**Impact of Twin Lockdowns on Hunger, Labor Market Outcomes, and Household Coping Mechanisms: Evidence from Uganda†**

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**Abstract**

We examine the short- and medium-run impacts of two of the strictest Covid-19 lockdowns in the developing world, employing longitudinal data from Uganda. Household fixed-effect estimations show significant, immediate increases in food insecurity with the first lockdown and a continued negative impact three months after its lifting. The second lockdown’s medium-term impact was even worse, likely because of a compounding effect of a concurrent drought. The rising food insecurity was partly the result of the lockdown-related reductions in the availability of paid work. Agricultural households were better able to continue working and consequently had better food security outcomes. The likelihood of agricultural work during the first lockdown and in the months following increased significantly, suggesting a switch to agriculture to cope. The typical coping mechanisms that households rely on for idiosyncratic shocks failed in the face of a worldwide shock, contributing to the sizeable increase in food insecurity.

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**Introduction**

Uganda had some of the strictest Covid-19 lockdowns in Sub-Saharan Africa, with one in 2020 and another in 2021 (BBC, 2020; Birner et al., 2021; Mahmud & Riley, 2021). Using longitudinal data and household fixed effects, we examine the impact of the twin lockdowns in Uganda on food insecurity, labor market outcomes, and how households attempted to cope with the lockdowns.

Early studies of the impact of the pandemic in developing countries generally find a negative effect of lockdowns on food insecurity, income, employment, and agricultural production.[[1]](#footnote-1) However, these studies suffer from significant limitations, such as using only cross-sectional type data or a narrow geographical focus, covering only one or two villages or states in a country. These studies also suggest that households try to cope with the lockdowns through behavior changes, such as reducing non-food expenditure, drawing down savings, leaving savings and loan groups, increasing borrowing, and sale of assets (Ceballos et al., 2021; Headey et al., 2020; Kansiime et al., 2021; Rönkkö et al., 2022; Ruszczyk et al., 2021). In addition, there is evidence that remittances declined, and there was insufficient government support to help households cope with the shock (Ceballos et al., 2021; Curi-Quinto et al., 2021).

Only four studies we could identify used panel data with household fixed-effect models, allowing them to control for household-specific time-invariant factors. Contrary to the cross-sectional studies, three of these studies found no effect of lockdowns on food consumption across Liberia, Malawi, Kenya, and Ethiopia (Aggarwal et al., 2022; Hirvonen et al., 2021; Janssens et al., 2021). Only the Nigerian lockdown appeared to increase food insecurity (Amare et al., 2021).

These fixed-effect studies do, however, also have limitations. The Liberia data had a low survey completion rate and evidence of a non-random attrition (Aggarwal et al., 2022). The Kenya study focused only on households with pregnant women or mothers with children below four years old in one county (Janssens et al., 2021). Ethiopia never went into a complete lockdown, and the study covers only Addis Ababa (Hirvonen et al., 2021). Finally, the Nigeria study could only examine the immediate effect of the lockdown and used a limited set of food insecurity questions (Amare et al., 2021).

Given the mixed findings and the limitations in data and estimation methods in the prior literature, our study makes four main contributions. First, we use country-wide panel data with household fixed-effect models—which allows us to control for unobservable household characteristics—to compare household food insecurity across almost 1½ years of varying restriction levels. Second, we estimate short- and medium-run effects of lockdowns to understand the persistence of the impact of lockdowns in the months following their lifting. Moreover, the second lockdown coincided with a prolonged dry spell, which allows us to investigate whether a weather shock compounds the effect of the lockdown (Atamanov et al., 2022). Third, we examine how the coping mechanisms households typically employ to handle idiosyncratic shocks perform in the face of repeated systemic shocks. Finally, rather than relying solely on reported lockdowns like in prior studies, we use additional data on the stringency of lockdowns and Google mobility data to conduct robustness checks of our analysis.

Using Food and Agriculture Organization’s (FAO) eight-question food insecurity experience scale (FIES) to measure food insecurity, we find that food insecurity significantly increased during the lockdowns. The point estimates are large, with an increase of 25 percentage points for any food insecurity during the first lockdown compared to the period with no lockdowns. Even more concerningly, the worst forms of food insecurity, such as skipping meals and going without eating the whole day, doubled and tripled in size, respectively, relative to non-lockdown periods.

We also find that lockdowns have a substantial medium-term impact, with food insecurity 12 percentage points higher two to three months after the first lockdown was lifted. The medium-term impact was even higher following the second lockdown, with a 22 percentage points increase in any form of food insecurity three months after the second lockdown had been lifted. The difference in the medium-run impact between the two lockdowns suggests that the drought compounded the negative effect of the lockdown.

To understand the mechanisms behind the significant impact on food insecurity, we examine the effect on labor market outcomes and find substantial decreases in paid work during the lockdowns and decreases across all income types, such as wage income, agricultural income, non-farm business income, and income from assets owned.[[2]](#footnote-2) However, agricultural households were significantly more likely to continue work during and after the first lockdown than non-agricultural households and, thus, were less affected.

Furthermore, households attempted to cope with the lockdown by switching to agricultural work, as shown by a significant increase in the likelihood of working in agriculture during and the months after the first lockdown. However, that increase dissipated by the second lockdown, likely because the concurrent drought made agriculture less attractive as a coping mechanism during the second lockdown.

Traditional sources of assistance, such as remittance from abroad or assistance from family members within the country, non-family individuals, and development organizations, all decreased during the lockdowns. This suggests that the worldwide macroeconomic shock from Covid-19 affected everyone’s income and ability to transfer resources to needy relatives or friends. This failure of the standard coping mechanisms likely is a significant factor in explaining lockdowns’ substantial effect on food insecurity. Finally, we find evidence of a net increase in household members, suggesting that lockdowns forced individuals living elsewhere to join/rejoin the household.

**2. Lockdown Context**

On March 18, 2020, the Ugandan government started imposing restrictions, including travel restrictions and cancellation of public gatherings, such as religious services, weddings, and music events (Uganda Bureau of Statistics, 2022). A total lockdown was imposed on March 30 with a nationwide curfew from 7 pm to 6:30 am, banning of public transportation, strict regulations on the movement of vehicles, and closure of all non-essential businesses, which extended till the end of May (Alfonsi et al., 2021; Margini et al., 2020).

Lockdowns were eased at the beginning of June 2020 with the resumption of public transportation and the opening of businesses (Guloba et al., 2021; Monitor, 2020; Schwartz et al., 2021; Wagner et al., 2022). Most small and medium businesses were back open by July-August 2020 (Alfonsi et al., 2021). International travel restrictions remained until the end of September, when land borders reopened and international flights resumed (Guloba et al., 2021).

In response to the resurgence of Covid-19 infections in 2021, the government of Uganda imposed a second lockdown from June 2021 (Atamanov et al., 2022; Athumani, 2021). This second lockdown was partly eased in August 2021.

**3.** **Estimation Strategy and Data**

To establish the causal effects of Covid-19 lockdowns, we use household fixed-effect models on a nationally representative longitudinal household data set, relying on the changes over time in government-imposed lockdowns to identify the effect.

Household data come from the *Uganda High-Frequency Phone Survey on Covid-19* (UHFS), conducted by the Uganda Bureau of Statistics in collaboration with the World Bank. The survey was conducted in seven waves, with four waves in 2020 (June, August, September, and October) and three in 2021 (February, March, and October). The goal of the UHFS was to help understand the economic and social impacts of the Covid-19 pandemic by collecting high-frequency data on individuals and households (Uganda Bureau of Statistics, 2022). To this end, the survey asked detailed questions on food insecurity, employment, income, outside assistance, and agricultural practices.

The UHFS sample is a subset of the 3,098 households interviewed in the 8th wave of the Uganda National Panel Survey in 2019/20 (UNPS 2019/20). In UNPS 2019/20, households were requested to provide a phone number so they could be reached if they moved from their location.[[3]](#footnote-3) Of the 2,386 households that provided a phone number, 2,227 were successfully interviewed for round 1 of the UHFS.[[4]](#footnote-4) To avoid potential bias arising from the possibility that the types of households with access to phones are fundamentally different from households without access to phones, the UHFS provides survey weights to ensure that the data is nationally representative. We use those sample weights in our estimations.

Over the seven rounds, the attrition rate was 12.4 percent, with 1,950 households from the baseline interviewed in round 7 (October 2021). However, replacement households were added to the sample following the first round. This brings our total sample size to 2,283 households and 14,467 observations.

Our main specification regresses outcomes, *Y,* discussed below, on a set of variables using a linear fixed-effect model:[[5]](#footnote-5)

*Yi, t = β0 +* *β1 L1 + β2 L2 + β3 L7 + β4 Casesi,t + β5 X1 i,t-1 + δi + εi,t* , (1)

where *i* denote household and *t* survey rounds. We use three indicator variables, *L1*, *L2*, and *L7*, to represent lockdown-related periods, with 1 for a lockdown-related period and 0 otherwise. L1 represents the first survey round in June 2020, which was towards the end of the first lockdown, and thus captures the immediate/short-run effect of that lockdown. L2 represents the second survey round in August 2020 and captures the medium-run impact of the first lockdown. *L7* represents the seventh round in October 2021, which was two to three months after the lifting of the second lockdown in July 2021. Thus, *L7* captures the medium-term impact of the second lockdown. In our estimations, we compare the periods during or soon-after lockdowns to the other periods with no lockdowns in rounds 3, 4, 5, and 6.

In addition to government-imposed lockdowns, individuals may be ill, decide to self-isolate, or take other steps to avoid contact with others if they perceive a high risk of contracting Covid-19, which may increase food insecurity. To capture the severity of the Covid situation, the *Cases* variable measures the number of new Covid-19 cases per 100,000 persons in the 30 days before the household’s survey date. The number of Covid cases comes from “Our World in Data.”[[6]](#footnote-6)

Lockdowns may also influence the household structure, so *X1* represents the number of household members in the prior round. We use the lagged values from the previous survey round to reduce endogeneity concerns.

The household fixed-effects, *δi*, control for unobserved household-level time-invariant factors that may bias the results. This approach allows us to control for time-invariant characteristics associated with the individual/household, such as gender, race and religion, constant preferences, household characteristics, area characteristics, and other time-invariant factors.[[7]](#footnote-7) For some estimations, we use individual-level dependent variables, like employment. In these cases, the models are individual fixed-effects models, as the same individual from the household is followed over the rounds.

*3.1 Alternative Approaches to Capturing Lockdowns*

Using indicator variables to capture the impact of lockdowns has the advantage of straightforward interpretation. Still, it is a relatively blunt approach that might miss potentially important nuances in government behavior over time. As consistency checks on our use of indicator variables to capture the impact of lockdowns, we, therefore, also employ two alternative measures of lockdowns. One measure captures the stringency of the lockdown, and the other measure the changes in mobility over time. The results for both measures are presented in the Appendix.

To capture the stringency of the lockdown policies, we employ a modified version of the lockdown stringency index developed at the Blavatnik School of Government, University of Oxford (Hale et al., 2021). The original index is a daily composite measure of how strict the lockdowns were based on nine indicators, including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100, where 100 is the strictest response. Because some of the restrictions in the original index, such as school closure and international entry restrictions, are likely to have minimal immediate impacts on food insecurity, we recalculate the index using workplace closings, limits on public transport, stay-at-home requirements, and any restrictions on internal movement. We use the variation in the average of this revised index over the 30 days before the households were surveyed to capture the impact of the lockdowns.

Neither the lockdown indicator variables nor the stringency index captures to what extent the lockdown policies were enforced or adhered to. We, therefore, use Google Mobility data to create a measure of time spent at residential locations in the 30 days before each household’s survey dates (Google, 2022). Each day of the week is scaled relative to a “baseline day,” which is the median value from the five weeks, January 3 – February 6, 2020, and captures the change in percent in the time spent at residential locations. Other mobility information, such as the number of visitors to groceries and pharmacies per day, are available but tend to be noisier and give similar results to our time at home measure.



Figure 1: Revised Stringency Index, Time Spent at Residential Locations, Daily New Covid Cases per 100,000 persons and New Deaths per 100,000, and Data Collection Window for Each UHFS Survey Round.

Figure 1 shows our revised daily stringency index, the daily Google Mobility measure of time spent at residential locations, the smoothened daily number of new Covid-19 cases and deaths per 100,000 persons, and the data collection window for each of the UHFS rounds in shaded grey. The strongest restrictions are just before round 1, where there is an almost complete lockdown. The second lockdown is nearly as strict according to our stringency measure as the first. Furthermore, the four months after each lockdown show similar stringency levels, with stringency only dropping in September 2020.

That the lockdown policies were enforced is shown by the substantial increases in the amount of time spent at residential locations during the April through June 2020 and the June through August 2021 periods. Despite some remaining restrictions during the second and third rounds, the time spent at residential locations had returned to almost the baseline by the end of the second round’s data collection in mid-August 2020, which is why we did not include the third round as a lockdown round. Through the non-lockdown periods, the time spent at home remained relatively stable except for the Christmas and New Year’s celebrations.

The number of confirmed infections and deaths from Covid remained very low in Uganda until halfway through 2021. Even with the spike in cases in 2021, Uganda’s cumulative number of cases per 100,000 at the end of 2021 was only 306.9 compared with 16,294.5 in the US. Furthermore, as in many other developing countries, the number of Covid deaths was low. Even with the increase in cases and deaths by the end of 2021, Uganda had only 7.2 deaths per 100,000 persons, while, for comparison, the US had 245.1 deaths per 100,000 persons.

*3.2 Main Outcomes: Food Insecurity*

The survey measures food insecurity based on the Food Insecurity Experience Scale (FIES) developed by the FAO (FAO, 2016). FIES uses eight questions with dichotomous (yes/no) responses to understand the different challenges related to food insecurity. This measure has been empirically validated for cross-cultural use (Ballard et al., 2013; Kansiime et al., 2021). FIES asks whether, during the last 30 days, there was any time when any adult in the household experienced the following because of lack of money or other resources: (i) were worried about not having enough food to eat; (ii) were unable to eat healthy and nutritious/preferred foods; (iii) ate only a few kinds of foods; (iv) skipped a meal; (v) ate less than you thought you should; (vi) ran out of food; (vii) went hungry, but did not eat; and (viii) went without eating for a whole day. We create an indicator variable for each question where 1 represents “yes,” and 0 represents “no.” Additionally, we create another variable to capture whether a household experienced any food insecurity, with 1 for answering “Yes” to at least one of the eight FIES questions and 0 otherwise.

*3.3 Mechanisms that Affect Food Insecurity*

To understand how the government lockdowns affected food insecurity and how households responded to the lockdowns, we examine three broad categories of outcomes: labor market outcomes, changes in income across sources, and whether the households received assistance from outside sources.

Labor Market Outcomes

Lockdowns may affect the availability of employment, both because workplaces close and because of the overall reduction in economic activity likely to follow lockdowns. Respondents were asked whether they did “any work for pay, any kind of business, farming or other activity to generate income” in the last week. If yes, they were asked whether this was the same job as the previous round and the broad industry in which they worked in the current survey round. For round 1, respondents were also asked whether they did the same work as before the pandemic started and if it was a different job, which industry it was in. We create two indicator variables to capture the likelihood of working: doing any market work and working in the same job as the prior round. The UHFS also asked whether any household member had operated a non-farm family business since the prior round, so we also created an indicator variable where 1 represents operating a business and 0 otherwise.[[8]](#footnote-8)

The loseng of workplaces likely affected some types of work less affected than others. For example, in agriculture, workers can more easily socially distance themselves while working, and, in many cases, the workers are from the same household removing the need to socially distance. Furthermore, lockdowns are more challenging to enforce on farms in rural areas.

There are two implications of this differential effect of lockdown on workplace closings. First, the impacts of lockdowns likely differ between agricultural and non-agricultural households. Second, it is essential to understand how lockdowns affected the movement between unemployment, agricultural work, and non-agricultural work. We create a categorical variable where 0 represents non-agricultural work, 1 represents agricultural work, and 2 represents unemployment. As we know the industry before the first lockdown, we can utilize that data as a pre-lockdown round (i.e., round 0), so we have eight rounds of data for this estimation.

With three potential outcomes, we use a conditional fixed-effect multinomial logit model to estimate the movements between unemployment, agricultural work, and non-agricultural work. There are two potential issues with this estimation method. First, as with any multinomial model, the sign of a coefficient does not necessarily indicate the direction of the relationship between the explanatory variable and the outcome. Second, standard marginal analyses are not meaningful because the fixed-effect estimator cannot make predictions that account for the panel-level fixed effects, which are not estimated explicitly. To mitigate these issues, we present two sets of relative risk ratios, one the likelihood of working in the agricultural sector against working in the non-agricultural sector, and the other the likelihood of not working against working in the non-agricultural sector.

Finally, the survey asked agricultural households whether they changed planting activities because of Covid-19. If yes, they are asked how they changed their activities. This allows us to examine whether households changed their agricultural strategy in response to the lockdowns.

Income

Households were asked income-related questions in rounds 1 through 6. Instead of the monetary value of their income, households were asked whether their income from different sources increased, remained the same, decreased, or had a complete loss since the prior round (for round 1, the questions were asked relative to the start date of the lockdown). The income questions covered five sources: (i) family farming, livestock, or fishing, (ii) non-farm family business, (iii) wage employment, (iv) income from assets (properties, investments, or savings), and (v) pension. As the income question was ordinal, we created variables for each income source where 1 represents an increase in income, 0 represents income remaining unchanged, and -1 represents a decrease in income or a complete loss.

Given that we use ordinal variables to represent changes in household income, we use a conditional fixed-effect ordered logistic model. The typical conditional logit model works by applying a fixed-effect logit model for households that see a change in the dependent variable over time. For the conditional *ordered* logit model, the actual values of the dependent variable are irrelevant. Instead, greater values correspond to higher-value outcomes (Baetschmann et al., 2015). Hence, for our regressions, a positive coefficient for lockdowns represents an increase in household income, a negative coefficient represents a decrease in income, and a coefficient near 0 indicates that income remained stable.

Outside Assistance

In rounds 1 through 6, the UHFS asked households whether they received assistance from the following sources: (i) remittance from abroad, (ii) assistance from family within the country, (iii) assistance from other non-family individuals, (iv) assistance from NGOs, and (v) assistance from the government.[[9]](#footnote-9) The questions were asked the same way as the income questions, where households can either report income increase, remaining the same, decrease, or complete loss relative to the prior round. Therefore, like the income estimations, we create ordinal variables where 1,0 and -1 represent an increase, same, and decrease/complete loss, respectively, and estimate the effect of lockdowns using the same conditional fixed-effect ordered logistic model.

Using the household roster information from both UHFS and the UNPS 2019/20, we have data on the number of household members, adults, and children. To understand the impact on household structure, we calculate the change in the number of household members by subtracting the number of household members in the prior round from the number for the current round.

*3.4 Summary Statistics*

We present the summary statistics of key variables in Appendix Table A1. Column 1 shows the overall sample mean, and columns 2, 3, and 4 show the respective sample means in round 1 (short-run effect of the first lockdown), round 2 (medium-run effect of the first lockdown), and round 7 (medium run effect of the second lockdown). Column 5 presents the mean for the non-lockdown-related rounds. Overall, the average food insecurity across all rounds is relatively high, with 55.4% reporting at least one type of food insecurity. However, the difference between the lockdown and non-lockdown periods is large. For example, 71.8 percent of households reported any food insecurity during the first lockdown (round 1) as opposed to 47.2 percent for the non-lockdown period, a difference of 24.6 percent.

**4. Results**

*4.1 Food Insecurity*

Table 1 shows the impact of the Covid-19 lockdowns in Uganda on the likelihood of food insecurity using a linear model with household fixed effects.[[10]](#footnote-10) Overall, lockdowns caused a substantial increase in all types of food insecurity in both the short and medium run.

As shown in column 1, the first lockdown led to a substantial and statistically significant short-run increase in the likelihood of having any food insecurity by 25.2 percentage points. Furthermore, the lockdowns lead to a significant increase in all eight food insecurity measures, where most of the point estimates are sizeable, with magnitudes of over 20 percentage points. Even more concerning, the worst forms of food insecurity—“had to skip a meal” and “went hungry but did not eat”—more than doubled, and “went without eating for a whole day” almost tripled.

The effects of the first lockdown persisted in the medium run, with significant increases in food insecurity about three months after the lockdowns were lifted. Any food insecurity was still 11.9 percentage points higher than in non-lockdown periods, and five of the nine food insecurity measures had a point estimate of at least 9 percentage points.

Moreover, the medium-term impact of the second lockdown is similar in size to the short-term effect of the first lockdown. The point estimates of the second lockdown are over 20 percentage points for six of the nine food insecurity measures. This suggests that the second lockdown, combined with a drought, had a worse impact on food insecurity than the first lockdown, at least in the medium run.

*4.2 Impact on Work*

One way lockdowns can affect food insecurity is by lowering people’s ability to work. Table 2, column 1, shows that the likelihood of any market work decreased by a significant 18.6 percentage points during the first lockdown. These employment effects were driven mainly by lockdowns rather than being ill from Covid-19. As shown in Figure 1, there were almost no cases during the first lockdown. Furthermore, UHSF asked individuals the reason for not working, and the top three reasons reported are that the place of work is closed (62%), being ill from any illness or quarantined (10%), and being laid off from the job (8%).

In the medium run, the likelihood of market work is 2.5 percentage points lower than in non-lockdown periods. This suggests that the labor market was approaching but not yet fully recovered. The medium-run impact of the second lockdown combined with the drought is large, with the likelihood of market work decreasing by 13 percentage points. This large impact on market work may explain the large impact on food insecurity in the medium run following the second lockdown.

While we do not have data for round 1 and cannot estimate the short-run effect on operating a non-farm family business, the likelihood of operating a non-farm family business decreased by seven percentage points in the medium run after the first lockdown (column 2). However, the second lockdown did not impact family business in the medium run, even though this coincided with the drought.

The first lockdown significantly decreased the likelihood of working at the same job as the prior round by about 8.6 percentage points (column 3), suggesting broader changes in the labor market. The impact in the medium run is small, indicating that people remained in their new jobs after the end of the lockdown. These new jobs likely paid less than the pre-lockdown job, suggesting continued labor market difficulties in the medium run, which would also affect food insecurity. There is a small effect in the medium run following the second lockdown. However, we cannot establish whether this is because the second lockdown follows the same pattern as the first or because there is less movement than during the first lockdown.

With workplace closures during lockdowns, we expect significant movement between sectors, and from employment to unemployment. Firings are likely in both the agricultural and non-agricultural sectors. To complicate the picture, some may resort to agricultural production, even if there is a lower return than their original job. Table 2, columns 4 and 5 show the relative risk of being in the agricultural sector and unemployed, respectively, versus working in the non-agricultural sector. Not surprisingly, the short-run effect of the first lockdown is to significantly increase unemployment relative to being employed in the non-agricultural sector, with the relative risk of unemployment increasing by 11.6 relative to working in the non-agricultural sector. However, there also is a significant shift to agriculture work after the first lockdown: the relative risk of working in agriculture is 3.86 times higher than the relative risk of working in the non-agricultural sector. The results suggest that while more people become unemployed, there is also a significant switch to agricultural work to cope with the effects of the first lockdown.[[11]](#footnote-11) While the magnitude of the relative risk for unemployment declined to 2.8 times, the strong effect of working in agriculture persisted in the medium run, suggesting that people did not immediately shift back to non-agricultural work after the end of the first lockdown.

However, we do not find a higher likelihood of agricultural work in the medium run following the second lockdown compared to the non-lockdown periods, likely because the concurrent drought negatively affected the agricultural labor market. The lack of opportunities in the agricultural sector may also explain why individuals were likely to remain at the same job after the second lockdown (results from column 3). Overall, these results suggest that while individuals were able to join the agricultural sector to cope with the effects of the first lockdown, the negative impact of the drought on agriculture meant that this was a less attractive coping mechanism during the second lockdown.

*4.3 Impact on Income*

As shown in Panel B of Table 2, the first lockdown significantly decreased farm income, non-farm family business income, wage income, and income from assets, and the effects persisted in the medium run. These income effects are likely a major reason for the significant decrease in food insecurity from the lockdowns. As a placebo, since pensions are typically not dependent on the state of the economy and remain steady over time, we also examine the impact on pension income. Not surprisingly, we do not find any changes in pension income during the lockdowns.[[12]](#footnote-12)

*4.4 Coping Mechanisms*

Given the reductions in household income with the lockdowns, we examine a set of potential coping mechanisms in Table 3 (Morduch, 1995; Townsend, 1994). Two possibilities are receiving assistance from family members outside of the household or receiving assistance from institutions. Assistance from both sources decreased during the first lockdown, with a significant reduction in assistance from the family within the country, assistance from non-family individuals, and assistance from NGOs. Remittances also decreased, but the effect is not statistically significant. The only increase came in government assistance, although the effect is statistically insignificant. Hence, households' standard coping mechanisms were unavailable during the lockdowns. This is in line with the substantial decline in remittances across the world in the second quarter of 2020, as lockdowns worldwide led to the closure of workplaces and limited people’s movements (Cardozo Silva et al., 2022; Guha et al., 2021; Kpodar et al., 2021; Shimizutani & Yamada, 2021; Zhang et al., 2021). The failure of these coping mechanisms in the face of large reductions in income likely contributed substantially to the large effects of lockdowns on food insecurity.

As households faced greater food insecurity during lockdowns, it is possible that, on the one hand, some household members left to look for better opportunities. On the other hand, as lockdowns led to reduced income and lower availability of work, migrants might return to their families. Panel B of Table 3 shows the impact of lockdowns on the change in the number of household members in each round. We find an increase in household members during the first lockdown (column 1). Furthermore, this effect holds for adults (column 2) and children (column 3). The positive effect continued in the medium run for total members, although statistically insignificant, and the number of children, but there was a slight reduction in the number of adults. In contrast to the effects from the first lockdown, there were larger effects in the medium run following the second lockdown.

The increase in the number of household members raises the question of whether the lockdowns caused an urban-to-rural migration. However, we find no such evidence of lockdown-induced migration in column 4, where we examine the likelihood of living in an urban area.

Lastly, given the shift to agricultural work, we examine whether agricultural households change their agricultural strategy to cope with the lockdowns. We find suggestive evidence that agricultural households changed their farming strategy during the lockdowns, such as changing the farming area and the variety of crops produced. The details of these results are in Appendix Section A1.

Overall, our results from the coping mechanisms suggest that the households, on average, could not take advantage of outside help, whether it was assistance from family members living outside of the household or assistance from institutions. We find evidence of net migration into the households and a switch to agricultural work, suggesting that some household members return to the family for farm work.

*4.5 Agricultural vs. Non-agricultural households*

Given the increase in agricultural work during the first lockdown, Table 4 examines whether agricultural households fared better than non-agricultural households. It is important to note that as we previously treated whether the household works in agriculture as a choice variable, these estimations are exploratory rather than causal. As lockdowns affected the likelihood of working in agriculture, we interact lockdown variables with whether the household was engaged in agricultural production in the prior round.[[13]](#footnote-13) As shown in column 1 of Table 4, agricultural households were 31 percentage points more likely to work during the first lockdown than non-agricultural households. However, this difference disappears in the medium run suggesting an improvement in employment conditions.

Agricultural households appeared to be more food secure than non-agricultural households during the first lockdown. Their likelihood of suffering “any food insecurity” during lockdowns was about 20 percentage points lower than non-agricultural households. Furthermore, all individual food security questions show that agricultural households do better than non-agricultural households. However, for “Had to skip a meal” and “Went hungry but did not eat,” the effects are not statistically significant. Like the employment results, the difference disappears in the medium run. Overall, these results suggest that agricultural households were better able to keep working and did better in terms of food security.

There is no difference in employment or food insecurity for the second lockdown between the two types of households. This is likely because of the concurrent drought during and after the second lockdown in Uganda that affected the agricultural households' employment and food production.

*4.6 Robustness Checks*

Finally, as discussed earlier, we use the average of our revised daily lockdown stringency measure for the 30 days before the interview as a consistency check on our main specifications using indicator variables for lockdowns. The results are presented in Appendix Table A4. Stronger stringency leads to significant increases in all food insecurity variables. During the first round, the average measure of the stringency index is 77, while the index in the non-lockdown rounds (rounds 3 through 6) is 47. Therefore, the point estimates imply that “any food insecurity” increased by 15 percentage points when comparing the first lockdown to the periods with no lockdown.

One downside of the stringency measure is that it does not capture the extent to which the policies were enforced. Therefore, we also use Google mobility data on the amount of time individuals spend at their residences. The results are presented in Appendix Table A5. As mentioned above, the third round looks almost identical to the second in terms of the stringency measure, but the mobility measure was down to 5 percent above the baseline at the end of the second survey window. As for the stringency measure, the mobility measure suggests significant increases in food insecurity due to the lockdowns. For example, taking 10% above the baseline as the non-lockdown periods suggests a 30 percentage points increase in any food insecurity due to the first lockdown.

**5. Conclusion**

Using country-wide panel data with a household fixed-effect model, we examine the impact of two Covid-19 lockdowns in Uganda on food insecurity. Food insecurity increased substantially during the first lockdown, with the relative effects largest for the worst types of food insecurity. The first lockdown also had a significant medium-term impact on food insecurity. The medium-term impact was even higher following the second lockdown, as a drought compounded the negative effect of the lockdown.

There were significant decreases in paid work and earned income. However, agricultural households were better able to continue working during the first lockdown than non-agricultural households. Consequently, their food security outcomes were better as well.

We find evidence that households attempted to cope with the first lockdown by temporarily switching to agricultural work. However, traditional sources of coping mechanisms, such as remittance from abroad, assistance from family members within the country, assistance from non-family individuals, and assistance from development organizations, all decreased during the lockdowns. The lack of assistance may explain lockdowns’ substantial effect on food insecurity. Lastly, to make matters more challenging for households, there was a net increase in the number of household members, suggesting that lockdowns forced individuals living elsewhere to join/rejoin the household.

Three broader conclusions emerge from our results. First, on average, agriculture is likely less productive than non-farm work but better than unemployment. With a slow rate of switching back from agriculture, the lockdowns can potentially have severe long-term adverse effects on Uganda’s development. Second, the results show the limit of self-insurance and mutual insurance when faced with a systemic shock. Most of the literature has focused on the smaller and more frequent risk of idiosyncratic shocks and how households respond to these. However, a better understanding of systemic shocks and how households respond is still lacking. Finally, the case of Uganda illustrates well the issues with the wholesale lockdown of economies in response to Covid-19 in situations with low state capacity. Uganda has been hailed as a leading example of curbing Covid-19 (Adams et al., 2021). However, the mitigation efforts failed to reach those most affected by the lockdown, and with the low mortality rate in Sub-Saharan Africa, including Uganda, the potential long-term cost of the lockdowns likely significantly outweighs the benefits.

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1. Several studies examine the impact of lockdowns during the Covid-19 pandemic on food insecurity (Agamile, 2022; Ceballos et al., 2020, 2021; Dasgupta & Robinson, 2021; Egger et al., 2022; Gaitán-Rossi et al., 2021; Giacoman et al., 2021; Hamadani et al., 2020; Harris et al., 2020; Headey et al., 2020; Jaacks et al., 2021; Kansiime et al., 2021; Kesar et al., 2021; Kundu et al., 2021; Lee, Kenneth et al., 2022; Nguyen et al., 2021). Similarly, several studies examine the impact on income, employment, or agricultural production (Balde et al., 2020; Deshpande, 2020; Egger et al., 2022; Harris et al., 2020; Headey et al., 2020; Jaacks et al., 2021; Kang et al., 2021; Kesar et al., 2021; Komin et al., 2021; Rönkkö et al., 2022; Ruszczyk et al., 2021; Wild et al., 2021). [↑](#footnote-ref-1)
2. Panel data from Ghana show significantly decreased employment and earnings during lockdowns (Schotte et al., 2021). [↑](#footnote-ref-2)
3. The phone number could be the household’s number or a reference person’s, such as a neighbor or a friend. [↑](#footnote-ref-3)
4. The heads of the households were typically the respondent to this survey. If the household head was not present, another member of the household over the age of 15 could respond to the survey. [↑](#footnote-ref-4)
5. A linear model has two advantages over non-linear models, such as conditional logit, and has often been used in recent studies (Alam & Bose, 2020; Alam & Pörtner, 2018; Charles & DeCicca, 2008). First, coefficients are easier to interpret. Second, a linear model allows a more straightforward comparison of coefficients across regressions where some dependent variables are binary and some non-binary. The robustness checks presented in Appendix Table A1 show that conditional logit models lead to similar results. [↑](#footnote-ref-5)
6. The advantage of using “Our World in Data” is that it collects available Covid-19 data from many sources. The data are available at <https://covid.ourworldindata.org/data/owid-covid-data.csv>, and a complete listing of underlying sources is at <https://github.com/owid/covid-19-data/tree/master/public/data/owid-covid-codebook.csv>. [↑](#footnote-ref-6)
7. This means that any variable that does not change over time that are likely to influence our outcome variables would be controlled by the household fixed and would consequently drop out of the estimations. [↑](#footnote-ref-7)
8. Round 1 only asks whether the family has operated a business since the beginning of 2020 and does not ask about operations since the start of lockdown. This means we are unable to use round 1 information to examine the impact of lockdown on doing family business. [↑](#footnote-ref-8)
9. Households were also asked whether they received unemployment benefits, but there was only one observation representing a change, so we do not have any variation to conduct a conditional ordered logit estimation. [↑](#footnote-ref-9)
10. As our point estimates are relative to non-lockdown periods, we present the mean of outcome variables in non-lockdown periods at the bottom of each column. [↑](#footnote-ref-10)
11. While not focusing on lockdowns, this is consistent with the pandemic leading to a switch in occupations, particularly among salaried and business persons, with agriculture seeing the biggest inflow of labor compared to other industries (Gupta et al., 2021). [↑](#footnote-ref-11)
12. Note, we do not have income data for round 7 and thus cannot examine the medium-term impact of the second lockdown. [↑](#footnote-ref-12)
13. For round 1, the survey asks about the employment industry before the lockdown, which allows us to identify whether individuals were employed in agriculture before the round 1 lockdown. [↑](#footnote-ref-13)