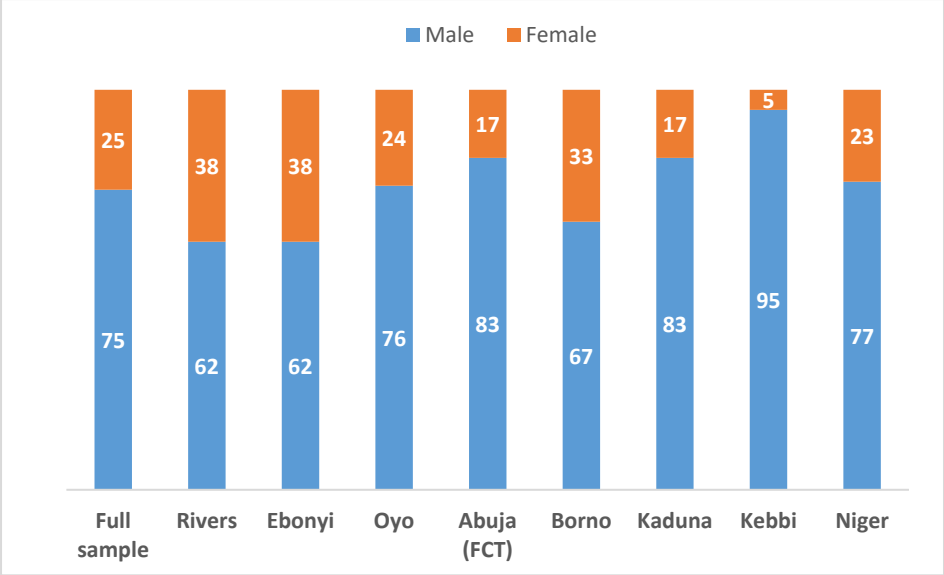


Source: Authors calculations

Figure 3 presents the gender of surveyed business owners by state. Three-quarters (75%) of surveyed businesses were male-owned and 25% were female-owned. The share of businesses owned by women respondents varied across states, ranging from 5% in Kebbi to 38% in Ebonyi, likely reflecting cultural differences between regions.

Table 1 presents the distribution of businesses by scale of operation, gender of owner, and supply chain segment (lateral, upstream, midstream and downstream). Small businesses are most common in the downstream segment of the value chain (retail), where they account for 71% of businesses, but are distributed more evenly in other segments (56% - 61%). Women-owned businesses are most common in the downstream and midstream segments of the value chain, where they account for 35% and 31% of business, respectively. Conversely fewer businesses owned by women are found in upstream and lateral segments (17% and 18%, respectively). This finding implies that women's ownership is particularly concentrated in trade and retail activities, and thus - particularly in the case of retail - ownership of smaller enterprises.

Figure 3. Share of surveyed enterprises, by gender of owner.



Source: Authors calculations

Table 1. Share of respondents by value chain segment, business size and gender of owner (%)

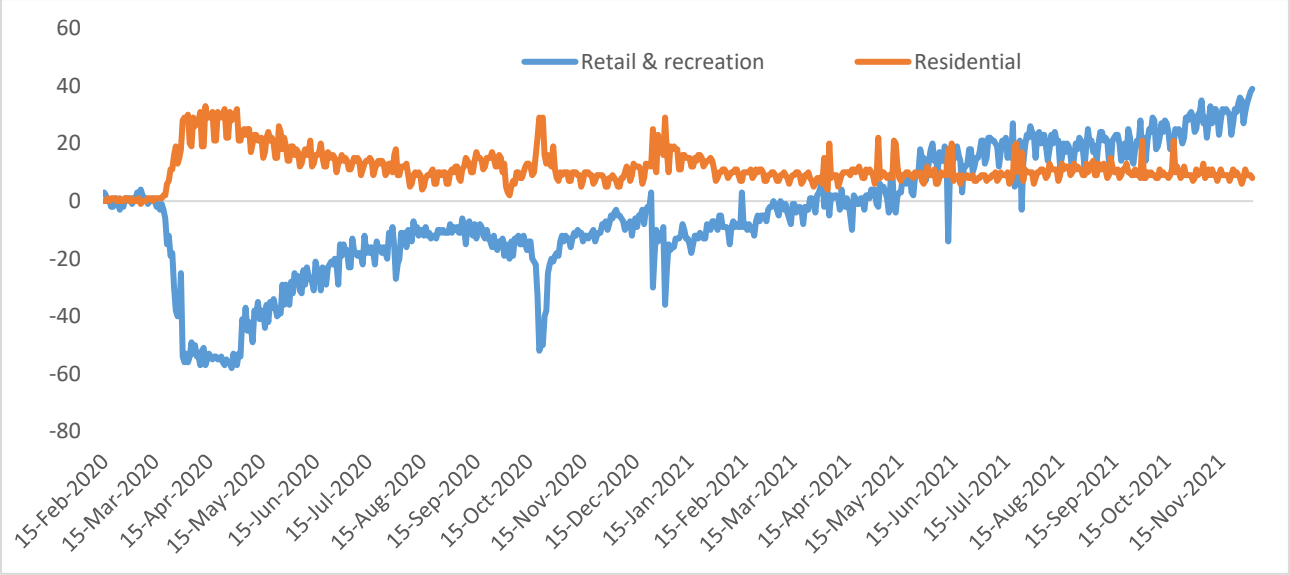
	Lateral	Upstream	Midstream	Downstream
Small	61	56	60	71
Non-small	39	44	40	29
Male	82	83	69	65
Female	18	17	31	35

Source: Authors calculations

During the onset of the COVID-19 pandemic, restrictions on human mobility were among the first responses implemented to curtail the spread of the virus. In Nigeria, movement restrictions took the form of night-time curfews, or outright lockdowns. The approaches taken varied by state. For example, strict lockdowns were enforced in Kaduna State, Niger State, Borno State, Rivers State (though only in May 2020) and FCT Abuja. In most of the other states there were either restrictions in movement in the form of curfews from dusk to dawn (e.g., Oyo) or limited restrictions but reduced movements for formal activities in educational institutions and religious houses of worship (e.g. Ebonyi).

The impacts of these restrictions on mobility at the national level are captured in Figure 4, which presents Google mobility indexes (GMI) for 'retail and recreational movement', and 'residential movement' (i.e., staying at home). GMI are part of a publicly available dataset, created by Google using anonymized location data sourced from mobile devices. The indexes express the percentage change in visits made, or time spent in categorized places (such as grocery stores, recreation centers, and residential areas) compared to a baseline value of zero, derived from the median level of movement during the first 15 days of February 2020, just prior to the onset of the pandemic and associated containment policies.

Figure 4. Google mobility index for retail and recreation, and residential movement in Nigeria, February 15, 2020 to November 15 2021



Source: Derived from data available at https://www.google.com/covid19/mobility/

The data reveal a precipitous 60 percentage point decline in retail and recreational mobility from late March, continuing until early May, and gradually recovering thereafter to reach, and eventually exceed, pre-pandemic levels of activity from around mid-May 2021 onwards. Conversely, the mobility index for residential movement (staying at home) peaks at around 30% above average during April 2020, and subsequently declines gradually.

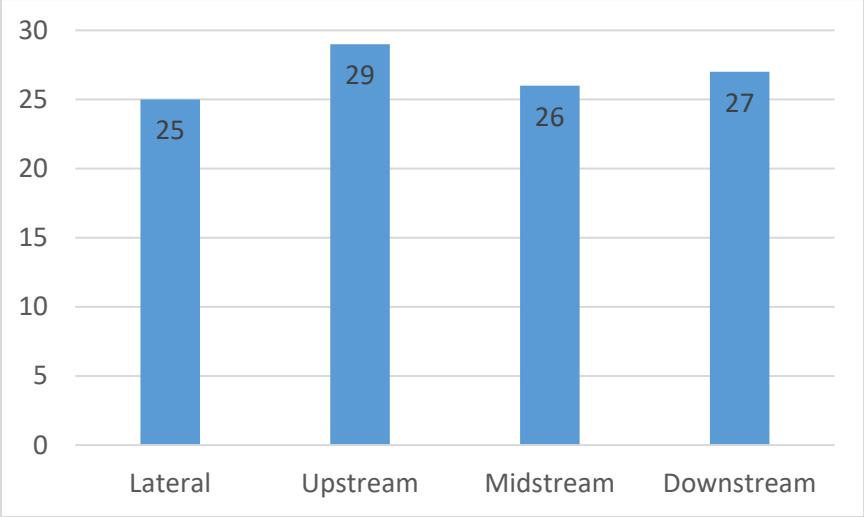
Distribution and operation of SMEs by scale and month

Figure 5 presents the average number of days per month SMEs were in operation during the survey period, by value chain segment. The pattern of reduced mobility and economic activity outlined above had a slightly negative effect on the number of days operated each month by SMEs, but most continued their activities.

SMEs operated for between 81% to 94% of the maximum days possible each month (i.e., between 25 and 29 days) on average between February and October 2020. SMEs in lateral supply chains (hatcheries and feed supply businesses) operated for the fewest days per month on average (81%; 25 days) relative to SMEs in other segments. Upstream SMEs (farms and fishers) had the highest average number of days of operation (29 days; 94%), perhaps reflecting the nature of the farm production cycle, which cannot be interrupted and restarted later because it involves live organisms that require constant care.

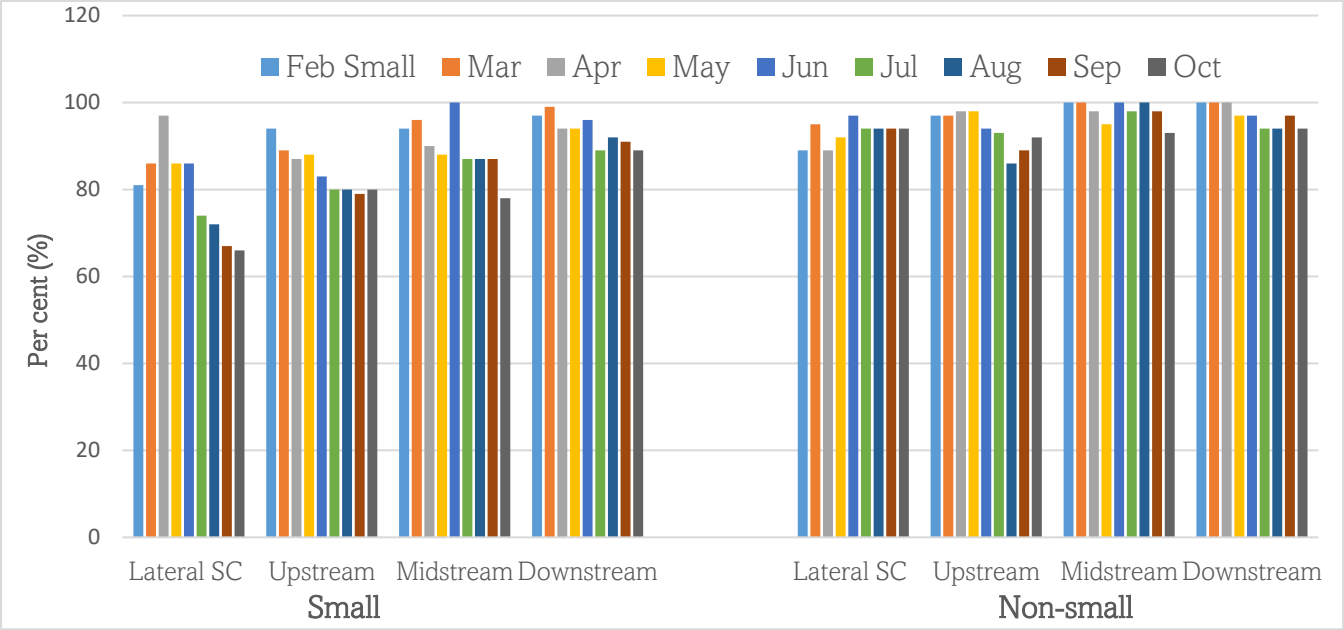
Actors in Borno State in the conflict prone Northeast of the country operated for the fewest days (23 days). This may reflect disruption caused by Boko-Haram militants in addition to disruption resulting from restrictions on movement linked to COVID-19 containment. Actors in Kaduna State (in the North, adjacent to the capital, FCT Abuja) faced the next highest level of business closures (operating 24 days/month on average). Kaduna faced a strict lockdown and thereafter, a dusk to dawn curfew, which may have been why SMEs in the state operated for fewer days than other states in our sample.

Figure 5. Average number of days businesses operation per month, by value chain segment



Source: Authors calculations

Figure 6. Share of businesses operating pre- and post-pandemic (by business Scale)



Source: Authors calculations

Figure 6 shows the share of businesses operating from February to October 2020. April-June were the months of strict lockdown in some states (e.g., Abuja, Niger, Kaduna), and varying restrictions in the others. The figure reveals important variations in the impacts of these policies on the operations of small and non-small businesses over the nine-month survey period.

Small businesses appear more likely to have been affected negatively than non-small businesses by COVID-19 containment policies. The number of small businesses operating declined fairly steadily between February and October, dropping by around 10-15 percentage points over this period. This trend appears quite consistent across all supply chain segments. In contrast, the number of non-small businesses in operation during this period remained rather stable or declined only slightly (around 3-5 percentage points) during the months of August-October. This trend suggests in addition to smaller

businesses proving less resilient to the effects of COVID-19 related restrictions, the stresses they experienced exacted a deepening toll over time, even after immediate restrictions were relaxed.

The greater severity of the impacts experienced by small businesses compared to non-small also appears to be reflected in the average number of days of business operation by month. Data in Table 2 suggest that non-small businesses operated for around 6-10% more days on average than small businesses in the same node.

The average number of days in operation appear similar for small and non-small business during April/May (the peak of the lockdown). However, in the succeeding months, small businesses tended to operate for fewer days than non-small businesses, likely indicating a medium to long-term impact of the COVID-19 lockdown and associated challenges that disproportionately affected the former. It is likely that non-small businesses were able to continue to operate due to having more resources than smaller enterprises, making them better able to weather the COVID-19 shock, and perhaps also having greater capacity to pivot actively to work around challenges.

Table 2. Average number of days SMEs are in operation (across the months)

	Full	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct
					Small					
Lateral SC	24	23	24	22	24	25	26	25	24	26
Upstream	28	26	28	27	29	29	29	28	27	29
Midstream	26	24	25	22	24	26	28	27	28	27
Downstream	26	25	25	22	24	27	29	29	28	28
					Non-small					
Lateral SC	25	26	25	22	24	26	27	27	26	26
Upstream	30	28	31	30	31	30	31	30	29	31
Midstream	28	26	28	23	26	28	30	29	28	30
Downstream	28	26	26	24	27	28	30	30	29	30

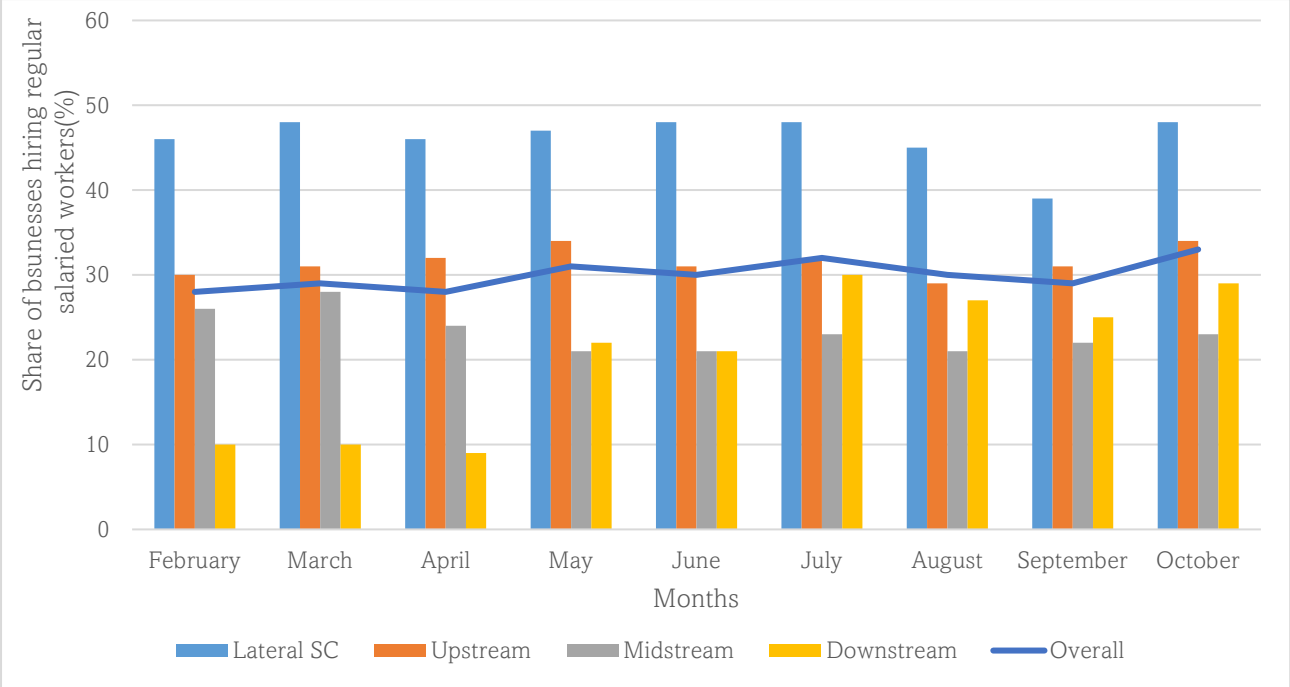
Source: Authors calculations

Employment patterns among SMEs

The impact of COVID-19 containment measures on SMEs appears to vary by value chain segment. In terms of hiring of regular salaried workers, SMEs in the lateral (input supply) and upstream (farming) segments were more likely than other nodes to hire regular salaried workers. Comparing the share that hired regular salaried workers over time it appears that lateral and upstream SMEs were also less impacted than midstream and downstream segments (Figure 7). Enterprises in lateral and upstream segments of the supply chain are primarily situated in fixed locations, and business activities require a steady supply of hired regular salaried workers.

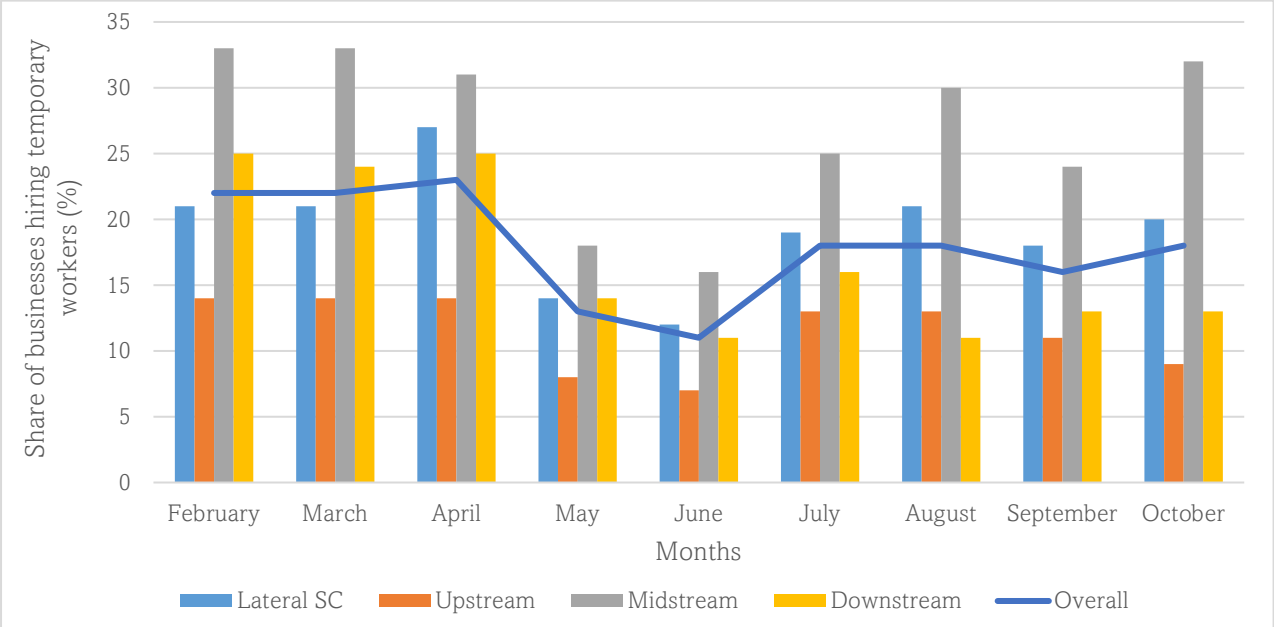
There was a significant reduction in midstream SMEs (e.g., traders and fish processors) hiring salaried workers, down from 30% to 20% during the lockdown period. Surprisingly, downstream SMEs (retailers) that were typically less likely than businesses in other nodes to hire regular salaried workers (about 10% hired in February) saw a significant increase in the use of regular salaried workers (to about 20%) during the later months of the lockdown (May and June), and this remained higher than pre-lockdown levels after the lockdown was eased. The increase in the use of regular salaried workers seems to have been accompanied by a reduction in the use of daily hired laborers (See Figure 8). This might reflect the need for these SMEs to secure guaranteed labor (via salaried workers) to address the uncertainty associated with labor supply from daily hired labor due to constrained mobility of workers, and reluctance to risk exposure to COVID-19.

Figure 7. Distribution of SMEs that hired regular salaried workers, by value chain segment and month



Source: Authors calculations

Figure 8. Distribution of SMEs that hired daily laborers, by value chain segment and month



Source: Authors calculations

Figure 8 suggests that the SMEs in all value chain segments reduced the use of daily laborers during the peak lockdown months of May and June, likely due to a combination of lower demand, constrained mobility of workers, and reluctance to risk exposure to COVID-19. However, except for SMEs in the downstream, the share of SMEs hiring casual workers subsequently recovered to near pre-pandemic levels. This lower use of hired labor (relative to the pre-lockdown period) is consistent with their increased use of salaried workers during the lockdown period that continued post lockdown.

Considering the number of casual daily workers hired per business, reductions in hiring were particularly evident for wholesalers and processors (midstream SMEs) and retailers (downstream) from around July onwards, suggesting lagged impacts on business activity continuing after the lockdown ended (Table 3). In contrast, the average number of regular salaried workers hired per business changed little over time

Table 3. Average number of daily laborers hired by SMEs, by month (conditional on hiring workers)

	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
Lateral	3.3	3.5	3.0	3.8	3.3	3.8	3.1	3.3	3.5
Upstream	3.3	3.3	3.5	3.3	4.3	3.5	3.7	2.8	2.8
Midstream	5.6	5.6	6.0	6.2	6.4	4.9	3.7	3.5	3.0
Downstream	3.4	4.2	4.2	4.5	2.3	2.2	2.6	2.1	2.2
Overall	4.2	4.4	4.4	4.6	4.4	3.8	3.4	3.0	2.9
Observations	102	102	108	61	51	79	85	72	69

EMPIRICAL ESTIMATION OF THE IMPACTS OF COVID-19 CONTAINMENT MEASURES ON SMES

We estimated a correlated random effects (CRE) model to analyze the impact of lockdowns and movement restrictions on SMEs. This approach enabled us to control for firm specific unobserved factors likely to be associated with a firm's true exposure to the lockdown policy (e.g., firms having unobserved characteristics such as social capital that might affect their true restrictions due to the lockdown policies) but also their business operations and choices.

Specifically, we analyzed the impact of lockdowns and associated restrictions on the number of days SMEs operated from February to October 2020, and on the hiring of regular salaried workers and daily hired laborers. By including month dummies in all estimations, we also account for any seasonality in the activities of the SMEs. Finally, we explored the challenges faced by SMEs and whether the probability of facing challenges is a function of the direct or indirect effect of lockdown or restrictions. Tables 4, 5, and 6 provide the results of the econometric analyses.

Impact on days of operation

Table 4 reveals a significant negative impact of lockdowns on the number of days operated by lateral SMEs, and a positive impact for upstream. Feed millers, feed sellers and hatcheries in states with strict lockdowns operated for approximately 32% fewer days (10 days) relative to SMEs engaged in the same activities in states with little or no restrictions on movement. A possible reason why this effect is so large could be that lateral supply chains often transact business across state borders and as such, restrictions on interstate movement would significantly impact their operation alongside restrictions on within state movement.

Small enterprises in lateral supply chains faced significantly larger negative impacts (about 16% fewer days) than non-small lateral supply chain businesses. This result confirms that small scale SMEs were disproportionately affected by lockdowns, with respect to the number of days they were able to operate.

More surprisingly, the impact of lockdowns on upstream SMEs - farmers and fishers – was positive. Most upstream SMEs are farms, whose business activities do not require movement between states, unlike many SMEs in other supply chain nodes. In addition, farming was considered an essential service and farms were largely free to continue operation, so movement restrictions impacting non-farming activities might have seen farmers who otherwise might have been sharing their time between farming and other non-farm activities, allocating more time on their upstream activities.

Similar to the lateral segment of the supply chain, small upstream SMEs were more heavily impacted, operating on about 16% fewer days (5 days) than their non-small counterparts. This finding further lends credence to the observation that lockdown measures disproportionately affected smaller businesses. For farms upstream, this result likely reflects the inability of smaller farms to cushion themselves against disruptions in access to input and output markets due to lockdown policies.

There was no significant effect of lockdowns on the average number of days operated by midstream and downstream SMEs, but small SMEs in both these value chain segments were significantly more affected by the lockdown than their large-scale counterparts.

Midstream and downstream SMEs owned by women were significantly more negatively impacted by the lockdown than businesses owned by men. Male-owned SMEs in these segments operated for 5-6% more days that female-owned businesses. While the number of days may appear small, considering that these SMEs mainly transact daily in finished or almost finished commodities, any disruption in business operations, however small, may will impact negatively on final business margins and may ultimately threaten their survival.

Table 4. Impacts of COVID-19 Lockdown on SME's Days of Operation

	(1) Lateral SC	(2) Upstream	(3) Midstream	(4) Downstream
VARIABLES		**Days of operation**		
Lockdown	-9.516***	6.082***	-1.127	0.045
	(2.390)	(0.807)	(1.678)	(1.423)
Urban location (1/0)	-2.428	1.065	-1.967	3.101
	(2.079)	(1.156)	(1.580)	(2.111)
Peri-urban location (1/0)	-1.313	1.104	-1.792	0.970
	(1.635)	(0.829)	(1.337)	(1.745)
Small scale business (1/0)	-4.548**	-4.724***	-2.057**	-1.404*
	(1.798)	(0.992)	(0.941)	(0.800)
Male business owner (1/0)	0.779	-0.021	1.737*	1.472*
	(1.658)	(0.873)	(1.056)	(0.868)
Other controls included	Yes	Yes	Yes	Yes
Mean of time varying controls included	Yes	Yes	Yes	Yes
Constant	31.757***	23.771***	22.732***	18.164***
	(2.918)	(1.597)	(1.677)	(2.225)
Observations	834	1,315	1,016	960

Note: Other controls include month dummies. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Impacts on hiring regular salaried workers

Lockdowns were associated with significant negative impacts on the number of hired daily laborers and regular salaried employees hired by SMEs, with significant differences also apparent between male and female owned businesses in lateral supply chain segments, as well as between small and non-small businesses.

Table 5 reveals that SMEs in lateral, upstream, and downstream value chain segments in states that experienced lockdowns hired fewer regular salaried workers than those in states without lockdowns. On average lateral SMEs in lockdown states, hired two regular salaried workers less than those in states without lockdowns. Not surprisingly, small lateral SMEs hired fewer regular salaried workers than their larger counterparts.

Similarly, upstream SMEs in states with lockdowns hired fewer regular salaried workers on average, than those in states that experienced no lockdowns (1.6 workers less), and small upstream SMEs hired fewer regular salaried workers (2 fewer, on average) than their larger counterparts. Lower hiring of salaried workers upstream in lockdown states could be due to challenges associated with labor movements documented in Nigeria during the lockdown (Liverpool-Tasie et al. 2021) and/or challenges associated with timely output market access that caused many farms to reduce their scale of operation.

We find no significant impact of lockdowns on the number of regular salaried workers hired by midstream SMEs. However, just as in lateral and upstream segments, small midstream SMEs were disproportionately affected, reducing the number of regular salaried workers hired by an average of 1.6 compared larger businesses.

In summary, these results provide clear evidence of the negative impacts of lockdown on the number of regular salaried workers hired by SMEs in Nigeria, and the greater severity of impacts on small businesses relative to non-small. The findings suggest that businesses across the poultry and fish value

chains adopted cost-saving strategies to mitigate the effects of the lockdown by reducing the number of regular salaried workers hired.

Table 5. Impacts of COVID-19 Lockdown on SME's Hiring of Regular salaried workers

	(1)	(2)	(3)	(4)
	Lateral SC	Upstream	Midstream	Downstream
VARIABLES	**Number of Regular Salaried Workers Hired**			
Lockdown	-1.895***	-1.449***	-0.431	-1.636***
	(0.440)	(0.372)	(0.662)	(0.559)
Urban location (1/0)	-0.022	-0.667	-0.351	-0.722
	(0.334)	(0.482)	(0.761)	(0.571)
Peri-urban location (1/0)	-0.214	-0.050	-0.619	-0.236
	(0.247)	(0.379)	(0.447)	(0.504)
Small scale business (1/0)	-0.742*	-1.734***	-1.603***	-1.168***
	(0.386)	(0.381)	(0.507)	(0.390)
Male business owner (1/0)	-0.656*	0.297	0.244	-0.041
	(0.383)	(0.251)	(0.270)	(0.116)
Other controls	Yes	Yes	Yes	Yes
Mean of time varying controls included	Yes	Yes	Yes	Yes
Constant	2.723***	1.662***	1.399**	2.834***
	(0.686)	(0.421)	(0.600)	(0.972)
Observations	833	1,315	1,016	960

Note: Other controls include months dummies. Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Impact on hiring daily laborers

Table 6 presents the impact of lockdowns on hiring daily (casual) laborers. We see that lockdowns had a significant negative impact on hiring causal workers among businesses in the midstream and downstream of poultry and fish value chains, suggesting strongly that restrictions on movement of workers and customers influenced the number of daily laborers hired. This is unsurprising given the nature of SMEs in these value chain nodes. Strikingly, midstream SMEs in states with lockdowns hired an average of 5 fewer daily laborers than those in states without any lockdowns, while downstream businesses hired approximately 2 daily laborers less.

These reductions might result from a combination of attempts by businesses to reduce costs, more limited labor requirements due to reduced business activity, or inability to hire workers due to movement restrictions or concerns about contracting COVID-19. Interestingly, unlike in the case of regular salaried workers, we do not find any significant differences between small and non-small businesses in terms of hiring daily laborers, except for downstream actors. When juxtaposed with Table 5, this suggests that, on average, small businesses are more likely to depend on casual workers, as compared to regular salaried workers.

Table 6. Impacts of COVID-19 Lockdown on SME's Hiring of Daily Workers

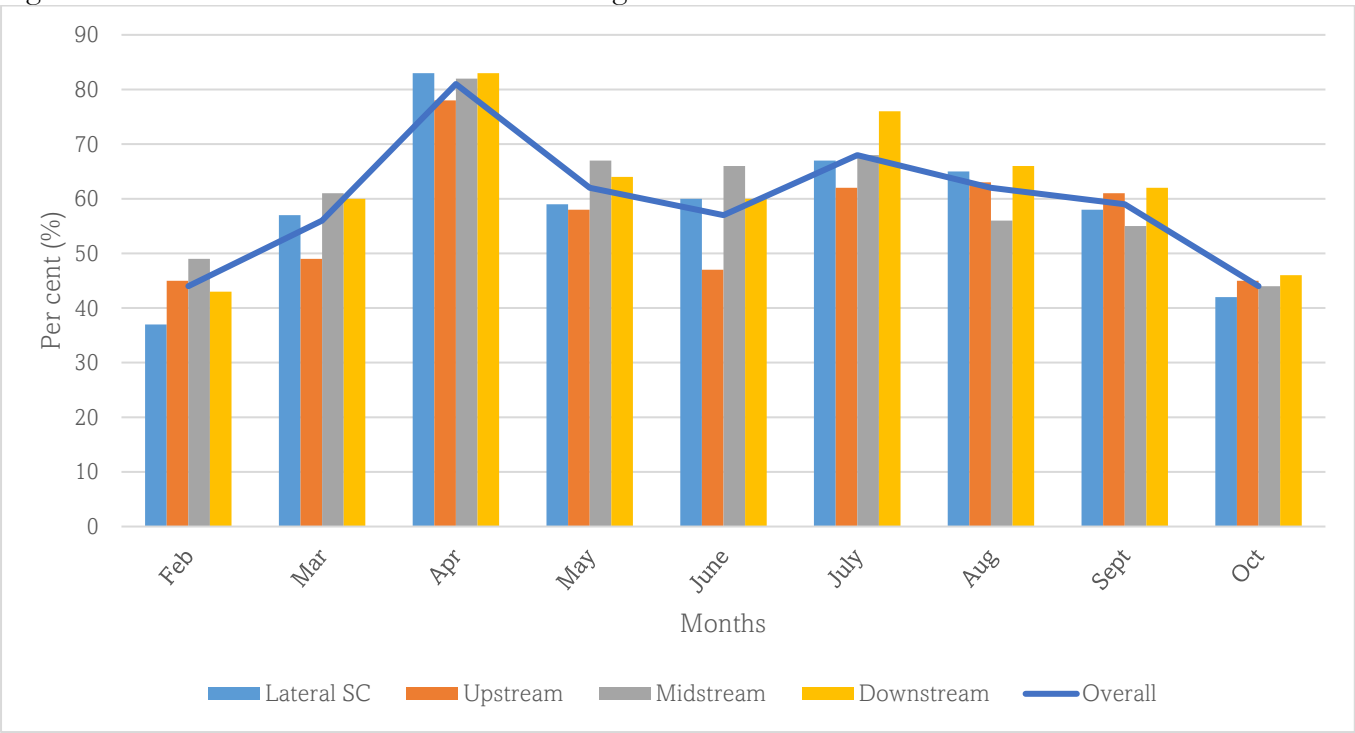
	(1) Lateral	(2) Upstream	(3) Midstream	(4) Downstream
VARIABLES	**Number of Daily Workers Hired**			
Lockdown	-1.117	-0.177	-4.916***	-1.636***
	(1.277)	(0.234)	(1.279)	(0.559)
Urban location (1/0)	0.486*	-0.074	-0.469	-0.722
	(0.259)	(0.254)	(1.192)	(0.571)
Peri-urban location (1/0)	0.282	0.270	-0.755	-0.236
	(0.235)	(0.196)	(1.264)	(0.504)
Small scale business (1/0)	-0.231	-0.203	-0.605	-1.168***
	(0.437)	(0.195)	(0.408)	(0.390)
Male business owner (1/0)	-0.226	0.155	0.092	-0.041
	(0.208)	(0.136)	(0.219)	(0.116)
Other controls	Yes	Yes	Yes	Yes
Mean of time varying controls included	Yes	Yes	Yes	Yes
Constant	1.422	0.537	6.326***	2.834***
	(1.312)	(0.411)	(1.629)	(0.972)
Observations	830	1,313	1,012	960

Note: Other controls include months dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

CHALLENGES FACED BY SMES DURING THE COVID-19 PANDEMIC

In this section, we provide a brief descriptive summary on the main challenges faced by SMEs in the study sample from February to October 2020, by value chain segment. Figure 9 presents the share of SMEs reporting facing any challenge to their business operations during these months. The share of SMEs reporting challenges peaked in April 2020 with the initial set of lockdown restrictions. This share fell slightly in the intervening months, finally returning to a level similar to February's in October.

Figure 9. Distribution of SMEs that faced challenges



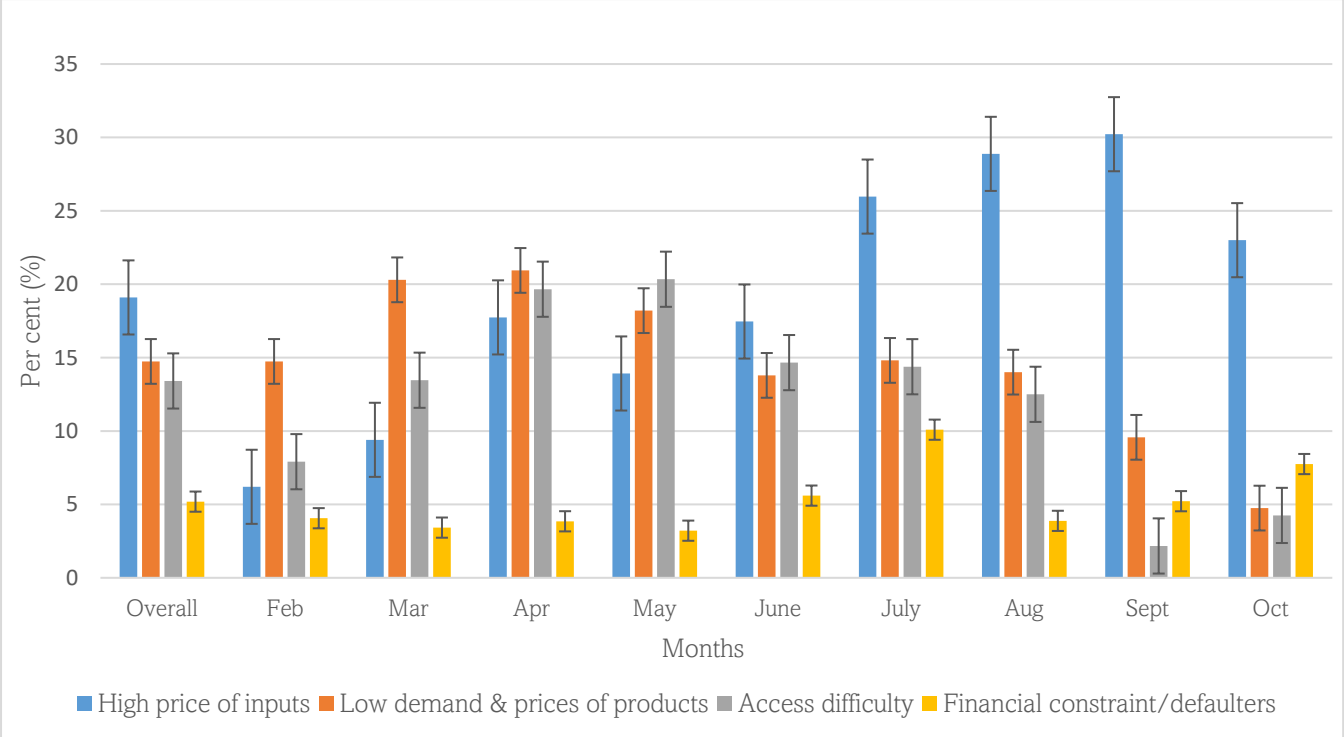
Source: Authors calculations

We break these COVID-19 linked challenges down into four major categories: (1) high price of inputs; (2) low demand for and/or prices of commodities; (3) difficulty accessing inputs or markets for outputs (including transportation related challenges); (4) financial challenges. The share of respondents facing each type of challenge in each month are reported in Figure 10. Respondents were able to report facing more than one type of challenge, and all responses were included in the percentage calculations.

We see clear evidence of the effect of lockdown on the share of respondents reporting difficulty accessing inputs, markets and transport, which peaked at around 20% in April and May before declining gradually. The share of respondents reporting low demand and low sales prices as challenges followed a similar pattern, also peaking during the lockdown months or March-May at around 20%, before declining gradually to 5% in October.

Interestingly we also observe a medium to long-term increase in the share of respondents facing high input prices. The share of SMEs reporting high inputs prices as a challenge grew steadily, was higher than in February (6%) in all other months and rose especially sharply from 17% in May to 30% in September. It is not clear to what extent this is a lagged effect from the earlier lockdown period (e.g., due to decisions to delay production during this period during inadequate demand), or an effect of inflation, which was high in Nigeria during 2020.

Figure 10. Share of respondents that faced supply chain challenges



Source: Authors calculations

Financial constraints were reported by less than 5% of respondents in most months but increased to 10% in July and 8% in October, possibly hinting at a lagged effect of the pandemic on business cash flows through, for example, extension of additional trade credit to buyers.

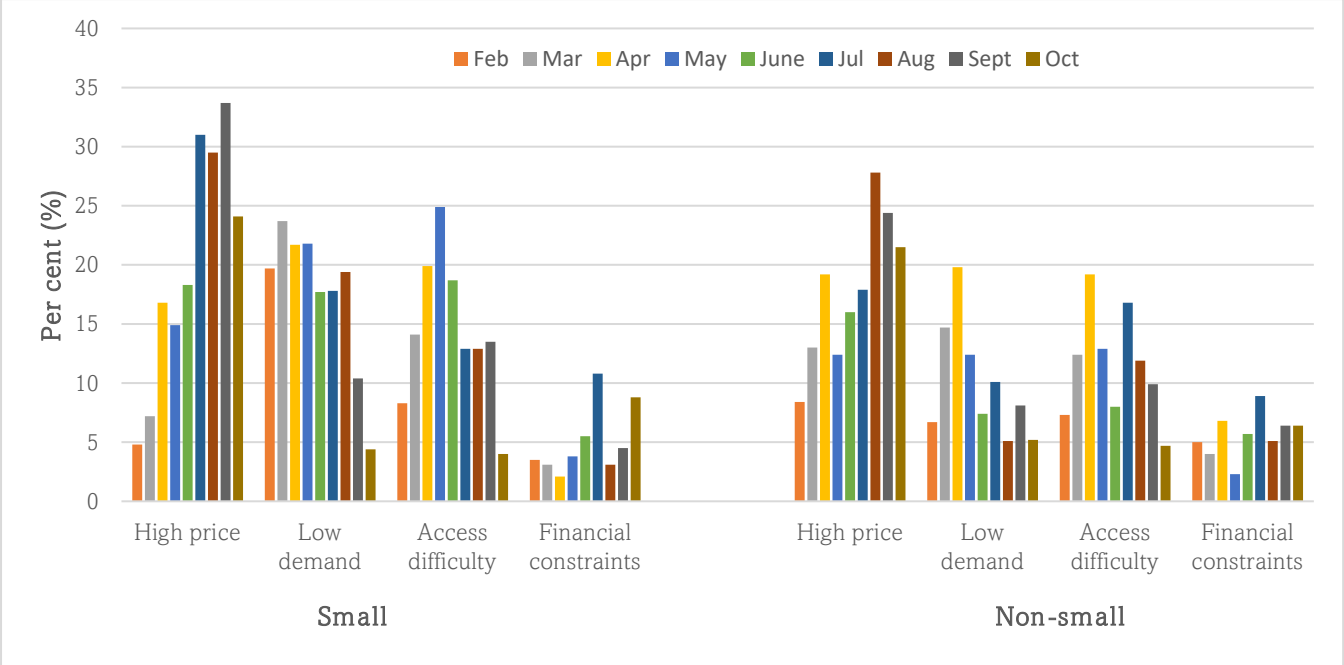
Disaggregation of challenges by scale of business and gender of owner

Figure 11 reports the types of challenges faced by SMEs based on their scale of operation. Business operations of SMEs were greatly affected by the lockdown policy irrespective of the scale of operation. For example, we see a steady increase in the share of businesses reporting the challenge of high prices by both small and non-small businesses.

However, small businesses tended to be disproportionately affected by challenges compared to non-small businesses, particularly low demand and access difficulties. These challenges were persistent during post-lockdown months. For example, at the peak of lockdown measures in April 2020, a similar share of small (22%) and non-small SMEs (20%) reported low demand as a challenge. However, by August, about 19% of small SMEs still reported facing this challenge, compared to 8% of non-small enterprises.

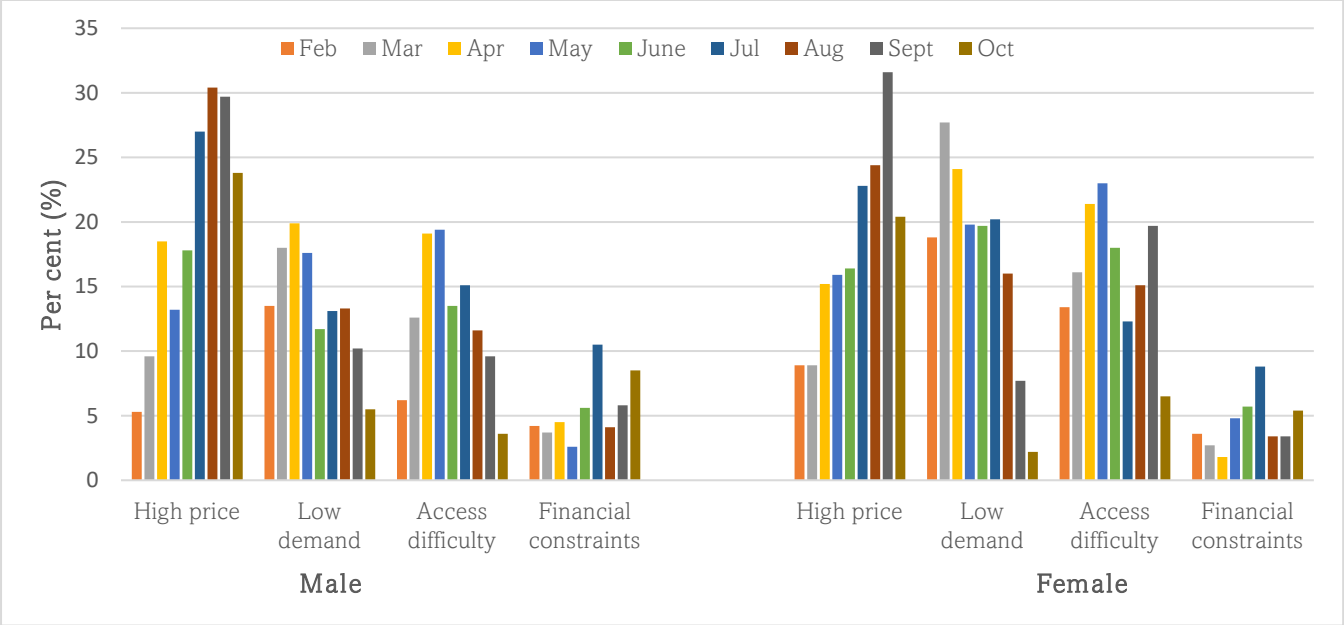
We see a similar contrast in the share of businesses reporting challenges by gender (Figure 12). Female owned businesses were more likely to report low demand and difficulties accessing inputs or transport, relative to male owned businesses. This may reflect the nature of challenges impacting the types of business in which women were most concentrated (downstream and midstream), as well as more systemic issues relating to freedom of movement, or disparities in social capital.

Figure 11. Share of SMEs facing challenges by scale and month



Source: Authors calculations

Figure 12. Share of SMEs facing challenges by gender of business owner and month



Source: Authors calculations

Challenges faced by SMEs, by exposure to lockdowns

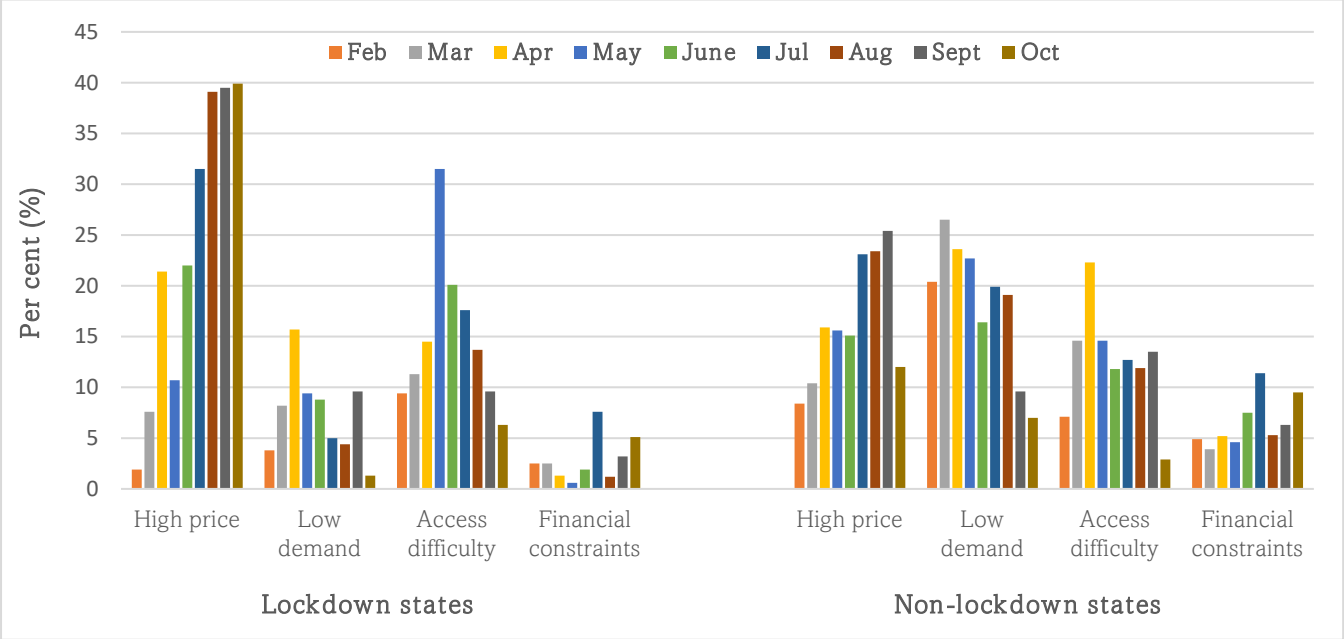
During the pre-pandemic months in February and March, a higher proportion of SMEs located in non-lockdown states (8-16%) reported facing high prices of inputs compared to SMEs in lockdown states (2-8%), as shown in Figure 13. However, during and after lockdown, we see a sharp rise in share of SMEs in lockdown states reporting high input prices as a challenge (up to 40% in October) compared to only about 12% among SMEs in non-lockdown states.

The share of businesses in lockdown states reporting difficulties in accessing inputs, markets or transport was also higher in lockdown states from May to August than in non-lockdown states, with a

peak in May, particularly in lockdown states, consistent with movement restrictions imposed at this time.

Somewhat surprisingly, SMEs in states that did not experience lockdowns were much more likely to report facing low demand (16-26%, vs 5-15%) than SMES in states that did have lockdowns, and somewhat more likely to face financial constraints.

Figure 13. Share of SMEs facing challenges by location of business and month



Source: Authors calculations

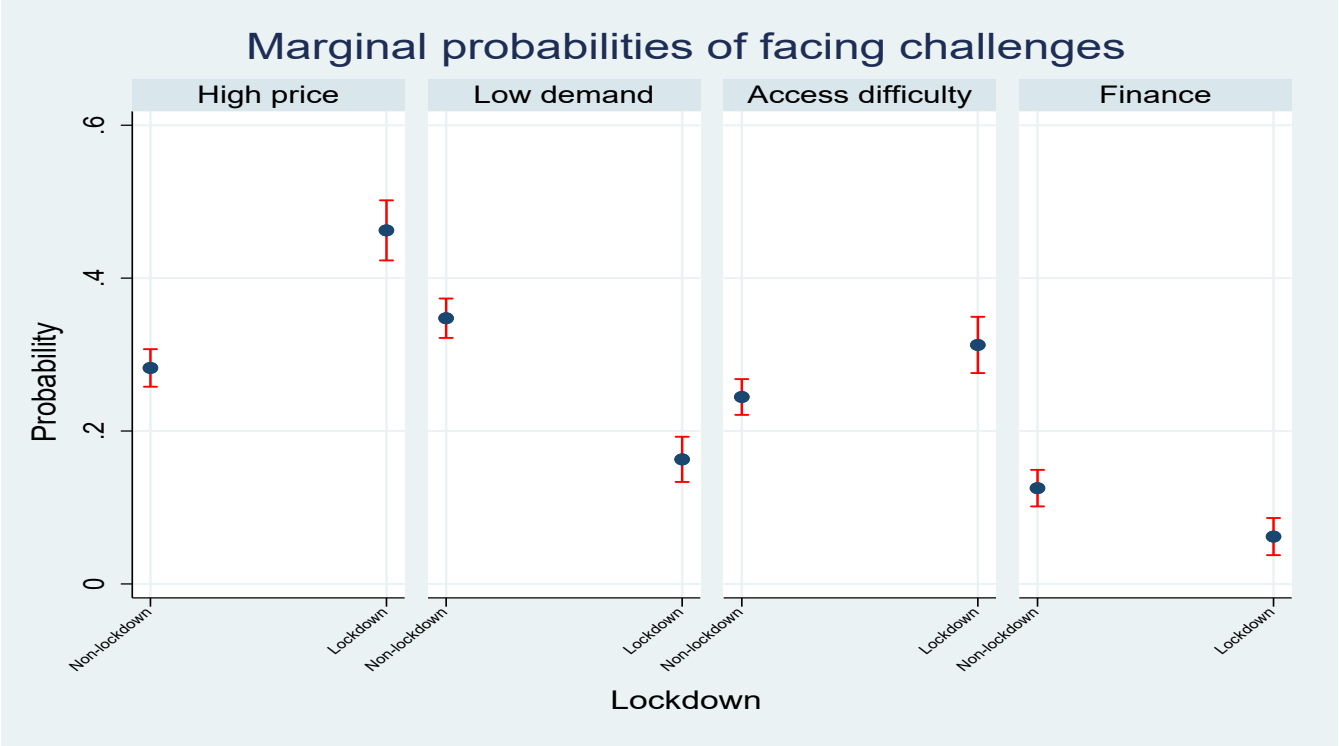
Does SMEs' exposure to lockdowns influence the probability of facing a challenge?

We explored whether being in states that experienced a lockdown influenced the expected probability of facing each type of challenge. Figure 14 shows that for SMEs in states with a strict lockdown, the expected probabilities of SMEs experiencing challenges were as follows; high input prices 0.46; low demand or prices 0.16; input scarcity or difficulty accessing, markets or transport 0.31, and financial challenges 0.06.

The graph confirms that SMEs in states where lockdowns were imposed were more likely to experience high prices of inputs relative to SMEs in non-lockdown states. Conversely, the graph also suggests that SMEs in lockdown states were less likely to experience low demand for marketed products, and slightly less likely to experience financial challenges relative to those in states without lockdowns. These findings might reflect the cross-border spill-over effects of restrictions in movement on business activities, particularly if the major markets for the products of SMEs in non-lockdown states were in states where there was a lockdown (e.g., Abuja).

Finally, there appears not to be a significant difference in the likelihood of experiencing scarcity or difficulty in accessing markets, inputs and transport, whether or not the state experienced a lockdown. This finding implies that COVID-19 containment measures negatively impeded SMEs' trading activities irrespective of location, likely due to logistical challenges impeding ability to procure inputs or access markets, and the spillover effects of lockdown policies on states that depended on states with lockdowns for their inputs, and or output markets.

Figure 14. Expected probability of facing challenges by exposure to lockdowns



Source: Authors calculations

We further examined empirically, the likelihood that these challenges were a function of whether states where SMEs were located experienced a lockdown (Table 7). Results in Table 7 are the marginal effects of the probability of facing any challenges, coming from a correlated random effects probit model. The results confirm that being in a state with a lockdown is positively and significantly associated with facing high prices of inputs and experiencing difficulty accessing inputs, markets and transport.

However, being in a lockdown state is negatively and significantly associated with SMEs reporting experiencing low demand for products, as well as facing financial related challenges. As noted above, these patterns may reflect the spillover impacts of COVID-19 containment policies on business activities across state boundaries, as well as the disparate policies adopted across the different states in Nigeria.

Table 7. Factors associated with SMEs reporting challenges (CRE probit estimates)

	High price of inputs	Low demand and price of product	Scarcity/Access difficulty	Financial challenges	Non-COVID
Lockdown state (1/0)	0.152***	-0.153***	0.071***	-0.06***	-0.011
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Male business owner (1/0)	-0.003	-0.007	-0.039*	0.004	0.045**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Rural location (1/0)	-0.062**	0.054**	0.001	-0.027	0.034
	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
Business node (Base: Downstream)					
Lateral SC	0.076***	-0.07***	0.047*	-0.031**	-0.02
	(0.03)	(0.02)	(0.01)	(0.01)	(0.03)
Upstream	0.076***	-0.122***	-0.008	-0.037***	0.091***
	(0.03)	(0.02)	(0.02)	(0.01)	(0.03)
Midstream	0.047*	-0.063***	0.016	-0.012	0.012
	(0.03)	(0.02)	(0.02)	(0.01)	(0.03)
Non-small scale business (1/0)	0.028	-0.07***	-0.016	0.013	0.045**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
North (1/0)	0.224***	-0.112***	-0.127***	0.059***	-0.044**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Other controls	Yes	Yes	Yes	Yes	Yes
LL	-3178.87				
AIC	6495.74				
BIC	6894.61				
Observations	2,394	2,394	2,394	2,394	2,394

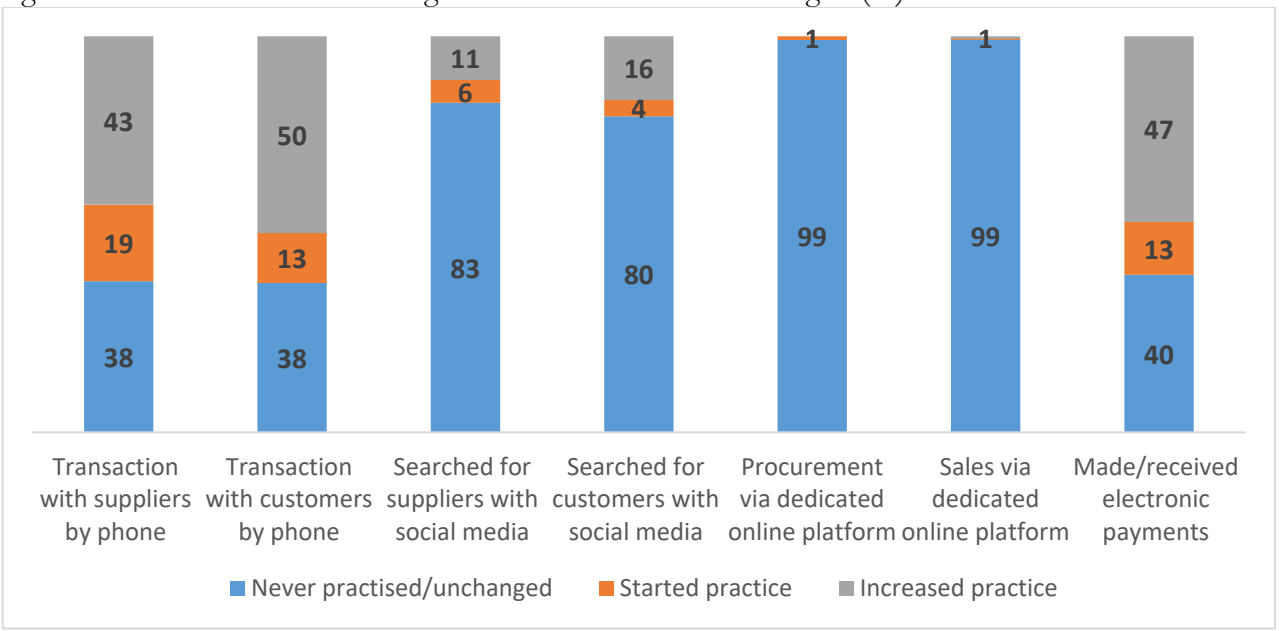
Note: Other controls include months dummies. Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

PIVOTING AND COPING STRATEGIES AND ASSISTANCE

This section addresses pivoting behaviors (proactive adaptations or innovations) adopted by businesses to overcome challenges posed by COVID-19 and associated containment policies, as well as coping strategies (reactive or passive adaptations followed to enable living with challenges or surviving them).

During our 2021 resurvey, all respondents were asked whether they had practiced any of a series of behaviors hypothesized to be possible responses to challenges posed by the pandemic, during the three years from 2019 to 2021. Behaviors were selected for inclusion based on responses to research conducted during 2020. For each behavior practiced within the past three years, respondents were asked whether the behavior had been initiated as a response to the pandemic, whether it was pre-existing but had been increased due to the pandemic, or whether it was pre-existing and remained unchanged. In the following analysis we aggregate 'never practiced' and 'remained unchanged' answers into a single category.

Figure 15. Use of electronic and digital communications technologies (%)



Source: Authors calculations

1) Figure 15 presents information on behaviors related the use of electronic and digital communications technologies during transactions with suppliers or customers. Key results are as follows:

2) Mobile phones already were widely used prior to the pandemic to organize transactions with suppliers and customers by call or text. However, phone use for this purpose increased sharply in response to the pandemic. For instance, 50% of respondents increased their use of phones during transactions with customers while 13% started using phones for this purpose. Similarly, 43% increased their use of phones during transactions with suppliers and 19% started using phones for transacting with suppliers.

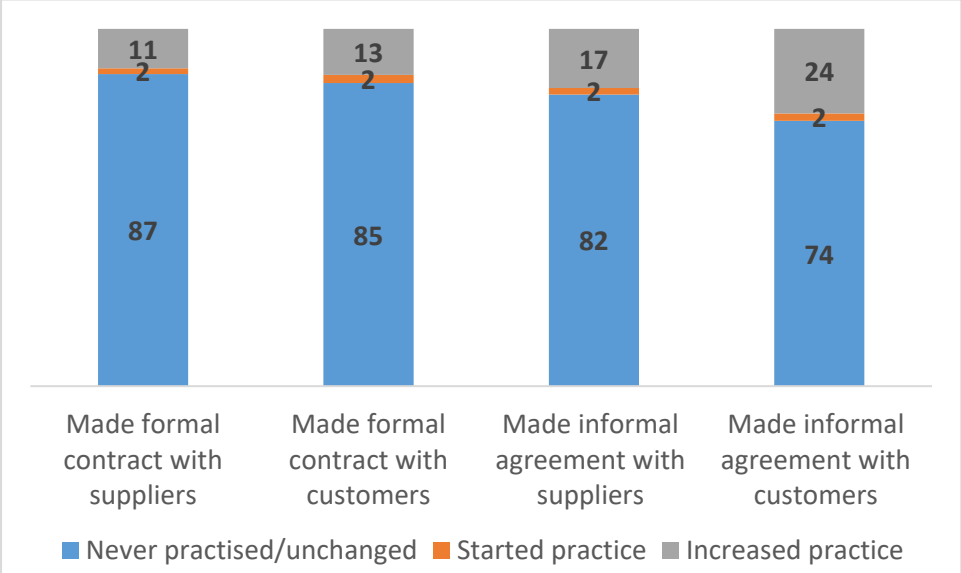
3) Internet and social media use to search for suppliers and customers increased in response to the challenges posed by the pandemic (e.g., 16% of respondents increased the use of internet and social media for seeking customers, and 4% started using them for this purpose).

4) There was very limited change in use of dedicated online marketplace platforms such as Jumia, Konga, or Agromint for either procurement or sales, among survey respondents, suggesting

that most of the transition toward e-commerce was driven by enterprises making use of general-purpose social media platforms (e.g., WhatsApp, Facebook).

5) There was a big increase in use of electronic payments (e.g., mobile money or mobile banking applications) when making or receiving transaction, with most respondents (60%) reporting having started (13%) or increased (47%) their use in response to the pandemic, likely corresponding to the increase in remote transactions organized by phone or online, and possibly increased concern about the hygiene implications of handling cash.

Figure 16. Contractual arrangements with suppliers and customers (%)



Source: Authors calculations

Figure 16 illustrates changes in contractual relations (defined here as formal contracts or informal agreements between respondents and their suppliers/customers committing them to buy from/sell to them in future). In all cases, few respondents (2%) initiated any new form of contractual agreement in response to COVID-19. However, many respondents reported an increase in pre-existing arrangements.

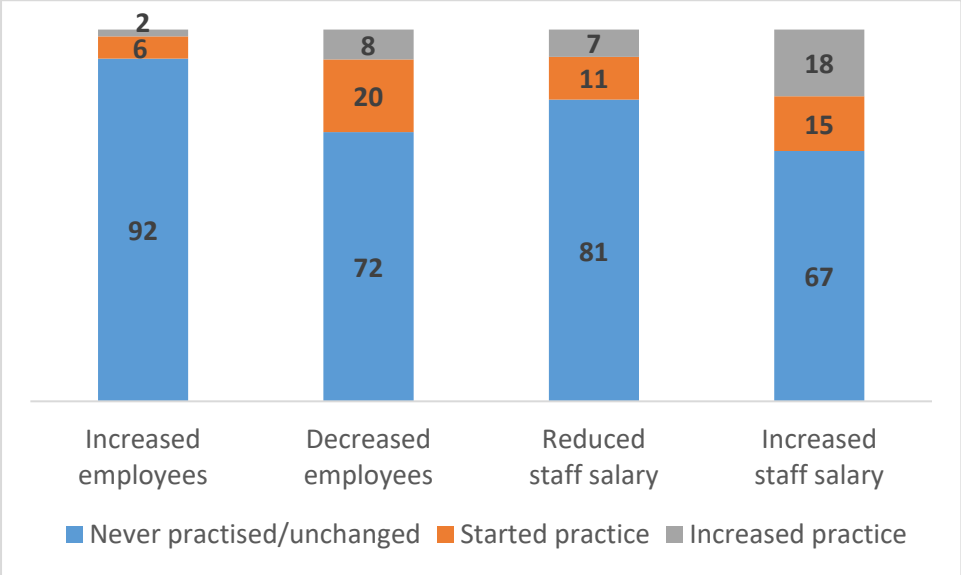
Informal agreements between actors are more common than formal contractual relations, increasing by 17% and 24% for suppliers and customers, respectively. Formal contracts with suppliers and customers were reported to have increased by 11% and 13% of respondents, respectively. The increased use of informal and formal agreements between actors in the surveyed value chains regarding future transactions may be interpreted as a form of coordination used to in the attempt to instill greater predictability under volatile conditions.

Changes in hiring practices (increasing or decreasing numbers of employees, or their wages) are illustrated in Figure 17. As expected, reducing the numbers of employees hired was a common strategy, initiated by 20% of respondents, and increased by 8%, likely reflecting a combination of lower levels of business activity and attempts to reduce costs. Fewer businesses (6%) hired additional employees.

Interestingly, businesses reported increasing wages for workers (initiated by 15% and increased by 18%) more frequently than reducing them (initiated by 11% and increased by 7%). This may be interpreted as a response to worker shortages during periods when mobility restrictions and fear of contracting COVID-19 prevented businesses hiring sufficient labor: a somewhat paradoxical combination of high unemployment and higher wage rates.

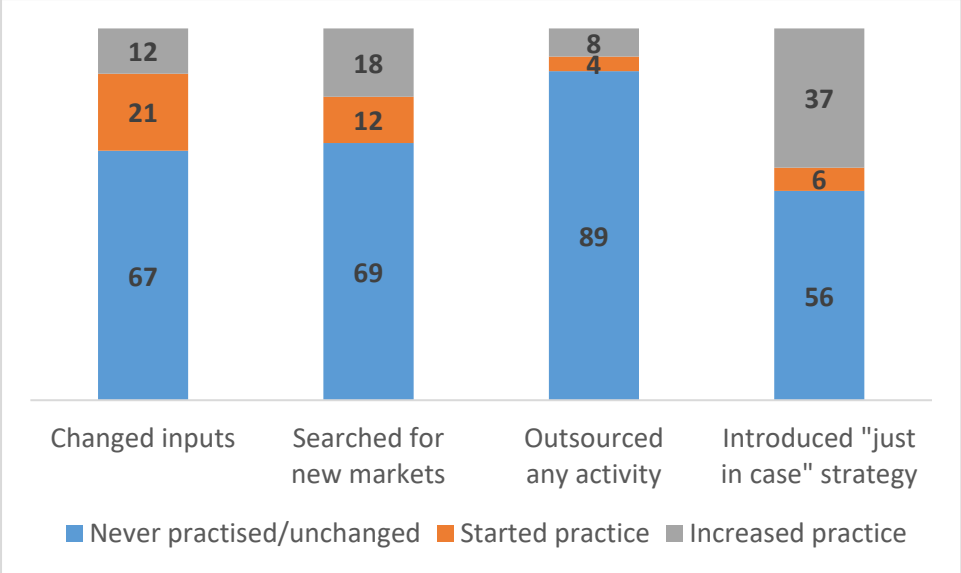
Figure 18 presents the share of respondents reporting having adopted pivoting behaviors. Changing the type of inputs used because a preferred type of input was unavailable or expensive was a common strategy, initiated by 21% of businesses, and increased by 12%. Depending on the circumstances under which such decisions were taken they might be seen as proactive moves to optimize operations, or strategies of last resort. Searching for new markets was for products was also common; initiated by 12% of businesses and increased by 18% in response to the challenges posed by COVID-19. Again, such attempts might constitute proactive pivots or coping strategies, depending on the circumstances under which they occurred.

Figure 17. Changes in hiring practices (%)



Source: Authors calculations

Figure 18. Use of pivoting behaviors (%)



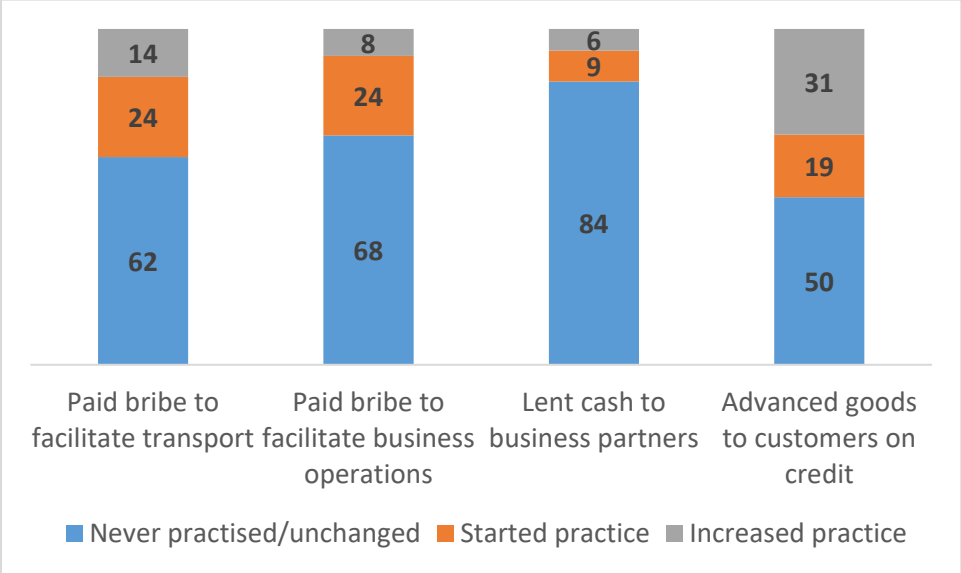
Source: Authors calculations

A smaller, but still significant share of enterprises reported outsourcing activities that they previously carried out – a clear example of pivoting - with 8% having started doing so, and 4% having increased the practice. Finally, 37% of respondents reported having increased the introduction of "just in case"

strategies (defined as "a strategy that can help you handle a shock to your input or output supply, such as stocking more inputs than normal or paying in advance for logistics services as a backup plan for procuring inputs or selling outputs), while 19% had introduced these strategies for the first time. This result appears indicative of significant behavioral change, likely taken in response to the experience of initial shocks associated with COVID-19, and thus perhaps indicates a tendency for supply chains to evolve toward greater resilience.

We hypothesized that restrictions imposed to contain COVID-19 (e.g., movement restrictions, business closures) might create new opportunities for rent seeking behaviors. This is confirmed by results presented in Figure 19, indicating that one-quarter of respondents (24%) began paying informal payments (e.g., bribes) to facilitate transport for their business. The same number paid bribes or other informal payments to facilitate continued business operations, with 14% and 8%, respectively, increasing the frequency of these practices.

Figure 19. Use of informal payments and credit (%)



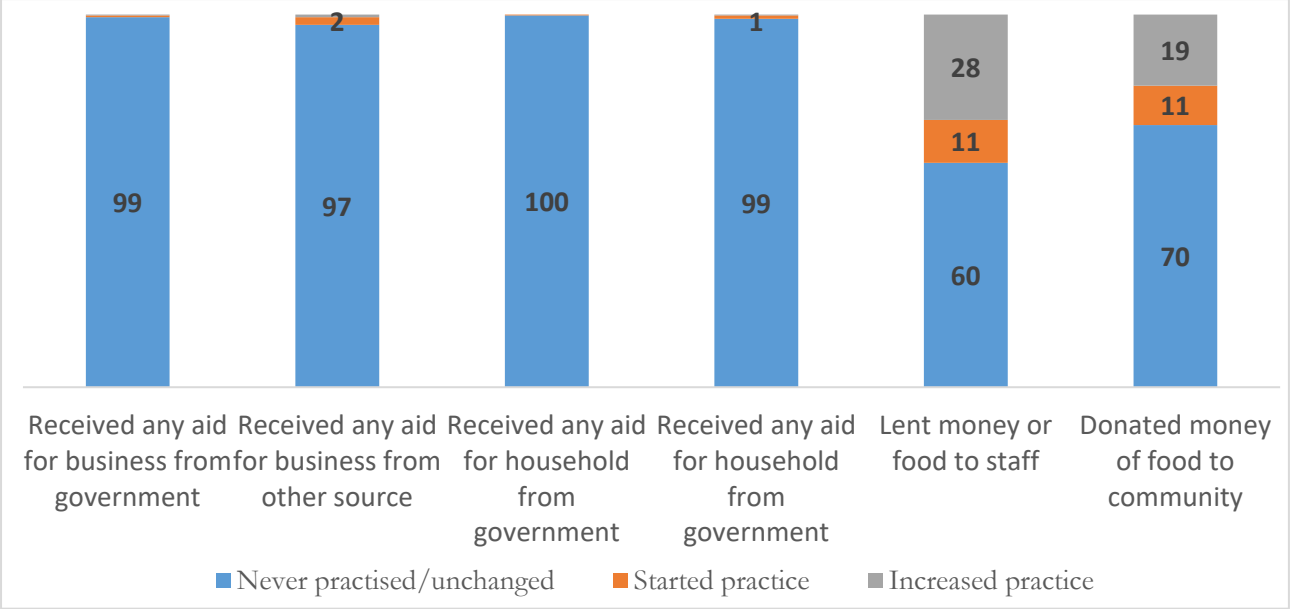
Source: Authors calculations

Informal credit provision was widely used to facilitate business operations. Nine percent of respondents reported lending cash to business partners – a high number given that many surveyed enterprises are operated by sole traders. Half of respondents either began (19%) or increased (31%) the practice of advancing goods as in-kind or trade credit. Both behaviors can be seen as responses to liquidity and cash flow problems, taken to enable business operations to continue running.

Figure 20 illustrates the wide gap between the extent of formal and informal support mechanisms. Less than 1% of businesses and no households reported receiving any form of government assistance in response to the COVID-19 crisis. Assistance from other types of institution (e.g., business associations) was also limited, received by only 3% of businesses and 1% of households.

In contrast, 40% of business owners reported that they had started (11%) or increased (28%) the practice of lending money or food to employees in response to the COVID-19 crisis, and 30% reported having started (11%) or increased (19%) donations of money or food to the communities in which they were located.

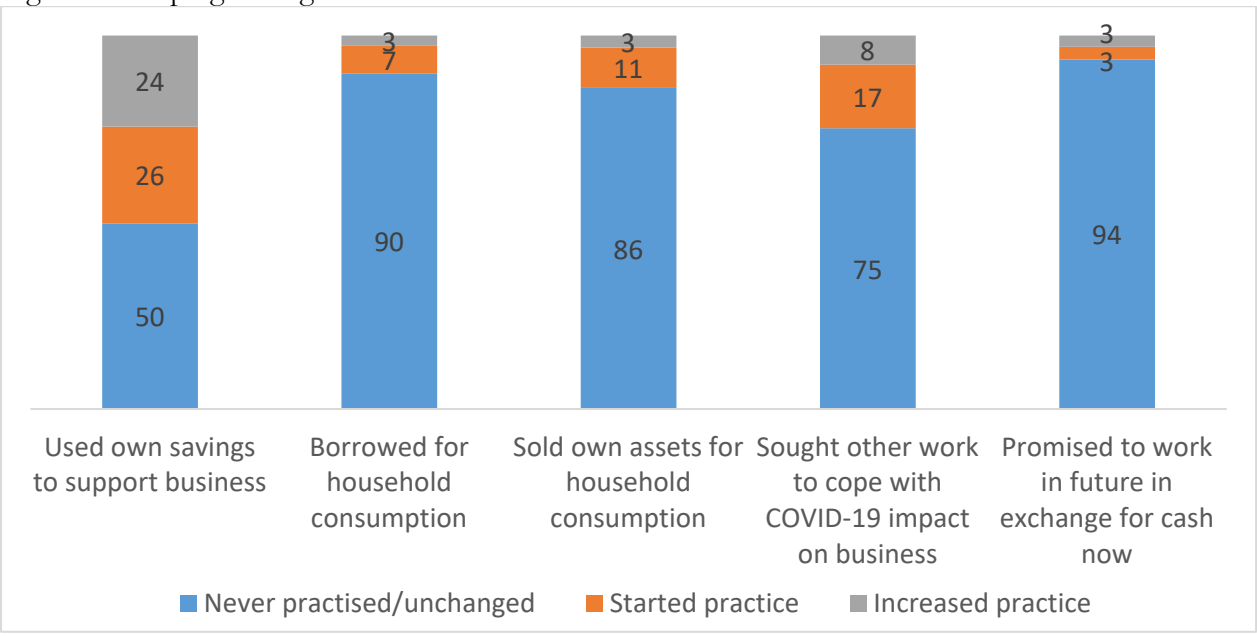
Figure 20. Receipt or provision of formal and informal assistance (%)



Source: Authors calculations

The final set of graphs (Figure 21) presents coping strategies employed by businesses and households to weather the economic challenges associated with COVID-19. Drawing down own savings to support continued business operations was an extremely common strategy, reported by half of respondents (initiated by 26% and increased by 24%). In addition, respondents often looked for other kinds of work in order to cope with the effects of the COVID-19 pandemic on their businesses, reported by 25% (17% started, 8% increased).

Figure 21. Coping strategies



Source: Authors calculations

Smaller numbers of respondents (approximately 10%) borrowed or sold assets to support household consumption needs, with most of them initiating this practice in response to COVID-19. Relatively few respondents (6%) took the step of promising to work for someone in the future in exchange for immediate advance payment; a step that would typically be associated with adverse terms for the borrower.

Taken together this last set of findings indicates that a significant portion of business owners experienced considerable financial hardship due to downturns in business activity, causing them to draw down savings. Coupled with higher costs of doing business (e.g., bribes, transport costs), and more frequent provision of credit to other actors to maintain business turnover, these trends are consistent with the increasing financial difficulties reported in the preceding section.

Correlates of pivoting

In this subsection we estimate the relationship between key business characteristics - gender of owner; location (rural/non-rural); supply chain segment (upstream, midstream, and lateral, with downstream as the base segment), business size, and geography (North/South) - and probability of altering a selection of the business practices described in the previous subjection.

We run two models; a multinomial logistical regression (mlogit) which predicts the probability of one of three possible outcomes (practice unchanged, practice started, practice increased), and a probit regression, which estimates the probability of any change in practice occurring. We evaluate the relationship between the variables identified above and changes in eight business practices involving use of information and communications technology (ICT), contracts, use of savings to fund business operations, and payment of bribes.

Table 8 compares probabilities of using (PROBIT) and starting or increasing use (MLOGIT) of: (1) phones during transactions with suppliers, and (2) internet or social media when searching for suppliers.

The following points stand out: (1) Rural businesses were more likely than non-rural to start using mobile phones during transactions with suppliers ($p<0.01$). (2) Upstream businesses (farms and fishers) were significantly less likely than those in downstream segments to alter their use of mobile phones during transactions with suppliers ($p<0.01$) (3) Businesses in Northern Nigeria were significantly more likely ($p<0.01$) to begin using a phone during transactions with suppliers, but less likely to ($p<0.01$) to increase their use.

In case of searching for suppliers online or with social media, rural businesses, non-small businesses, and businesses in lateral supply chains were all more likely ($p<0.1$) to change this practice (i.e., start or increase it) than non-rural, small, and downstream businesses. Businesses in Northern Nigeria were significantly less likely ($p<0.01$) to search for suppliers in this way than those in the South.

We interpret these results as follows. Use of phones to facilitate transactions with suppliers was already a common practice prior to the pandemic, whereas use of social media is more recent and relatively less widespread. It is likely that both practices are more common in urban areas and the Southern part of the country. Respondents in rural areas were thus more likely than their urban counterparts to take up both technologies in response to constraints related to the pandemic that made remote communication and coordination more important, but this effect was stronger for phones (a more basic technology than internet).

Non-small businesses were more likely than small businesses to adopt the use of social media, perhaps reflecting higher levels of access to smartphones among the former. Upstream value chain actors were less likely than those downstream (retailers) to start using phones during transactions with suppliers. This may reflect the high frequency of transactions typically made by retailers with suppliers, compared to upstream producers who procure inputs from time to time.

Table 8. Correlates of changing use of ICT during business transactions

	Transaction with suppliers by phone				Searched for suppliers with social media			
	MLOGIT			PROBIT	MLOGIT			PROBIT
Variable	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)
Female owned enterprise (1/0)	-0.077	0.069	0.0085	0.076	-0.010	0.0094	0.00061	0.013
	(0.057)	(0.042)	(0.055)	(0.056)	(0.043)	(0.027)	(0.033)	(0.043)
Rural (1/0)	-0.31***	0.083	0.23***	0.312***	-0.079	0.0015	0.078*	0.084*
	(0.075)	(0.053)	(0.066)	(0.072)	(0.050)	(0.035)	(0.037)	(0.050)
Upstream (1/0)	0.18**	-0.074	-0.11	-0.180***	-0.081	0.040	0.041	0.075
	(0.061)	(0.046)	(0.064)	(0.061)	(0.053)	(0.032)	(0.045)	(0.051)
Midstream (1/0)	0.0053	0.0078	-0.013	-0.003	-0.049	-0.015	0.064	0.049
	(0.069)	(0.048)	(0.068)	(0.068)	(0.058)	(0.040)	(0.044)	(0.053)
Lateral (1/0)	0.070	-0.036	-0.033	-0.066	-0.087	0.051	0.037	0.090*
	(0.069)	(0.053)	(0.068)	(0.068)	(0.056)	(0.033)	(0.046)	(0.054)
Non-small business (1/0)	-0.047	-0.028	0.075	0.047	-0.067	0.046	0.021	0.071*
	(0.048)	(0.038)	(0.048)	(0.048)	(0.039)	(0.028)	(0.030)	(0.038)
North (1/0)	-0.10	0.43***	-0.32***	0.007	0.092	0.095*	-0.19***	-0.127***
	(0.056)	(0.077)	(0.048)	(0.048)	(0.051)	(0.039)	(0.031)	(0.034)
N	435	435	435	435	435	435	435	435

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9 estimates probabilities of starting or increasing use of: (1) electronic payments systems for business transactions, and (2) own savings to support business operations. Women were significantly more likely ($p<0.05$) to start the use of electronic payment systems than men. Rural businesses were significantly more likely than non-rural businesses to increase ($p<0.1$) or change ($p<0.01$) their use. Businesses located in the North were more likely to start use ($p<0.01$), but less likely to change use ($p<0.05$) than those in the South.

We interpret these findings as follows: Women and businesses in rural areas may have been less likely to make use of electronic payments prior to the pandemic, hence more likely to start or change their use during the pandemic to facilitate more remote transactions. This interpretation is consistent with significant rural increases in use of phone and social media, as well as the positive but insignificant increase in the use of these technologies by women reported in Table 8. Businesses in the North of Nigeria were less likely to start or increase use or electronic payments than those in the more

economically developed South, also consistent with the patterns of phone and social media use presented in Table 8.

Businesses in northern Nigeria were significantly less likely than those in the South ($p<0.05$) to use their own savings in support of business operations. One possible explanation is that Northern businesses have less savings to draw on for this purpose.

Table 9. Correlates of making electronic transactions, and use of savings to maintain business operations

	Electronic payments for business				**Used own savings to support business**			
	MLOGIT			PROBIT	MLOGIT			PROBIT
Variable	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)
Female owned enterprise (1/0)	-0.029	0.11**	-0.081	0.032	-0.013	0.024	-0.011	0.011
	(0.056)	(0.035)	(0.055)	(0.057)	(0.059)	(0.050)	(0.052)	(0.059)
Rural (1/0)	-0.18*	0.051	0.13*	0.188***	-0.0084	0.13*	-0.12	0.034
	(0.072)	(0.045)	(0.067)	(0.072)	(0.077)	(0.056)	(0.076)	(0.074)
Upstream (1/0)	0.0067	-0.020	0.014	-0.003	-0.028	0.00034	0.027	0.024
	(0.064)	(0.041)	(0.065)	(0.063)	(0.066)	(0.059)	(0.057)	(0.066)
Midstream (1/0)	-0.0036	-0.021	0.025	0.004	-0.088	0.054	0.035	0.088
	(0.068)	(0.043)	(0.067)	(0.068)	(0.070)	(0.061)	(0.059)	(0.070)
Lateral (1/0)	-0.063	-0.034	0.097	0.074	-0.0079	0.049	-0.041	0.010
	(0.070)	(0.047)	(0.067)	(0.069)	(0.072)	(0.062)	(0.064)	(0.072)
Non-small business (1/0)	-0.058	0.040	0.018	0.055	0.037	-0.057	0.019	-0.038
	(0.051)	(0.033)	(0.050)	(0.050)	(0.052)	(0.044)	(0.045)	(0.052)
North (1/0)	0.0061	0.32***	-0.32***	-0.098**	0.032	-0.11**	0.073	-0.038
	(0.058)	(0.076)	(0.048)	(0.048)	(0.050)	(0.041)	(0.044)	(0.050)
N	435	435	435	435	435	435	435	435

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10 presents probabilities of respondents starting or increasing formal contracts or informal agreements committing them to the purchase of goods from suppliers. Patterns for both types of agreement are similar. Women were significantly less likely than men ($p<0.01$) to change their behavior regarding either type of contract, indicating, that men were more likely to enter such contracts.

Upstream and midstream businesses were both significantly more likely ($p<0.05$) than downstream businesses to start formal contracts and informal agreements with their suppliers in response to COVID-19, but less likely to increase their use of contracts, and less likely to change their use of contracts overall. We interpret this to mean that downstream businesses (retailers) were already more likely prior to the COVID-19 crisis to have contracts with their suppliers than upstream farms and midstream traders and processors, making that the latter groups more likely to initiate these arrangements to increase the predictability of input supply under the volatile conditions.

Businesses in northern Nigeria were significantly less likely ($p<0.01$) to increase or change their use of formal or informal contracts than those in the South, indicative perhaps of the more highly developed nature of supply chain coordination in the dynamic South.

Table 10. Correlates of making formal contracts and informal agreements with suppliers

	Formal contract with suppliers				**Informal agreement with suppliers**			
	MLOGIT			PROBIT	MLOGIT			PROBIT
Variable	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)
Female owned enterprise (1/0)	0.057	-0.0025	-0.054	-0.065*	0.075	0.017	-0.093*	-0.071
	(0.038)	(0.013)	(0.037)	(0.037)	(0.047)	(0.014)	(0.045)	(0.045)
Rural (1/0)	0.14	-0.22**	0.077*	0.046	-0.059	-0.094	0.060	0.062
	(0.085)	(0.084)	(0.036)	(0.040)	(0.056)	(0.020)	(0.053)	(0.056)
Upstream (1/0)	-0.12	0.23**	-0.11*	-0.076*	-0.047	0.23**	-0.19***	-0.145***
	(0.092)	(0.088)	(0.043)	(0.043)	(0.091)	(0.085)	(0.049)	(0.049)
Midstream (1/0)	-0.18	0.24**	-0.056	-0.013	-0.090	0.24**	-0.15**	-0.100**
	(0.092)	(0.089)	(0.041)	(0.042)	(0.093)	(0.088)	(0.049)	(0.051)
Lateral (1/0)	0.047	-0.00058	-0.046	-0.055	-0.11	0.22**	-0.11*	-0.085*
	(0.040)	(0.0026)	(0.040)	(0.043)	(0.088)	(0.082)	(0.048)	(0.051)
Non-small business (1/0)	-0.010	0.021	-0.010	0.011	-0.053	0.0097	0.043	0.051
	(0.033)	(0.014)	(0.031)	(0.031)	(0.040)	(0.014)	(0.038)	(0.039)
North (1/0)	0.21***	0.0042	-0.21***	-0.202***	0.17***	0.011	-0.18***	-0.174***
	(0.035)	(0.011)	(0.033)	(0.029)	(0.036)	(0.013)	(0.033)	(0.034)
N	435	435	435	435	435	435	435	435

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 11 presents probabilities of respondents paying bribes or other informal payments to facilitate transport (e.g., to allow movement of goods through checkpoint) or business operations (e.g., to allow them to remain open). Rural businesses were significantly more likely to begin paying both types of bribes. This may suggest that urban businesses were already more likely to be subject to rent-seeking behaviors prior to the onset of the COVID-19 pandemic, and that such behaviors increased in rural areas during the pandemic, perhaps reflecting the increasing frequency of roadblocks and other security measures.

Upstream and midstream businesses were significantly less likely ($p<0.01$ and $p<0.05$, respectively) than downstream businesses to report changes in the payment of bribes to facilitate transport. Upstream businesses, but not midstream businesses, were significantly less likely ($p<0.01$) than downstream businesses to report changes in the payment of bribes to facilitate business operations.

Table 11. Correlates of paying bribes to facilitate transport or business operations

	Paid bribes to facilitate transport				**Paid bribes to facilitate business operation**			
	MLOGIT			PROBIT	MLOGIT			PROBIT
Variable	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)	Practice un-changed	Practice started	Practice increased	Practice changed due to covid (1/0)
Female owned enterprise (1/0)	-0.068	0.081	-0.013	0.069	-0.093	0.075	0.018	0.092*
	(0.054)	(0.046)	(0.040)	(0.054)	(0.049)	(0.045)	(0.030)	(0.050)
Rural (1/0)	-0.14	0.22***	-0.080	0.174***	-0.10	0.20***	-0.094	0.157***
	(0.073)	(0.045)	(0.071)	(0.065)	(0.077)	(0.045)	(0.079)	(0.058)
Upstream (1/0)	0.15*	-0.074	-0.075	-0.164***	0.14*	-0.082	-0.055	-0.149**
	(0.060)	(0.054)	(0.043)	(0.061)	(0.059)	(0.053)	(0.039)	(0.059)
Midstream (1/0)	0.13*	-0.00057	-0.13*	-0.136**	0.047	-0.0033	-0.044	-0.058
	(0.064)	(0.056)	(0.050)	(0.064)	(0.061)	(0.055)	(0.037)	(0.061)
Lateral (1/0)	-0.043	0.11*	-0.071	0.039	-0.062	0.085	-0.023	0.056
	(0.066)	(0.054)	(0.046)	(0.066)	(0.060)	(0.053)	(0.035)	(0.061)
Non-small business (1/0)	-0.040	0.014	0.026	0.040	-0.058	0.029	0.028	0.061
	(0.049)	(0.042)	(0.037)	(0.049)	(0.046)	(0.041)	(0.029)	(0.046)
North (1/0)	0.20***	-0.22***	0.022	-0.209***	0.24***	-0.26***	0.019	-0.255***
	(0.042)	(0.033)	(0.032)	(0.043)	(0.037)	(0.030)	(0.026)	(0.037)
N	435	435	435	435	435	435	435	435

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

We interpret these results to mean that downstream businesses faced the highest level of exposure to demands for bribes, perhaps reflecting their mobile and highly informal nature. Businesses in the North were significantly less likely than those in the South to report starting or changing the payment of bribes of either type. This finding seems to imply that businesses in the North faced higher existing levels of exposure to bribery, possibly linked to high levels of insecurity (e.g., due to the threats posed by Boko Haram), relative to the South.

To summarize, the following key points emerge from the regressions result presented in this sub-section:

1) Use of technologies such as phones, social media, and electronic payments was already in widespread in the relatively economically developed urban areas and Southern part of the country prior to the pandemic. As a result, these technologies were more likely to be taken up in response to the pandemic by businesses in northern Nigeria and in rural areas, as the challenges to mobility further enhanced their utility, driving adoption in more peripheral areas.

2) Adoption of advanced co-pivoting practices requiring new forms of coordination between actors in different value chain segments (e.g., formal contracts and informal commitments to the purchase of goods from suppliers) were less frequently adopted by businesses in the North, perhaps reflecting of the existence of 'shallower' markets in this region, as compared to the South.

3) Downstream businesses were more likely to adopt pivoting behaviors than those in upstream value chain segments. Upstream businesses are less likely to adopt formal or informal contracts, likely reflecting the higher frequency of procurement by retail businesses as compared to farms and hence greater need for coordination to assure access to business supplies. Upstream businesses were also less likely than those downstream to change their payment of bribes, likely reflecting the mobile and informal nature of retail businesses which makes them vulnerable to rent seeking behaviors.

4) Gendered differences in pivoting behaviors are indicative of disadvantages faced by women business owners. Businesses operated by women are significantly more likely than those operated by men to have started using electronic payments systems during the pandemic, suggesting a lower rate of adoption by women prior to this time. Businesses operated by women were significantly less likely than those run by men to enter into formal contracts or informal agreements with suppliers, possibly signifying a lower level of bargaining power among businesses run by women relative to those run by men. Finally, businesses operated by women were more likely than those operated by men to increase payment of bribes to facilitate continuation of business operations, indicative of their greater vulnerability to rent seeking behavior, perhaps linked in part to higher representation in informal and mobile businesses in downstream and midstream value chain segments.

5) Business size seems to have little effect on the likelihood of altering the behaviors discussed in this section, perhaps because many of them (e.g., use of phones or social media; informal agreements), are scale neutral.

BUSINESS FAILURES

Table 12 presents the probability of businesses ceasing operations between the final survey round in 2020 and the resurvey in 2021. Four important results stand out. First, businesses operated by women were 15 percentage points more likely to close than those operated by men, a result that is highly significant ($p<0.01$). Second, small businesses were 15 percentage points more likely to close than non-small businesses ($p<0.01$). Third, businesses in the North were 6 percentage points more likely to close than those in the South ($p<0.01$). Fourth, similar patterns hold when closures unrelated to COVID-19 are excluded, indicating that factors associated with COVID-19 accounted for most business closures.

These figures suggest strongly that COVID-19 and associated containment policies intensified underlying inequalities by causing higher levels of closures among businesses that were operated by women, small in scale, or located in the less economically developed and more insecure North. Conversely, businesses operated by men businesses, non-small, or in the more prosperous and stable South have proven more resilient.

Table 12. Correlates of going out of business between 2020 and 2021 survey rounds, including and excluding factor unrelated to COVID-19

	Probability of closing down	**Probability of closing down, excluding closures unrelated to COVID-19**
VARIABLES	Margins	Margins
Female owned enterprise (1/0)	0.151***	0.111***
	(0.031)	(0.028)
Rural (1/0)	0.009	0.021
	(0.047)	(0.040)
Upstream (1/0)	0.034	0.021
	(0.043)	(0.040)
Midstream (1/0)	-0.025	-0.020
	(0.048)	(0.045)
Lateral (1/0)	0.019	0.047
	(0.044)	(0.039)
Non-small business (1/0)	-0.153***	-0.132***
	(0.033)	(0.031)
North (1/0)	0.064*	0.072**
	(0.033)	(0.028)
Lockdown (1/0)	-0.033	-0.043
	(0.035)	(0.031)
N	435	415

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

CONCLUSIONS

This report uses a panel dataset from two phone surveys covering February–October 2020 and March–July 2021, with nearly 500 small and medium enterprises (SMEs) in the poultry and fish value chains of eight states in all six of Nigeria's geopolitical zones. We address three empirical gaps in the knowledge of the impacts of COVID-19 and containment policies on enterprises in these value chains.

- First, how did state level variations in COVID-19 containment policies affect the operation of businesses during 2020, and how did these effects vary by location (rural and urban; North and South), size of enterprise (small and non-small), value chain segment (lateral, upstream, midstream, and downstream), and gender of business owner.
- Second, what kinds of challenges did businesses confront during this period and how did that vary over time and across nodes.
- Third, what pivoting strategies did SMEs apply in response to COVID-19 challenges (in terms of, for instance, changes to marketing, procurement, technologies, and employment behaviors) and how did these vary by location, business scale, value chain segment, and gender of the enterprise.

Lockdown policies had direct and indirect impacts on SME business operations, but effects were disproportionally negative for small-scale enterprises and enterprises owned by women. Lockdowns negatively impacted the number of days operated by SMEs in lateral supply chains (feed businesses and hatcheries), but small lateral supply chains SMEs in faced significantly larger negative impacts than non-small. Midstream and downstream SMEs (wholesalers and retailers) owned by women were significantly more negatively impacted by lockdowns than businesses owned by men.

Lockdowns were associated with significant negative impacts on the number of hired daily laborers and regular salaried workers employed by SMEs, with significant differences also apparent between male and female owned businesses in lateral supply chin segments, as well as between small and non-small businesses.

We find clear evidence of the effect of lockdown on difficulty accessing inputs, markets and transport. These challenges peaked in April and May (when the lockdown policies were implemented most fully) before declining gradually. The share of respondents reporting low demand and low sales prices as challenges followed a similar pattern. In contrast, the share of SMEs reporting high input prices as a challenge grew steadily in all months but increased especially sharply post-lockdown.

Small businesses tended to be disproportionately affected by these challenges, particularly difficulties associated with low demand and market access, which were more persistent during post-lockdown months for small enterprises than for non-small.

Surveyed SMEs adopted a range of pivoting behaviors in response to the challenges faced. Many of the strategies deployed seem consistent with improved resilience, but others could negatively affect long-term business sustainability.

Mobile phones were widely used to organize transactions prior to the pandemic, but their use for this purpose increased sharply during the pandemic, as reported by around half of respondents. Internet and social media use to search for suppliers and customers also increased significantly. However, this transition toward e-commerce was driven by informal use of social media platforms (e.g., WhatsApp, Facebook) rather than formal dedicated online marketplace platforms such as Jumia, Konga, or Agromint.

There was a big increase in the use of electronic payments (e.g., mobile money or mobile banking applications), with most respondents (60%) reporting having started (13%) or increased (47%) their use

in response to the pandemic, likely corresponding to the increase in remote transactions organized by phone or online, and possibly increased concern about the hygiene implications of handling cash.

Few respondents (2%) initiated any new form of contractual agreement in response to COVID-19, but 12% reported an increase in the use of pre-existing contracts, likely to instill greater predictability under volatile conditions. Informal agreements between actors were more common than formal contractual relations and their use was reported to have increased by around 20% of respondents.

As expected, reducing numbers of employees hired was a common cost saving strategy in the face of lower levels of business activity. Interestingly, a non-trivial share of businesses reported increasing wages for workers (initiated by 15% and increased by 18%). This may be interpreted as a response to worker shortages during periods when mobility restrictions and fear of contracting COVID-19 prevented businesses hiring sufficient labor.

We found a sharp increase in the introduction of "just in case" strategies (defined as "a strategy that can help you handle a shock to your input or output supply, such as stocking more inputs than normal or paying in advance for logistics services as a backup plan for procuring inputs or selling outputs). 40% of respondents reported having increased the use of these strategies, while 20% reported introducing them for the first time. This result appears indicative of behavioral change taken in response to the experience of initial shocks associated with COVID-19, and thus perhaps indicates a tendency for supply chains to evolve toward greater resilience.

However, we also found evidence of behaviors with potentially negative impacts on SME operations. For example, COVID-19 containment policies such as movement restrictions and business closures created opportunities for rent seeking. One quarter of respondents began paying informal payments (e.g. bribes) to facilitate transport for their business, and the same share paid bribes to facilitate continued business operations. Provision of informal credit was widely used to facilitate business operations. About 10% of respondents reported lending cash to business partners – a high number given that many surveyed enterprises are operated by sole traders. Half of respondents began (19%) or increased (31%) advancing goods as in-kind or trade credit. Both behaviors can be seen as responses taken to enable business operations to continue running. However, the long-term impact of these strategies is uncertain as informal payments increase business operating costs and reduce profit margins while repayment failures by clients could have major financial implications for SMEs.

Very few surveyed SMEs received any kind of formal support in response to COVID-19 crisis. Less than 1% of businesses reported receiving any form of government assistance. Assistance from other types of institution (e.g., business associations) was received by only 3% of businesses and 1% of households. In contrast, 40% of business owners started (11%) or increased (28%) lending money or food to employees in response to the COVID-19 crisis, and 30% started (11%) or increased (19%) donations of money or food to the communities in which they were located.

Finally, we explored the determinants of the probability of businesses ceasing operations between the final survey round in 2020 and the resurvey in 2021. Businesses operated by women were 15% more likely to close than those operated by men. Small businesses were 15% more likely to close than non-small businesses. Businesses in Northern Nigeria were 6% more likely to close than those in the South ($p<0.01$).

These results suggest strongly that COVID-19 and associated containment policies intensified underlying inequalities by causing higher levels of closures among businesses that were operated by women, small in scale, or located in the less economically developed and more insecure North. Conversely, businesses operated by men, non-small, or in the more prosperous and stable South have proven more resilient.

REFERENCES

Gona, A., Woji, G., Norbert, S., Muhammad, H., Liverpool-Tasie, L.S.O., Reardon, T., Belton, B. 2018. *The Rapid Transformation of the Fish Value Chain in Nigeria: Evidence from Kebbi State.* Research Paper 115. September 2018. East Lansing: MSU

Liverpool-Tasie LSO, Reardon T, Belton B. 2020. "Essential non-essentials": COVID-19 policy missteps in Nigeria rooted in persistent myths about African food value chains. *Applied Economic and Perspectives and Policy.*1–20. https://doi.org/10.1002/aepp.13139

Liverpool-Tasie, S., Omonona, B., Sanou, A., Ogunleye, W., Padilla, S., Reardon. T. 2016. Growth and transformation of chicken & eggs value chains in Nigeria. Feed the Future Innovation Lab for Food Security Policy Research Paper 22. Michigan State University.

Liverpool-Tasie, S.O., Sanou, O., Reardon, T., Belton, B. 2021. Demand for Imported versus Domestic Fish in Nigeria. *Journal of Agricultural Economics.* https://doi.org/10.1111/1477-9552.12423

Padilla, S., Liverpool-Tasie, L.S.O., Myers, R.J. 2019. The effects of feed costs and increased energy needs on broiler farm productivity: A dynamic programming approach. Feed the Future Innovation Lab for Food Security Policy Research Paper 130. Michigan State University.

Reardon, T., A. Heiman, L. Lu, C.S.R. Nuthalapati, R. Vos, C. Zilberman. 2021. "Pivoting" by food industry firms to cope with COVID-19 in developing regions: e-commerce and "co-pivoting" delivery-intermediaries. *Agricultural Economics*, 52(3):1-17. https://doi.org/10.1111/agec.12631

Subasinghe R, Siriwardena SN, Byrd K, Chan CY, Dizyee K, Shikuku K, Tran N, Adegoke A, Adeleke M, Anastasiou K, Beveridge M, Bogard J, Chu L, Fregene BT, Ene-Obong H, Cheong KC, Nukpezah J, Olagunju O, Powell A, Steensma J, Williams G, Shelley C and Phillips M. 2021. *Nigeria fish futures. Aquaculture in Nigeria: Increasing Income, Diversifying Diets and Empowering Women.* Report of the scoping study. Penang, Malaysia: WorldFish. Program Report: 2021-16.

APPENDIX 1: DISTRIBUTION OF SMES ACROSS THE DIFFERENT STATES IN THE SAMPLE

	Full		Oyo		Kaduna		Rivers		Ebonyi		Borno		Niger		Kebbi		Abuja (FCT)	
Business type	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Feed mill	23	5	3	6	3	6	6	9	6	10	5	8	-	-	-	-	-	-
Feed seller	45	9	4	7	2	4	6	9	5	8	6	9	8	12	7	11	7	15
Fish Hatchery	19	4	1	2	2	4	3	4	3	5	-	-	7	11	-	-	3	6
Fish Farm	53	11	8	15	6	13	6	9	6	10	7	11	7	11	4	6	9	19
Fisher	41	9	4	7	6	13	6	9	5	8	6	9	6	9	8	13	-	-
Fish processor	40	8	1	2	6	13	6	9	6	10	4	6	7	11	5	8	5	10
Fish Wholesaler	41	9	5	9	1	2	6	9	4	6	8	13	5	8	6	9	6	13
Fish Retailer	38	8	5	9	-	-	5	7	5	8	6	9	5	8	5	8	4	8
Chicken Hatchery	9	2	3	6	3	6	3	4	3	5	-	-	-	-	-	-	-	-
Chicken farm	58	12	8	15	7	15	6	9	6	10	6	9	7	11	12	19	6	13
Chicken trader	34	7	4	7	5	10	5	7	5	8	6	9	4	6	4	6	1	2
Chicken retailer	31	7	3	6	2	4	4	6	4	6	5	8	5	8	6	9	2	4
Egg retailer	42	9	5	9	5	10	5	7	5	8	5	8	5	8	7	11	5	10
Observation	474		54		48		67		63		64		66		64		48	