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COVID-19 Working Paper: Food Insecurity During the First Year of the COVID-19 Pandemic in Four African Countries

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Abstract

This report analyzes trends in food security up to one year after the onset of the Coronavirus (COVID-19) pandemic in four African countries. Using household-level data collected by the World Bank, this report shows differences in food security over time during the pandemic between rural and urban areas as well as between female- and male-headed households in Burkina Faso, Ethiopia, Malawi, and Nigeria. Analysis of data collected during the pandemic shows a sharp increase in food insecurity in the early months of the pandemic with a subsequent gradual decline. Additionally, this report finds that a larger increase in food insecurity occurred in rural areas relative to urban areas within each of these countries. Finally, the authors found no systemic difference in food insecurity between female-headed and male-headed households. These trends, documented amid the first year of the COVID-19 pandemic, complement previous microeconomic analyses studying short-term changes in food security associated with the pandemic and macroeconomic projections based on expected changes to income, prices, and food supply.

Keywords: Coronavirus, COVID-19 pandemic, food security, rural food security, urban food security, markets, gender, sub-Saharan Africa, World Bank, Burkina Faso, Ethiopia, Malawi, Nigeria, U.S. Department of Agriculture, USDA, Economic Research Service, ERS

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Summary

What Is the Issue?

The SARS-CoV-2 coronavirus (COVID-19) pandemic led to widespread reductions in global food security, potentially affecting vulnerable households in almost every country around the world. These adverse consequences will likely continue beyond 2022 as new variants of the virus emerge and continue to spread the illness. Moreover, although COVID-19 vaccines became widely available in high-income countries, as of the publication of this report, very few people in low-income countries can access these vaccines. Understanding the longer term socioeconomic consequences of this global health crisis is important for informing effective policy responses.

What Did the Study Find?

The authors observed three main sets of results. First, after studying longitudinal trends during the COVID-19 pandemic, the authors found an initial spike in food insecurity in the early months of the pandemic followed by a gradual decline. As of late 2021, the measures of each food insecurity level had not returned to the levels observed in the first month of the pandemic. Second, merging pre-pandemic data with data collected during the COVID-19 pandemic, food insecurity in most of the countries in the study increased more in rural areas relative to urban areas. Households in rural areas reported food insecurity scores between 0.1 and 0.2 standard deviations higher than households in urban areas. Finally, with the exception of Nigeria, there was no evidence of differences in changes in each of the measures of food insecurity between female-headed and male-headed households. In Nigeria, male-headed households experienced larger adverse changes in food security.

How Was the Study Conducted?

The authors used household-level survey data—collected by the World Bank's Living Standards Measurement Study (LSMS) team—to document trends in food security relative to pre-pandemic levels in Burkina Faso, Ethiopia, Malawi, and Nigeria. In particular, these data allowed the authors to both explore national-level trends over time and to examine sub-national dynamics in these trends across rural and urban areas and female-headed and male-headed households.

Introduction

The SARS-CoV-2 coronavirus (COVID-19) pandemic led to widespread reductions in global food security, potentially affecting vulnerable households in almost every country around the world. These adverse consequences will likely continue beyond 2022 as new variants of the virus emerge and continue to spread the illness. Moreover, although COVID-19 vaccines became widely available in high-income countries, few people in low-income countries have had access to these vaccines. As noted by Miguel and Mobarak (2021), as of August 2021, only 1.2 percent of people in sub-Saharan Africa were fully vaccinated against COVID-19. Therefore, understanding the medium-term and longer term socioeconomic consequences of this global health crisis is important for informing effective policy responses. Although short-term changes in food security associated with the onset of the pandemic are well-documented (Bloem and Farris, 2021; Josephson et al., 2021; Furbush et al., 2021), understanding and documenting longer-term trends is increasingly relevant.

This report documents trends in food security up to one year after the onset of the COVID-19 pandemic in four sub-Saharan Africa countries: Burkina Faso, Ethiopia, Malawi, and Nigeria.[1] Household-level survey data—collected by the World Bank's Living Standards Measurement Study (LSMS) team—were used to provide insight into key socioeconomic indicators amid the COVID-19 pandemic in sub-Saharan Africa. Upon the onset of the pandemic, the LSMS team suspended in-person data collection in each of their study locations and quickly implemented phone surveys administered to a representative subset of the full study sample in each country. These data are used to document trends in food security relative to pre-pandemic levels in Burkina Faso, Ethiopia, Malawi, and Nigeria. In particular, these data allowed the authors to both explore national-level trends over time and to examine sub-national dynamics in these trends across rural and urban areas and female-headed and male-headed households.

The analysis in this report complements two strands of existing research on the COVID-19 pandemic and food security. First, in the immediate aftermath of the onset of the COVID-19 pandemic, numerous studies set out to document short-term changes in food security.[2] In a review of past microeconomic literature, Bloem and Farris (2021) noted this literature has found conflicting evidence of how food security trends differ between rural and urban areas and by household socioeconomic status. In addition, all past studies are limited to documenting short-term changes in food security associated with the onset of the pandemic. Second, existing macroeconomic projections estimated the number of food insecure people in the world would rise by 291 million people in 2021—an increase of roughly 30 percent (Baquedano et al., 2021).[3] Although these macroeconomic projections provided valuable insight into expected future changes in food security, supplementing these macroeconomic projections with microeconomic analysis of household-level data can help to create a better understanding of global food security amid the COVID-19 pandemic by facilitating sub-national analysis. Two goals of this report are to: (a) document longer term trends in food security across four African countries with household-level survey data and (b) use microeconomic analysis to investigate differences between rural and urban areas and between female-headed and male-headed households within Burkina Faso, Ethiopia, Malawi, and Nigeria.

[1] Due to the unknown duration of the COVID-19 pandemic at the time of writing this report, the authors refer to "longer term" trends to indicate they document trends that are longer than those previously estimated in the literature. The authors prefer this term over more restrictive terms, such as "medium" or "long," which imply that these trends represent the medium or long term of the COVID-19 pandemic.

[2] These studies include Abay et al. (2020) studying rural Ethiopia; Adjognon et al. (2021) studying Mali; Aggarwal et al. (2020) studying rural Liberia and Malawi; Amare et al. (2021) studying Nigeria; Ceballos et al. (2020) studying India; Kansiime et al. (2021) studying Kenya and Uganda; Mahmud and Riley (2021) studying rural Uganda; and Hirvonen et al. (2021) studying Addis Ababa, Ethiopia.

[3] Similar macroeconomic projections are reported by the United Nations, Food and Agriculture Organization (FAO et al., 2021) and the International Food Policy Research Institute (IFPRI, 2021). These macroeconomic projections do not isolate changes specifically due to the COVID-19 pandemic but more generally project a combination of changes associated with the pandemic and other long-term macroeconomic factors.

This report is most closely related to Mueller et al. (2021), who studied food security trends in Bangladesh, Kenya, and Nigeria from October 2020 through April 2021. In doing so, Mueller et al. (2021) were able to document longer term trends in food security within low- and middle-income countries and show that knowledge of a person who is infected with COVID-19 is associated with food insecurity. This report differs from Mueller et al. (2021) in that it compares the results of a pre-pandemic survey with reported trends in food security amid the COVID-19 pandemic. Also, although both Mueller et al. (2021) and the authors of this report examined data from Nigeria, this report also used data from Burkina Faso, Ethiopia, and Malawi.

The authors observed three main sets of results. First, studying longitudinal trends amid the COVID-19 pandemic, the authors observed an initial spike in food insecurity in the early months (e.g., March through July 2020) of the pandemic followed by a gradual decline. Each of this report's measures of food insecurity levels did not return to the levels observed in the first months of the pandemic. Second, merging pre-pandemic data with data collected during the COVID-19 pandemic, the authors observed that food insecurity increased more in rural areas compared with urban areas for most of the measures of food insecurity in most of the countries studied within this report. The magnitude of the observed differences between rural and urban areas ranged from 0.1 to 0.2 standard deviations on a food insecurity index. Finally—with the exception of Nigeria—the authors did not find any evidence of differences between the changes in each of the food insecurity measures across female- and male-headed households. However, in analyzing household data from Nigeria, male-headed households were found to experience larger adverse changes in food security. Taken together, each of these findings highlight the critical importance of accounting for local-level factors when assessing food insecurity changes associated with the COVID-19 pandemic.

Data

To study changes in food security associated with the COVID-19 pandemic, the authors combined the World Bank's Living Standards Measurement Study (LSMS) household survey data collected before the pandemic with household survey data collected via phone calls amid the pandemic. The former data comprise this study's baseline and are collected via face-to-face survey data collected in Burkina Faso, Ethiopia, Malawi, and Nigeria prior to the COVID-19 pandemic. These data are combined with the World Bank's LSMS COVID-19 high-frequency phone surveys, which were collected amid the pandemic. The World Bank's COVID-19 data collection efforts began in May 2020 using a sampling frame based on the pre-pandemic LSMS face-to-face surveys. The COVID-19 phone survey data provided detailed monthly panel survey data for households up to the first year of the pandemic. The authors used data from Burkina Faso, Ethiopia, Malawi, and Nigeria. The selection of these countries was guided solely by the public availability of unit-record survey data measuring food security immediately prior to the pandemic.

Sampling Design and Survey Weights

The sampling design for the COVID-19 phone surveys is based on the sampling design from the pre-pandemic LSMS surveys. These pre-pandemic LSMS surveys included the Burkina Faso Harmonized Living Conditions Household Survey (EHCVM) for calendar years 2018 and 2019, Ethiopia Socioeconomic Survey (ESS) for calendar years 2018 and 2019, Malawi Integrated Household Panel Survey (IHPS) calendar year 2019, and Nigeria General Household Survey (GHS) Panel for calendar years 2018 and 2019. Each pre-pandemic survey sample is representative at the national, urban/rural, and regional levels. Josephson et al. (2021) provided additional detail on the sampling frame and design.

The study's empirical approach relies on longitudinal comparisons of household-level measures of food insecurity. Therefore, the authors only include households in the analysis that are both in the pre-pandemic LSMS sample and show up at least once in the COVID-19 phone survey sample. This provides a sample size of 2,413 unique households in Burkina Faso; 3,247 unique households in Ethiopia; 1,726 unique households in Malawi; and 1,950 unique households in Nigeria. The total sample includes 9,066 unique households across the 4 countries. Following these households over time yields a total of 66,314 observations across each wave in the panel data set. On average, each household appears in the data seven times.

Attrition in the post-COVID-19 survey leads to two types of selection bias. The first is associated with not being able to connect with households in the pre-pandemic LSMS sample because they do not own a mobile phone or because the listed phone number is no longer active. The second is nonresponse associated with not being able to interview households selected for the COVID-19 phone survey. Both issues resulted from the unbalanced nature of the data, as not all households own mobile phones, not all mobile phone numbers are active, and not all respondents reliably answer their mobile phone. In the appendix, figure A-1 illustrates round-specific phone survey response rates. The presence of selection bias and nonresponse bias means any results based on these data likely underestimate real changes in food security amid the COVID-19 pandemic because poorer households are both less likely than wealthier households to own phones and more likely to be vulnerable to experiencing food insecurity.[4] In order to account for bias driven by selection bias and survey nonresponse, the authors use sampling weights computed to correct for potential sources of bias following the methods of Tille (2006) and Himelein (2014). The phone survey sampling weights in each country build on the sampling weights for the corresponding pre-pandemic LSMS survey. These weights were calibrated to

[4] Household income is a common leading indicator for experiencing food insecurity. Analysis of household food security in the United States shows that low-income households are more likely to report experiencing food insecurity (USDA, ERS, 2021). In addition, macroeconomic projections use changes in household income, aggregated to the national level, to project the prevalence of food insecurity (IFPRI, 2021).

address the selection bias introduced from LSMS households not owning a mobile phone and nonresponse bias from not answering the phone. The latter issue is overwhelmingly due to nonworking phone numbers or prospective respondents not answering calls as opposed to refusals. To calculate sampling weights for the phone survey, a series of steps were implemented as discussed in more detail by Josephson et al. (2021). Sampling weights were calculated for each round in the data based on the response and nonresponse rates for a given round. The mean of a household's weight across all COVID-19 phone survey waves was then calculated. This mean sampling weight was used to correct for bias in the COVID-19 phone survey data. Baseline data were weighted using the sampling weights provided by the World Bank with the publicly available data.

Food Insecurity Experience Scale

The United Nations Food and Agriculture Organization (FAO) defines food security as existing "when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996, 2009). Although this definition is widely accepted, there is considerable variation in the methods researchers used to measure food insecurity (Carletto et al., 2013). The eight-question Food Insecurity Experience Scale (FIES) is the preferred measure of FAO, while the U.S. Department of Agriculture (USDA) provides a related 10-question measure of food insecurity used in surveys of households in the United States. Other studies use measures of dietary diversity as proxies for food insecurity, including the household dietary diversity score (HDDS) developed by FAO or the household species richness index (HSR) developed by Lachat et al. (2018). Bloem and Farris (2021) provided an overview of the different measures for food insecurity used in the existing microeconomic literature on food security changes amid the COVID-19 pandemic in low- and middle-income countries.

In this report, the FIES is used to measure food insecurity and is the primary outcome of interest. The FIES is an experience-based metric of food insecurity severity, which relies on people's direct responses to questions about their household's experiences with access to adequate food (Ballard et al., 2013; Cafiero et al., 2018). The FIES is constructed based on responses to eight survey questions about a respondent's experience in various domains of food insecurity at the household level. These eight survey questions include the following:

- FS1: Household members have been worried that they will not have enough to eat?
- FS2: Household members have been worried that they cannot eat nutritious foods?
- FS3: Household members had to always eat the same thing?
- FS4: Household members had to skip a meal?
- FS5: Household members had to eat less than they should?
- FS6: Household members found nothing to eat at home?
- FS7: Household members have been hungry but did not eat?
- FS8: Household members have not eaten all day?

The FIES is specifically designed to facilitate comparisons of food insecurity experienced by people in different contexts and across national and sub-national populations. Although the FIES is designed to allow for comparison of food insecurity in different contexts, there were several challenges in making such comparisons. First, in the COVID-19 phone surveys, all eight FIES questions were asked in each country and all questions use a reference period of the last 30 days. However, not every round of the COVID-19 survey in a country included the food security module. This means there were gaps in the round-to-round data regarding food insecurity (figure 1). Second, the pre-pandemic LSMS surveys included inconsistencies in what FIES

questions were used in the food security module, how the questions were phrased, and the reference period. For example, in Burkina Faso, the same eight questions were asked in the pre-pandemic LSMS survey and COVID-19 surveys, but the reference period differed. In the pre-pandemic LSMS survey, the reference period for all eight questions is the previous 12 months.[5] This measurement period was used to capture the seasonal nature of food insecurity for agricultural households. In the COVID-19 phone surveys, the reference period was the previous 30 days as survey rounds occurred roughly 30 days apart. Additionally, in Malawi, FS3 and FS8 were not included in the pre-pandemic survey. Ultimately, only in Nigeria were all eight FIES questions phrased in a similar way and with the same recall period for the pre-pandemic LSMS survey and COVID-19 phone surveys. In the appendix, tables A-1 through A-4 provide full details on the phrasing and reference period for each survey question in each country. Differences also persisted in other measures that the authors use to supplement their analysis. In Ethiopia and Malawi, pre-pandemic LSMS surveys asked questions asked about the number of days in the past week a household member performed a particular activity (e.g., How many times did you skip a meal?). In COVID-19 phone surveys, the questions were all binary indicators, asking if in the past 30 days a household member ever performed a particular activity (e.g., "Did you skip a meal?").

To address these inconsistencies, the primary outcome of interest is a standardized measure of the raw FIES score. For each household in each country in each round, the authors counted the number of affirmative answers to the FIES questions. This variable was standardized so that the variable equaled a mean of zero and a standard deviation of one. This standardization was done by country for the pre-pandemic LSMS surveys. For the COVID-19 phone survey data, the authors standardized by country across all survey rounds, as the questions and reference period were the same throughout all COVID-19 phone survey waves. This procedure follows the analysis reported in Adjognon et al. (2021).

This approach was taken for three reasons. First, because the survey data were collected in different months in each country, this standardization helps avoid bias driven by seasonality and allows for comparisons of deviations from the pre-pandemic mean and the mean of the variables after the onset of the pandemic within each country. This standardization procedure ensures the comparison of deviations from the mean before the pandemic versus during the pandemic. Second, because the baseline food security indicator questions were asked in different ways and with different reference periods, the standardization helps avoid bias driven by these differences and allows for comparison between pre-pandemic LSMS survey and COVID-19 phone survey data within a country, rather than including differences due to differences in the survey question between the pre-pandemic surveys and the COVID-19 phone surveys. Third, the standardization process allows for easier interpretation of our estimated coefficients in terms of standard deviations instead of a unit-less FIES score.

In addition to the weighted standardized FIES score, the food insecurity severity classifications developed by Cafiero et al. (2018) were used. Following Adjognon et al. (2021), "mild food insecurity" is defined as a raw FIES score greater than zero, "moderate food insecurity" is defined as a raw FIES score greater than three, and "severe food insecurity" is defined as a raw FIES score greater than seven—i.e., answering affirmatively to each of the eight FIES questions. With one exception, the classification of moderate and severe food insecurity is roughly equivalent to the measure used by Smith et al. (2017) to measure food insecurity globally and with Josephson et al. (2021) and Furbush et al. (2021) to measure the changes in food insecurity amid the initial months of the COVID-19 pandemic in Nigeria (i.e., May through July 2020). To ensure measures of food security were comparable across countries and time, Smith et al. (2017), Josephson et al. (2021), and Furbush et al. (2021) ran the raw FIES score through a Rasch model, which aims to correct for heterogeneity

[5] Exceptions exist to this: In Ethiopia and Malawi, the pre-COVID-19 survey asked about food insecurity using a 7-day reference period. This was done to shorten the recall period and capture more precise information.

that may influence responses to the FIES questions measuring food insecurity. In this study, as questions and reference periods differ, the authors lacked the symmetry necessary to correctly implement the Rasch model. So, instead, a weighted standardization was used to facilitate cross-country and cross-round comparisons. Therefore, four measures of food security are reported. First is the weighted standardized raw FIES score. The others are binary indicators of whether the household experiences mild, moderate, or severe food insecurity.

Estimation Strategy

To estimate the relationship between COVID-19, food security, and household characteristics, the authors used a difference-in-differences specification. This estimation strategy does not calculate a credible estimate of the causal effect of the COVID-19 pandemic on food insecurity. The goal was more modest—yet informative—as this approach estimates changes in the four measures of food insecurity across rural and urban areas within countries as well as female-headed and male-households.

This descriptive analysis is important for at least two reasons. First, as the COVID-19 pandemic persists, the geographic distribution of pandemic-related disruptions likely evolves. Therefore, the analysis helps inform an understanding of where households are most vulnerable to food insecurity amid the pandemic within the selected countries. For example, after analyzing data from the initial months of the pandemic in Mali, Adjognon, et al. (2021) found Mali's urban areas experienced an increase in food insecurity, whereas Mali's rural areas experienced no change on average. However, as discussed by Bloem and Farris (2021), it may be that this trend changes in the longer term as the pandemic and pandemic-related disruptions begin to extend into rural areas.

Second, the experience of vulnerable households may change and evolve as the COVID-19 pandemic persists. Reviewing the existing microeconomic literature, Bloem and Farris (2021) found the poorest and most vulnerable households had not consistently experienced the largest adverse changes in food insecurity. Therefore, household vulnerability was proxied by estimating changes in food insecurity amid the COVID-19 pandemic between female-headed and male-households (Buvinic and Gupta, 1997). The authors estimated a simple difference-in-difference specification that compared differences in food insecurity before and after the onset of the pandemic between urban households and rural households as well as between female-headed and male-headed households, respectively. Specifically, a linear regression was estimated that included an indicator for survey waves collected after the onset of the COVID-19 pandemic and either an indicator for urban—relative to rural—households or an indicator for female-headed—relative to male-headed—households.

Equation 1

$$y_{it} = a + \beta H_i + \delta COVID_t + \gamma(H_i \times COVID_t) + \pi_t + e_{it}$$

In this equation, y_{it} is the outcome variable measuring food insecurity for a household over time. H_i is a time-invariant binary indicator for either an urban household or a female-headed household; $COVID_t$ is a binary indicator for when the survey wave is from the COVID-19 phone survey collected after the onset of the pandemic; is a survey wave fixed effect; and e_{it} is an error term. The coefficient of interest is , which estimates the differential change in food insecurity amid the COVID-19 pandemic between rural and urban households or between female-headed and male-headed households. A set of dummy variables (not shown in equation 1) were also included to control for when a household did not, for any reason, answer all eight FIES questions. This allowed outcomes for a household that answered only a subset of the FIES questions to be compared with other households that answered the same subset of questions. Regressions for each country were estimated separately. All standard errors were clustered at the household-level and all regressions included sampling weights.

Again, this estimation approach does not calculate a credible estimate of the causal effect of the COVID-19 pandemic. To interpret the estimates in this way, the identifying assumption of parallel counterfactual trends in latent food security between households in urban versus rural areas or between female- versus male-headed households in the absence of the pandemic would be required. This parallel counterfactual trends assumption cannot be tested and may not hold in the context of the data. A variety of forms of unobserved heterogeneity beyond rural and urban locations or female-headed and male-headed households limit the ability to claim credible causal identification of the coefficient estimates. The analysis can be interpreted as describing heterogeneity in changes in food insecurity within each country associated with the COVID-19 pandemic.

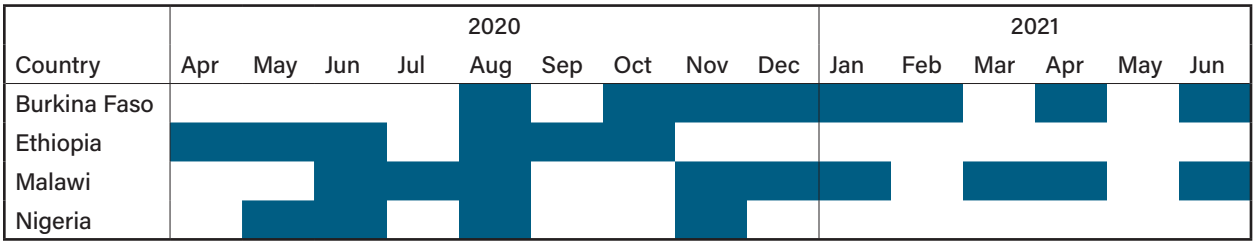
Results

The authors focused on three sets of results. First, longitudinal trends in the measures of food insecurity over time and during the COVID-19 pandemic in Burkina Faso, Ethiopia, Malawi, and Nigeria. These figures provided insight into household food insecurity amid the pandemic. Second, the authors report regression results to investigate differential changes in food insecurity amid the onset of the COVID-19 pandemic between rural and urban households. Finally, regression analysis was used to examine differential changes in food insecurity amid the onset of the COVID-19 pandemic between female-headed and male-headed households. These regression results describe how measures of food insecurity changed within countries relative to before the onset of the pandemic.

Longitudinal Trends Amid the COVID-19 Pandemic

Longitudinal trends in food insecurity amid the COVID-19 pandemic were analyzed from April 2020 until June 2021 using data from the COVID-19 phone surveys collected after the onset of the pandemic in Burkina Faso, Ethiopia, Malawi, and Nigeria. There is variation in the beginning and end of the COVID-19 survey waves between each country. This is because, as shown in figure 1, not every country completed a survey in every month between April 2020 and June 2021. Nevertheless, these results describe how the study's four measures of food insecurity changed amid the COVID-19 pandemic in the four countries.

Figure 1
Months in which food security module was included, 2020–21

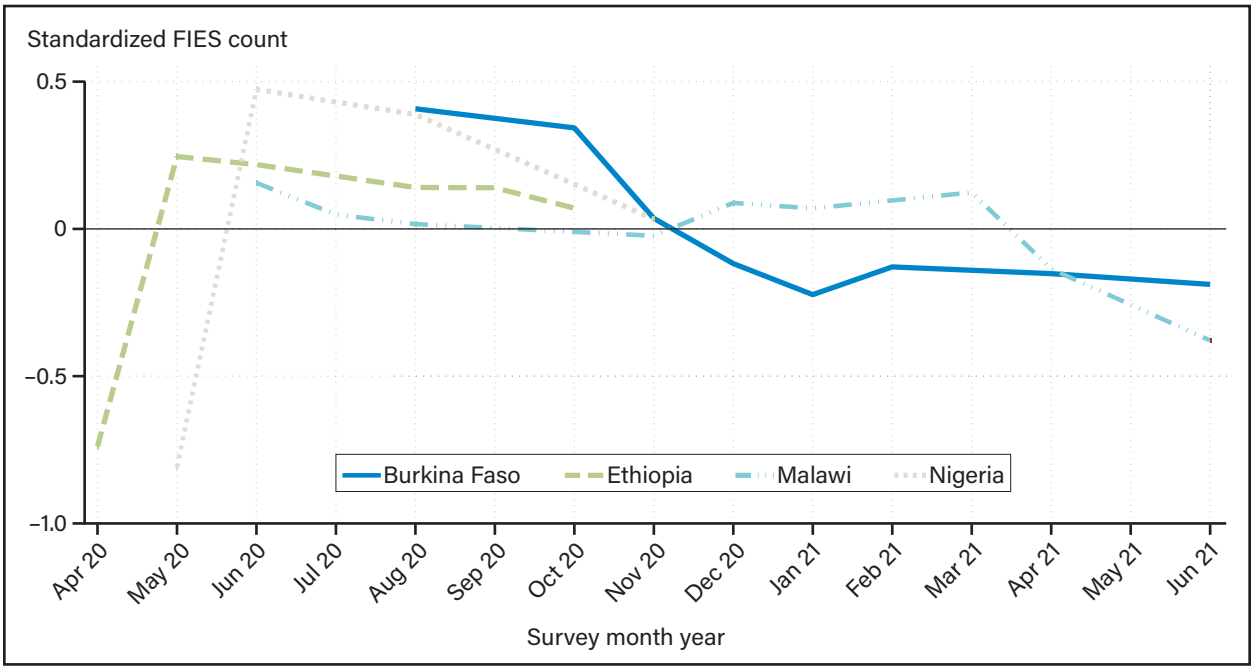


Note: Timeline shows, by country, which month the phone survey included the food security module containing the Food Insecurity Experience Scale (FIES) questions.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Study data.

Figure 2 plots the mean standardized raw FIES score by country and survey wave for the COVID-19 phone survey data collected after the onset of the pandemic. In general, an initial spike in food insecurity occurred in the first few months after the onset of the COVID-19 pandemic then—in subsequent months—mean standardized raw FIES scores began to decline. In particular, the trends for Nigeria and Ethiopia showed a dramatic increase in raw FIES score between the first and second waves of the COVID-19 phone survey. This was followed by a slow decline back toward the mean over subsequent waves. Malawi begins with an above average raw FIES score. However, it is important to note, the first wave of surveys that included questions about food insecurity for Malawi occurred in June 2020, so this observation may be driven by the timing of these questions relative to the onset of the pandemic in Malawi. After June 2020, the raw FIES score in Malawi decreased slightly, but it holds relatively steady until a notable decrease began in March 2021. In Burkina Faso, an above-average raw FIES score was initially observed. Again, it is important to note that the first survey wave in Burkina Faso to include questions about food insecurity began many months after the onset of the pandemic. In subsequent months, Burkina Faso experienced declines in food insecurity relative to August 2020. The steepest decline occurred between October 2020 and November 2020.

Figure 2
Changes in standardized raw FIES score over time



FIES = Food Insecurity Experience Scale.

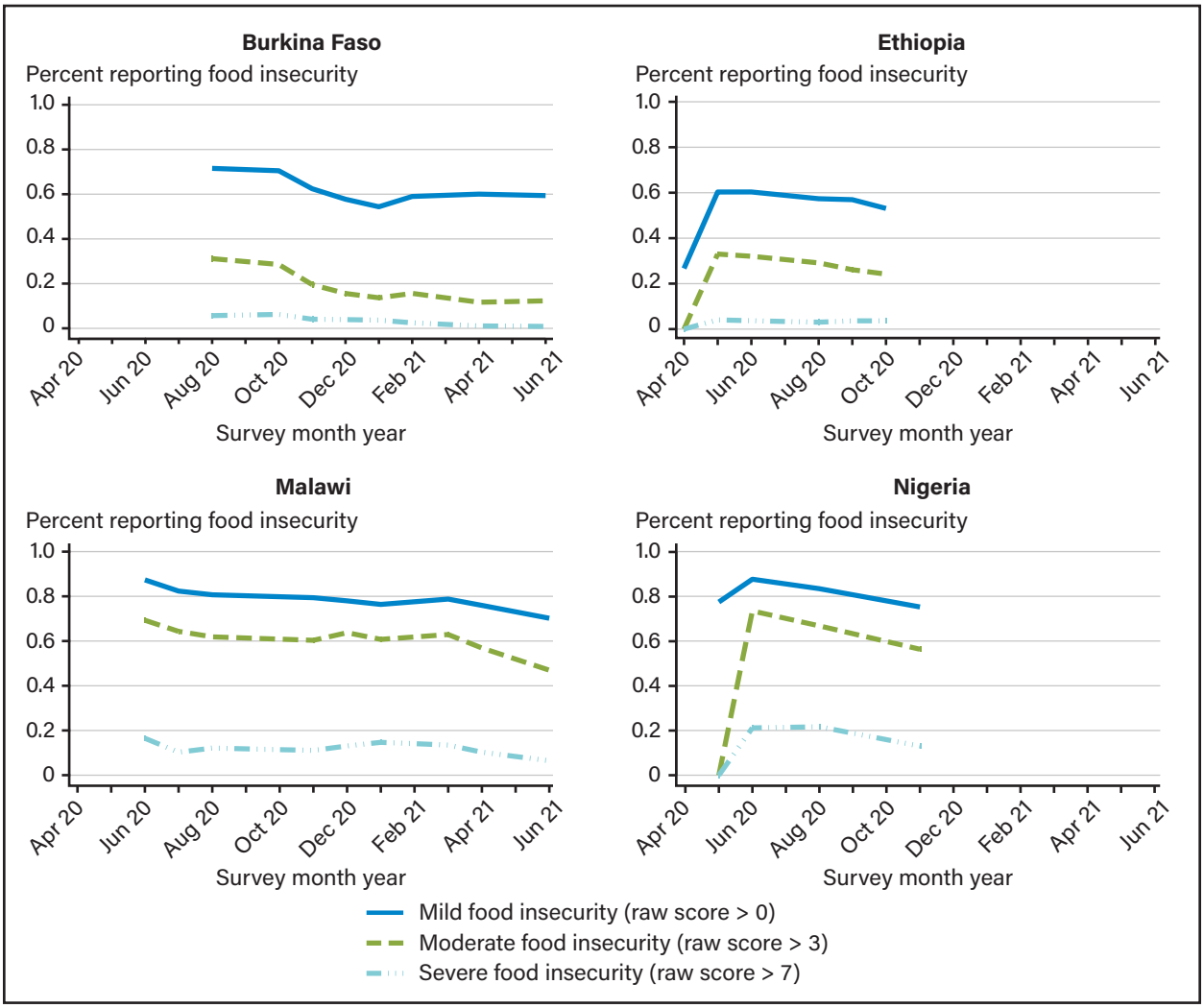
Notes: The figure presents the mean of the standardized raw FIES score by country and wave. All values are computed using survey weights. Survey data were not collected for all countries in the same month and not all surveys asked questions about food insecurity. As a result, there are gaps in the time series in each country.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Study data.

Figure 3 plots the three additional measures of food insecurity—mild, moderate, and severe—for each country between April 2020 and June 2021. In Burkina Faso, roughly 70 percent of people experienced mild food insecurity in August 2020. The number of people experiencing mild food insecurity decreased from October 2020 through January 2021, when it reached a low of roughly 55 percent before rising slightly and persisting at that level through June 2021. The percent of households reporting moderate food insecurity in Burkina Faso began at about 30 percent in August 2020 and followed a trend similar to mild food insecurity—declining to a low of 15 percent in January 2021 before leveling at roughly 20 percent through the end of June 2021. By contrast, the number of households reporting severe food insecurity remained fairly stable throughout the study period. In August 2020, less than 10 percent of people reported severe food insecurity, and that rate fell by only a few percentage points by June 2021. In Ethiopia—where data were only available through October 2020—an initial spike occurred in the number of households reporting mild and moderate food insecurity. In April 2020, the rate of mild food insecurity was roughly 30 percent, and the rate of moderate food insecurity was close to zero. One month later, in May 2020, roughly 60 percent of households reported mild food insecurity, and 30 percent of households reported moderate food insecurity. In subsequent months—through October 2020—rates of both mild and moderate food insecurity slowly declined but remained persistently higher than in April 2020. By contrast, the rate of severe food insecurity remained largely unchanged from April 2020 through October 2020 in Ethiopia.

Figure 3

Changes in food insecurity by country over time, April 2020–June 2021



Notes: The figure presents the mean of three different measures of food insecurity: mild food insecurity (raw score > 0); moderate food insecurity (raw score > 3); and severe food insecurity (raw Score > 7), by country and wave. All values are computed using survey weights. Survey data were not collected for all countries in the same month and not all surveys asked questions about food insecurity. As a result, there are gaps in the time series in each country.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Study data.

In Nigeria, a pattern in trends—similar to trends noted in Ethiopia—was observed. In particular, an initial spike in moderate food insecurity was seen in Nigeria before it slowly declined in subsequent months. More specifically, just under 80 percent of households were reporting mild food insecurity in May 2020. This rate increased slightly to just under 90 percent in June 2020 and eventually declined through November 2020. Similarly, the percent of households reporting moderate food insecurity increased from just above 0 percent in May 2020 to over 70 percent in June 2020. In subsequent months, the percent of households reporting moderate food insecurity slowly declined but remained relatively high—above 60 percent of households—through November 2020. Finally, the percent of households reporting severe food insecurity started close to 0 percent in May 2020 and increased to roughly 20 percent in June 2020, where this rate remained steady through November 2020.

Finally, in Malawi, trends similar to those in Burkina Faso were observed. In the first survey wave from June 2020, roughly 80 percent of households reported mild food insecurity. This rate declined only slightly through June 2021. Similarly, roughly 70 percent of households reported moderate food insecurity in June 2020. This rate declined slight by June 2021 to roughly 60 percent of households. Finally, the percent of households reporting severe food insecurity was steady—at roughly 20 percent of households—through the study period of April 2020 to June 2021.

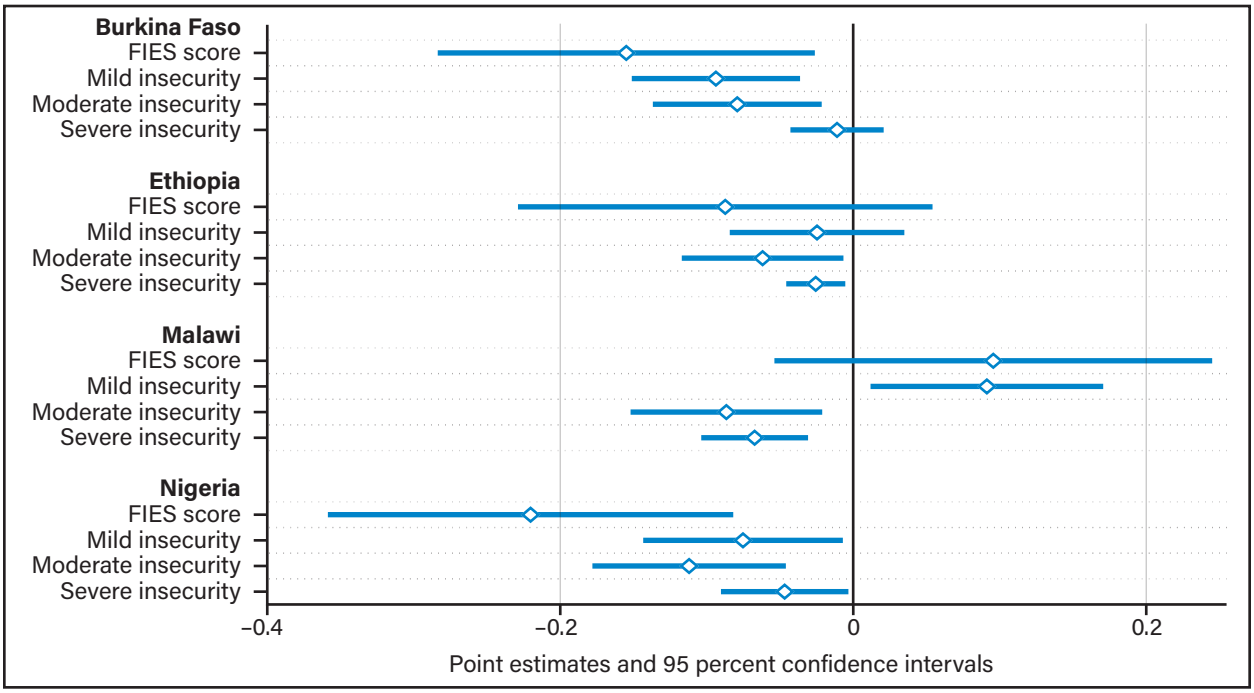
The longitudinal trend analysis highlights two clear findings. First, in countries where data were available from the early months of the pandemic (e.g., in Ethiopia and Nigeria), the percent of households reporting some level of food insecurity increased sharply. Second, in all countries, the percent of households reporting some level of food insecurity gradually declined in the subsequent months after the initial onset of the COVID-19 pandemic. However, no evidence was found to suggest rates of food insecurity fell back to the levels observed in the first month of the pandemic.

Differences Between Rural and Urban Areas

In a review of the microeconomic literature studying short-term changes in food insecurity associated with the COVID-19 pandemic, Bloem and Farris (2021) found conflicting evidence on differential changes in food insecurity between rural and urban areas. Conversely, research by Adjognon et al. (2021) found that adverse changes in food insecurity were much larger in Mali's urban areas than in rural areas. Furthermore, research by Amare et al. (2021) did not find any difference in changes in food insecurity between urban and rural areas in Nigeria. Merging pre-pandemic data with data collected during the COVID-19 pandemic, the authors were able to explore differences in changes in food insecurity associated with the COVID-19 pandemic between rural and urban areas in Burkina Faso, Ethiopia, Malawi, and Nigeria up to 1 full year after the onset of the pandemic.

Figure 4 shows the coefficient estimate of y from equation 1 when estimating differences between urban and rural households. When this coefficient estimate is positive, it implies urban households experienced more food insecurity relative to rural households. When this coefficient estimate is negative, it implies the opposite holds true. In general, with a couple of exceptions, figure 4 shows most coefficients are negative. In terms of magnitude, changes measured with the standardized FIES score show differences between rural and urban areas within the range of 0.1 to 0.2 standard deviations. Binary indicators of food insecurity suggest that the difference in moderate food insecurity between rural and urban areas is between 5 and 10 percentage points. Therefore, the observed differences in changes in food security between rural and urban areas associated with the COVID-19 pandemic are economically meaningful. This implies that for most measures of food insecurity in most of the countries in the study, food insecurity increased more in rural areas relative to urban areas since the onset of the pandemic. This general longer term trend follows the changing dynamics of the spread of the COVID-19 virus within some other countries around the world. For example, in the United States, the COVID-19 virus first spread quickly in major metropolitan areas before spreading into rural areas and eventually becoming even more deeply disruptive in rural areas in the longer term (McGranahan and Dobis, 2021).

Figure 4
Urban-rural differences in changes in food insecurity



FIES = Food Insecurity Experience Scale.

Notes: This figure reports the coefficient estimates (represented as diamonds, with associated confidence intervals around these estimates) of from the main regression equation when estimating differences between urban and rural households. When this coefficient estimate is positive, it implies households in urban areas experienced a larger increase in the given measure of food insecurity relative to rural households. When this coefficient estimate is negative, it implies households in rural areas experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank Living Standards Measurement Study data.

More specifically, in Burkina Faso, Malawi, and Nigeria, the estimated coefficient on each of the measures of food insecurity all indicate food insecurity increased more in rural areas than in urban areas amid the COVID-19 pandemic. In addition, most of these estimated coefficients are statistically significant at conventional levels, meaning the authors can reasonably rule out no difference in changes between rural and urban households. The two exceptions are in Malawi when using the raw FIES score and a binary indicator of mild food insecurity. Although the estimated coefficient is only statistically significant at conventional levels for the mild food insecurity measure, both coefficient estimates are meaningful in magnitude. These results highlight important heterogeneity in changes in food insecurity between rural and urban households amid the COVID-19 pandemic that can still persist even 1 year after the onset of the pandemic.

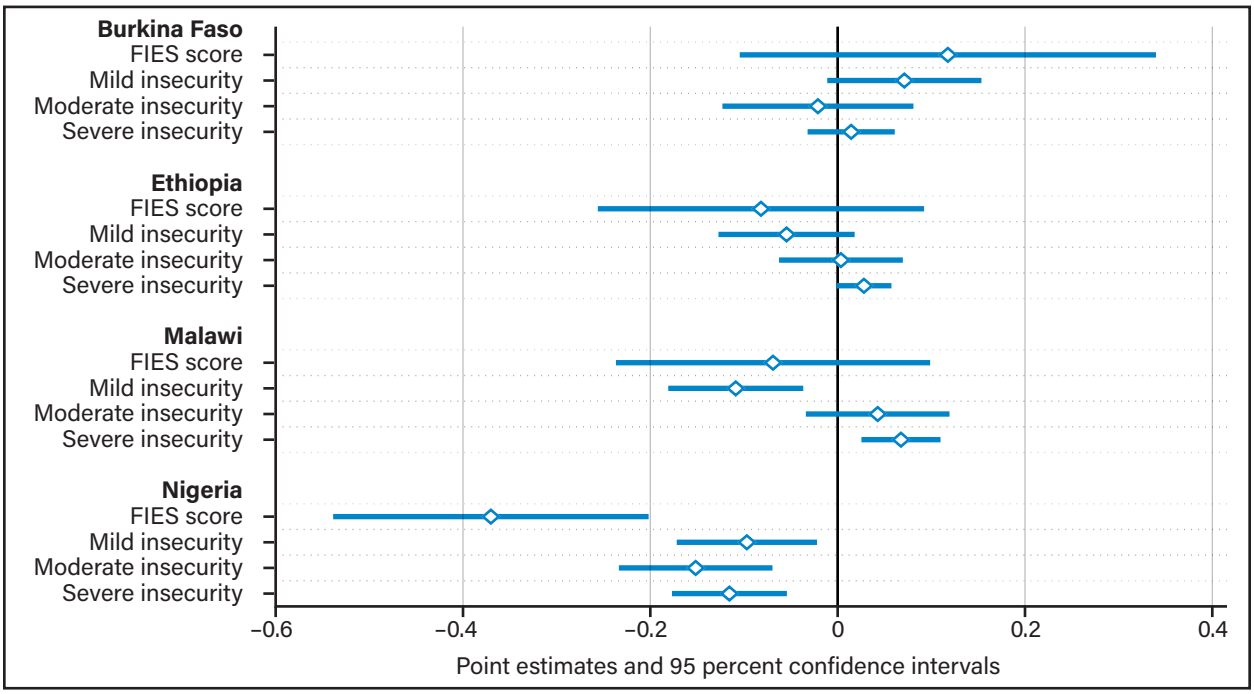
In the appendix, sets of supporting information are shown. First, the top panel of figure A-2 shows the share of urban respondents relative to rural respondents was stable over the entire study period. This supports the idea that the estimates reported in figure 4 are not biased from differential attrition of households between rural and urban areas. In addition, tables A-5 through A-8 show the results from figure 4 in tabular form with additional information about these regression results.

Differences Between Female-Headed and Male-Headed Households

As discussed by Buvinic and Gupta (1997), the vast majority of available evidence shows that female-headed households are more vulnerable and at risk of experiencing poverty. Therefore, it may be that female-headed households experience larger adverse changes in food insecurity amid the COVID-19 pandemic. In a review of the microeconomic literature studying short-term changes in food insecurity associated with the COVID-19 pandemic, Bloem and Farris (2021) found inconclusive evidence on differential changes by socio-economic status. Part of the explanation for these ambiguous results is, at least in the short-term, pandemic-related disruptions seem to more deeply influence the lives of those who are more tightly connected to international markets. These individuals and households may be relatively well-off—thus—in the short-term, more vulnerable households may not experience the most dramatic adverse changes in food security.

Figure 5 shows the coefficient estimate of y from equation 1 when estimating differences between female-headed and male-headed households. When this coefficient estimate is positive, this implies that female-headed households experienced a larger increase in the given measure of food insecurity relative to male-headed households. When the coefficient estimate is negative, this implies the opposite holds. In general, with a few exceptions, figure 4 shows most coefficients are not statistically significant. This implies that for most cases and by most measures, there is no noticeable difference in changes in food insecurity associated with the COVID-19 pandemic between female-headed and male-headed households.

Figure 5
Female-headed versus male-headed household differences in changes in food insecurity



FIES = Food Insecurity Experience Scale.

Notes: This figure reports the coefficient estimates (as diamonds, with associated confidence intervals around these estimates) from the main regression equation when estimating differences between female-headed and male-headed households. When this coefficient estimate is positive, it implies female-headed households experienced a larger increase in the given measure of food insecurity relative to male-headed households. When this coefficient estimate is negative, it implies male-headed households experienced a larger increase in food insecurity relative to female-headed households.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Study data.

More specifically, in Burkina Faso and Ethiopia, all the estimated coefficients of the differential change in food insecurity amid the COVID-19 pandemic between female-headed and male-headed households are not statistically significant at conventional levels. In Malawi, conflicting results are seen, depending on the measure of food insecurity. Both the raw FIES score and the binary measure of moderate food insecurity are not statistically significant. However, the binary measure of mild food insecurity is negative—indicating a larger adverse change for male-headed households—and the binary measure of severe food insecurity is positive—indicating a larger adverse change for female-headed households. Finally, in Nigeria, the estimated coefficients on each measure of food insecurity are negative and indicates larger adverse changes in food insecurity for male-headed households. Taken together, these results highlight the ambiguity in differentiating the socioeconomic consequences of the COVID-19 by socioeconomic status, at least as measured by the gender of the household head. On the one hand, female-headed households may be less able to protect themselves from adverse changes in their food security status than male-headed households. But on the other hand, male-headed households may be more connected with pandemic-related disruptions at the local and global level, therefore at greater risk of adverse consequences due to the pandemic.

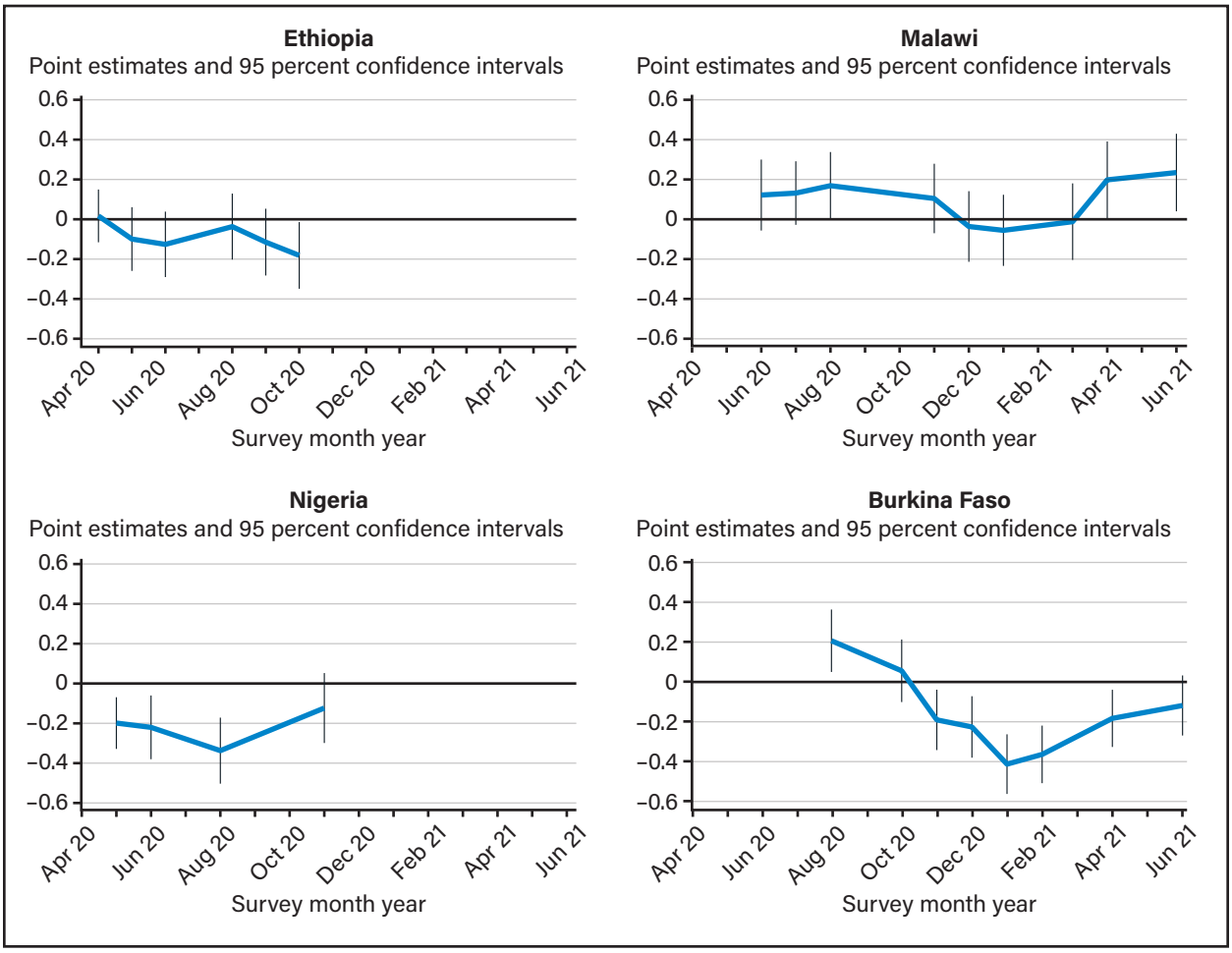
In the appendix, the authors again show sets of supporting information. First, the bottom panel of figure A-2 shows the share of female-headed households relative to male-headed households was stable over the entire study period. This supports the idea the estimates reported in figure 4 are not biased from differential attrition between female-headed households and male-headed households. In addition, tables A-5 through A-8 show the results from figure 4 in tabular form with additional information about these regression results.

Intertemporal Heterogeneity

In the final set of results, the authors investigated intertemporal heterogeneity. In the regression results reported and discussed so far, all the data collected during the pandemic was averaged together. Although this allows for a straightforward analytical approach, it can obscure potential heterogeneity over time. This section presents results from an event study regression specification that disaggregates estimates of subnational differences in changes in food insecurity associated with the COVID-19 pandemic. Figure 6 illustrates the event study results for differences between urban and rural households using the standardized raw FIES score as the outcome of interest.

Figure 6

Event study—urban-rural difference in food insecurity



FIES = Food Insecurity Experience Scale.

Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with the standardized raw FIES score, by country and wave. When the coefficient is positive, it implies households in urban areas experienced a larger increase in the given measure of food insecurity before the pandemic began relative to rural households. When the coefficient estimate is negative, it implies households in rural areas experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Study data.

As seen in figure 4, with the onset of the pandemic, the FIES score for Ethiopia increased more in rural areas than in urban areas on average, but this estimate was not statistically significant at conventional levels. Figure 6 shows similar results for the initial survey waves administered during the pandemic. However, by October 2020, the last wave of data from Ethiopia, the estimated difference in the trend of food insecurity relative to before the pandemic between urban and rural areas is statistically significant. Food insecurity for rural households increased more in October than it did for urban households, relative to pre-pandemic levels. These findings enrich previous analyses of short-term changes in food insecurity associated with the pandemic in Ethiopia by Abay et al. (2020) and Hirvonen et al. (2021). Studying a sample of rural households in Ethiopia, Abay et al. (2020) found evidence of increasing food insecurity in the initial months of the pandemic. By contrast, studying a sample of urban households in Ethiopia, Hirvonen et al. (2021) found no evidence of changes in food insecurity in the initial months of the pandemic.

In Malawi, figure 4 shows the FIES score increased more in urban areas than in rural areas on average in association with the pandemic. Similar to the estimate for Ethiopia, this estimate was not statistically significant at conventional levels. In figure 6, although the coefficient is positive in the initial months of the pandemic—indicating a larger increase in food insecurity in urban areas than in rural areas—estimates became negative at the beginning of 2021 before finally becoming positive in May and June of 2021. Despite most of these estimates being statistically insignificant at conventional levels, the results highlight the importance of investigating intertemporal heterogeneity since, in some months, food insecurity increased more in urban areas, whereas in others, food insecurity increased more in rural areas.

For Nigeria in figure 4, the FIES score increased more in rural areas than in urban areas on average in association with the pandemic. Figure 6 shows the estimate is negative and statistically significant in the early survey waves, implying food insecurity increased more in rural areas than in urban areas at least through August 2020. These results contrast with those estimated by Amare et al. (2021), and it is important to briefly discuss key methodological differences that likely led to these different results. The analysis of Amare et al. (2021) relied only on a single post-pandemic round of data and used only three of the eight FIES questions. Furthermore, the authors sought to use State-level COVID-19 case numbers to try determining whether there are differences in food security outcomes between rural and urban households. Amare et al. (2021) had not found evidence of heterogeneous changes in the immediate aftermath of the onset of the pandemic. Conversely, this report's analysis is more straightforward in that the authors do not aim to estimate exposure to COVID-19 disruptions as case reporting is prone to irreconcilable measurement error.

Finally, for Burkina Faso in figure 4, the FIES score increased more in rural areas than in urban areas in association with the pandemic. This estimate is statistically significant at conventional levels. In figure 6, this estimate varies over time and highlights critical heterogeneity. In August 2020, food insecurity increased more in urban areas than in rural areas, but in subsequent months this difference shifted. By November 2020, food insecurity increased more in rural areas. This difference persisted through June 2021 and was consistent with the idea that although pandemic-related disruptions initially were perhaps strongest in urban areas, pandemic-related disruptions spread to rural areas over time (McGranahan and Dobis, 2021).

The event study results disaggregate urban-rural differences over time using the FIES score as a measure of food insecurity. In the appendix, the event study results are shown for each of the other measures of food insecurity (e.g., binary measures indicating mild, moderate, and severe food insecurity). Differences are also disaggregated between female- and male-headed households. As shown in figure 5, differences in food security between female- and male-headed households were rarely statistically significant at conventional levels even when disaggregated over time.

Conclusion

In this report, the authors documented trends in food security up to 1 year after the onset of the COVID-19 pandemic in Burkina Faso, Ethiopia, Malawi, and Nigeria. To do this, the authors used household-level survey data collected by the World Bank's LSMS team both before and during the pandemic. This report's analysis complements both the previous microeconomic literature studying short-term changes in food insecurity associated with the COVID-19 pandemic (Bloem and Farris, 2021) and previous macroeconomic projections based on expected changes of national-level income, prices, and food supply (Baquedano et al., 2021). These results are specific to the countries studied and do not necessarily translate to other countries. This analysis is performed regarding each of the countries where the necessary data exist.

Three main sets of results are observed. First, an initial spike in food insecurity in the early months of the pandemic was followed by a gradual decline that has not returned to levels observed in the first month of the pandemic. Second, in general, food insecurity increased more in rural areas relative to urban areas. Finally, with a few exceptions, no evidence was found of systematic differences in changes in each of the measures of food insecurity between female-headed and male-headed households. One exception is in Nigeria, where male-headed households experienced larger adverse changes in food insecurity relative to female-headed households. Each of these findings highlight the critical importance of considering local-level factors when assessing changes in food insecurity associated with the COVID-19 pandemic.

The goal of this paper is to document changes in food security during the first year of the COVID-19 pandemic in four African countries. This is a modest but important goal. Future research could focus on understanding what factors drive the changes in food security documented in this paper. For example, the authors lacked access to the data necessary to investigate what factors drove the initial spike in food insecurity in the early months of the pandemic or why food insecurity increased more in rural areas than in urban areas. These are important questions that require detailed data on COVID-19 case counts, sub-national data on food prices and food supply, household-level data on income, and national-level data on imports.

The analysis in this paper is nevertheless important because the adverse consequences of COVID-19 pandemic will likely continue beyond 2022, as new variants of the virus emerge and continue to spread the illness. Moreover, although COVID-19 vaccines became widely available in high-income countries, as of publication of this report, very few people in low-income countries are able to access these vaccines. Therefore, understanding the longer term socioeconomic consequences of this global health crisis can help to inform policy responses. Although short-term changes in food security associated with the onset of the pandemic are well-documented (Bloem and Farris, 2021; Josephson et al., 2021), understanding and documenting longer-term trends are increasingly relevant.

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Appendix

Differential Attrition

The top panel of figure A-2 shows the share of urban respondents was fairly stable over the period of interest. Ethiopia led with the highest share of urban respondents at around 70 percent. In the Burkina Faso, Malawi, and Nigeria, the share of urban respondents clustered around 40 percent, with Burkina Faso having the lowest respondent rate. Ethiopia's share of urban respondents increased only slightly during the survey period. Nigeria's and Malawi's shares of urban respondents remained very consistent, other than a slight decline in urban respondents for Malawi in May 2021. Burkina Faso also had a slight decrease in the share of urban respondents in June 2020. However, the share increased to just under 40 percent in August 2020 and remained steady throughout the rest of the survey period.

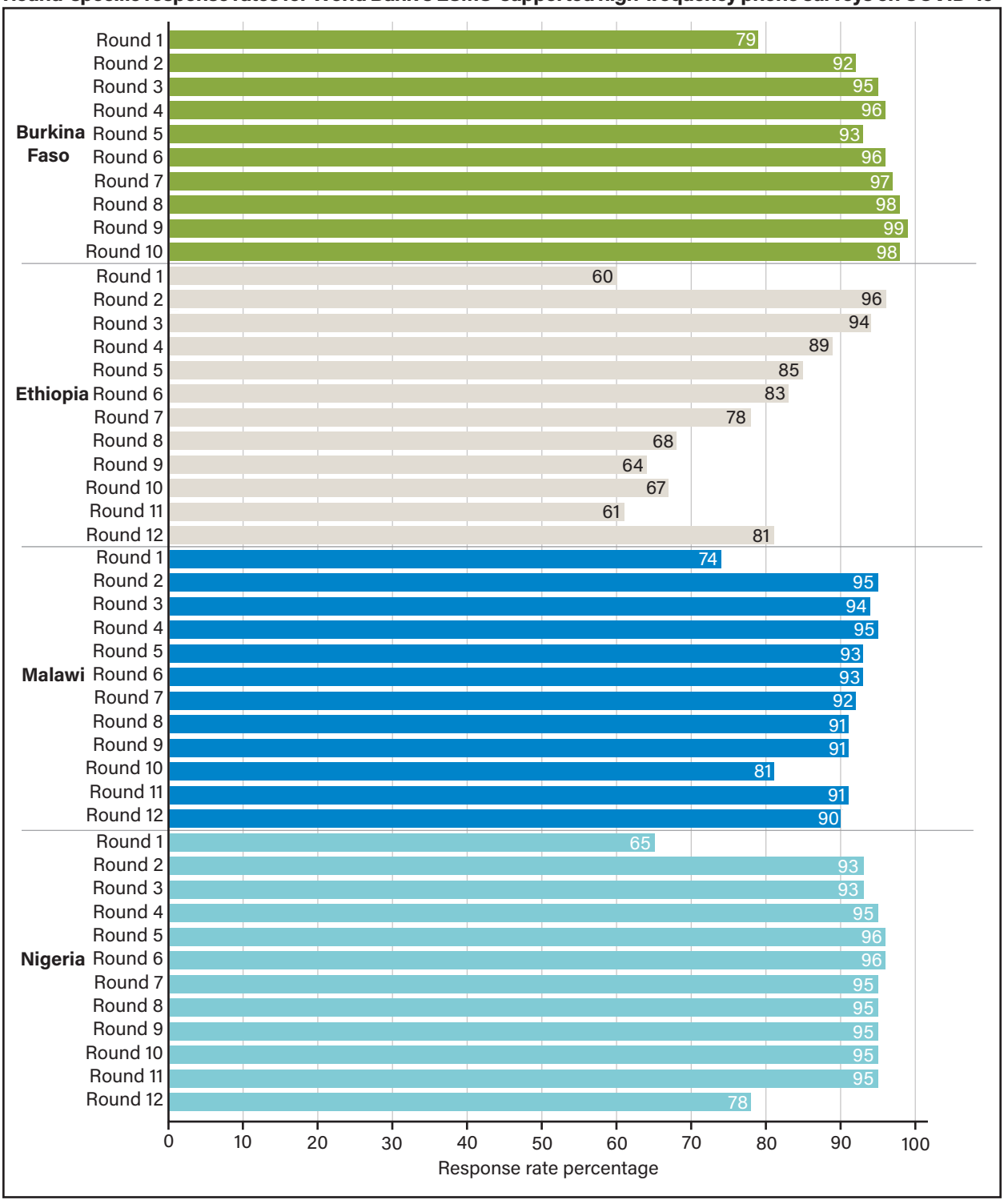
The bottom panel of figure A-2 shows the share of female-headed household respondents wasconsistent across the period of interest. Ethiopia held the highest share of female-headed household respondents at about 30 percent. The other countries clustered around 20 percent, with Burkina Faso having the lowest female-headed household respondents. The share of female-headed household respondents was above 20 percent for Malawi, where there was a slight increase in the share in May 2021 before decreasing in June 2021. In Nigeria and Burkina Faso, the share of respondents was just below 20 percent and remained consistent throughout the survey period.

Additional Tables and Figures

- Figure A-1 presents the percentage response rates for the World Bank Living Standards Measurement Study (LSMS)-supported high-frequency phone surveys on COVID-19 for each round.
- Tables A-1 through A-4 show the survey questions used to measure food insecurity in each country included in this study.
- Tables A-5 through A-8 show tabular results with additional information corresponding to figures 4 and 5 in the main body of the report.
- Figures A-3 through A-9 show event study results that disaggregate estimates of differential trends in food insecurity associated with the COVID-19 pandemic by survey wave.

Figure A-1

Round-specific response rates for World Bank's LSMS-supported high-frequency phone surveys on COVID-19



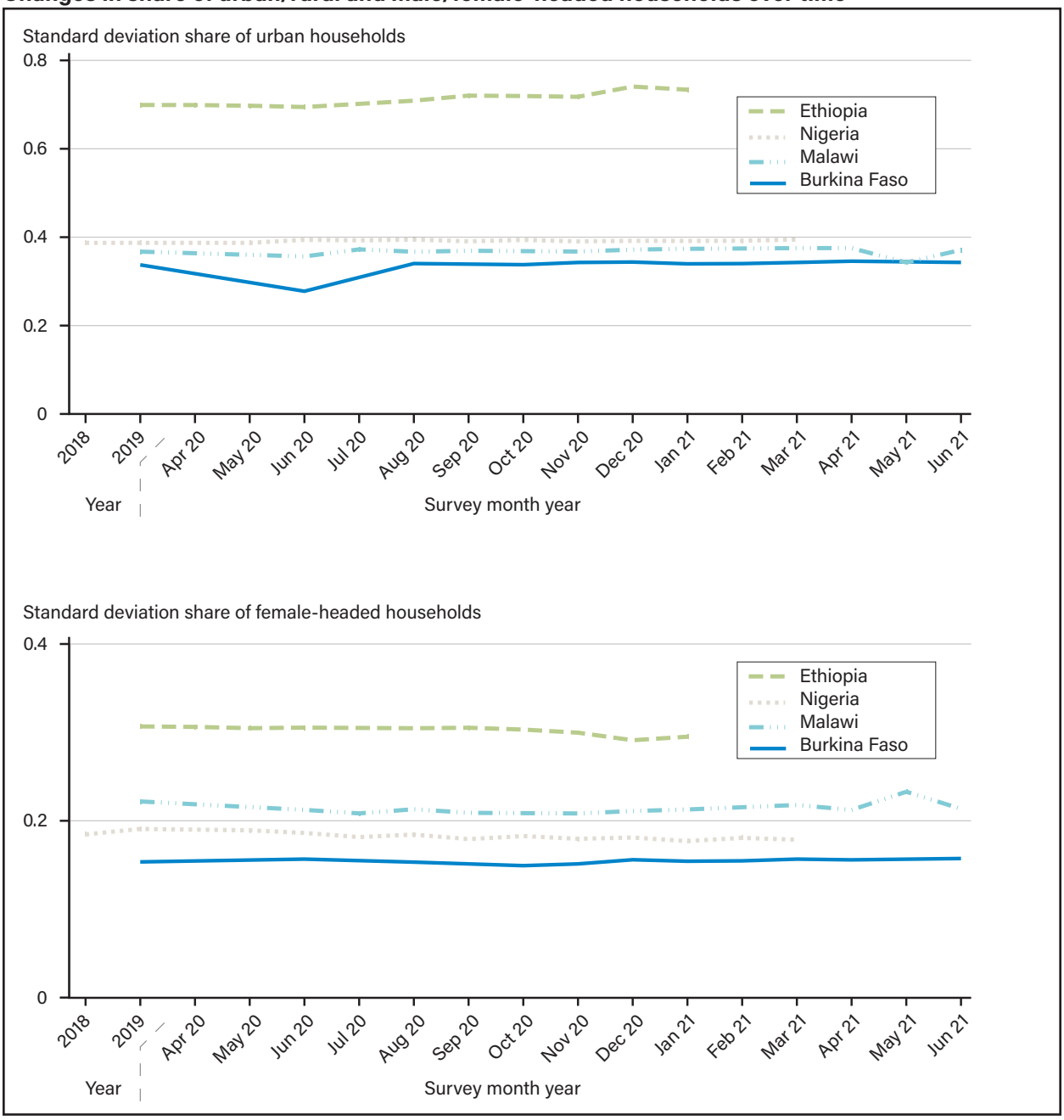
LSMS = Living Standards Measurement Study. ** = A survey round in which only Fielded Youth Aspirations and Employment module were implemented..

Notes: The figure presents the percentage response rates for LSMS-supported high-frequency phone surveys on COVID-19 for each round. Percentage response rates are calculated as the number of completed interviews over the number of attempted interviews. Later survey rounds (e.g., Round 2, Round 3) only attempt to contact respondents with completed interviews from prior round. In Round 10 for Malawi, there were only 1,136 eligible persons, while in Round 12 in Nigeria, there were only 1,238 eligible persons.

Source: USDA, Economic Research Service calculations using World Bank, LSMS data.

Figure A-2

Changes in share of urban/rural and male/female-headed households over time



Source: USDA, Economic Research Service's calculations using World Bank, Living Standards Measurement Survey data.

Table A-1

Food Insecurity Experience Scale (FIES) questions in Burkina Faso

	Pre-COVID-19 surveys		COVID-19 surveys	
FIES	Question	Recall	Question	Recall
FS1	Have you or other members of your household worried about not having enough food due to a lack of resources?	12 months	Have you or other members of your household been worried about not having enough food due to a lack of money or other resources?	30 days
FS2	Have you or other household members been unable to eat healthy, nutritious food due to a lack of money or other resources?	12 months	Have you or other members of your household been unable to eat healthy, nutritious food due to a lack of money or other resources?	30 days
FS3	Have you or other household members eaten with little variety due to a lack of money or other resources?	12 months	Have you or other members of your household not eaten enough varied food due to a lack of money or other resources?	30 days
FS4	Have you or other household members had to skip a meal because you/they did not have enough money or other resources to buy food?	12 months	Have you or other members of your household had to skip a meal because you did not have enough money or other resources to buy food?	30 days
FS5	Have you or other household members eaten less than you/they think you/they should because of a lack of money or other resources?	12 months	Have you or other members of your household ate less than you thought you should have eaten due to a lack of money or other resources?	30 days
FS6	Has your household run out of food because there was not enough money or other resources?	12 months	Has your household run out of food because there was not enough money or other resources?	30 days
FS7	Have you or other members of your household been hungry but did not eat because there was not enough money or other resources to buy food?	12 months	Have you or other members of your household felt hungry but did not eat because there was not enough money or other resources to buy food?	30 days
FS8	Did you or other members of the household go an entire day without eating because of a lack of money or other resources?	12 months	Did you or other members of your household go a whole day without eating due to a lack of money or other resources?	30 days

Source: USDA, Economic Research Service using World Bank, Living Standards Measurement Survey data.

Table A-2

Food Insecurity Experience Scale (FIES) questions in Ethiopia

	Pre-COVID-19 surveys		COVID-19 surveys	
FIES	Question	Recall	Question	Recall
FS1	Did you worry that your household would not have enough food?	7 days	Was there a time when you or any other adult in your household was worried about not having enough food to eat because of a lack of money or other resources?	30 days
FS2	How many days have you or someone in your household had to rely on less preferred foods?	7 days	Was there a time when you or any other adult in your household was unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?	30 days
FS3	How many days have you or someone in your household had to limit the variety of foods eaten?	7 days	Was there a time when you or any other adult in your household ate only a few kinds of foods because of a lack of money or other resources?	30 days
FS4	How many days have you or someone in your household had to limit portion size at mealtimes?	7 days	Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food?	30 days
FS5	How many days have you or someone in your household had to reduce the number of meals eaten in a day?	7 days	Was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources?	30 days
FS6	How many days have you had no food of any kind in your household?	7 days	Was there a time when your household ran out of food because of a lack of money or other resources?	30 days
FS7	How many days have you or someone in your household had to restrict consumption by adults for small children to eat?	7 days	Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources for food?	30 days
FS8	How many days have you or someone in your household had to go a whole day and night without eating anything?	7 days	Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources?	30 days

Source: USDA, Economic Research Service using World Bank, Living Standards Measurement Survey data.

Table A-3

Food Insecurity Experience Scale (FIES) questions in Malawi

	Pre-COVID-19 surveys		COVID-19 surveys	
FIES	Question	Recall	Question	Recall
FS1	Did you worry that your household would not have enough food?	7 days	Have you or any other adult in your household worried about not having enough food to eat because of a lack of money or other resources?	30 days
FS2	How many days have you or someone in your household had to rely on less preferred and/or less expensive foods?	7 days	Have you or any other adult in your household been unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?	30 days
FS3	N/A	7 days	Have you or any other adult in your household eaten only a few kinds of foods because of a lack of money or other resources?	30 days
FS4	How many days have you or someone in your household had to reduce the number of meals eaten in a day?	7 days	Have you or any other adult in your household had to skip a meal because there was not enough money or other resources to get food?	30 days
FS5	How many days have you or someone in your household had to limit portion size at mealtimes?	7 days	Have you or any other adult in your household eaten less than you thought you should because of a lack of money or other resources?	30 days
FS6	How many days have you or someone in your household had to borrow food or rely on help from a friend or relative?	7 days	Has your household run out of food because of a lack of money or other resources?	30 days
FS7	How many days have you or someone in your household had to restrict consumption by adults in order for small children to eat?	7 days	Have you or any other adult in your household been hungry but did not eat because there was not enough money or other resources for food?	30 days
FS8	N/A	7 days	Have you or any other adult in your household gone without eating for a whole day because of a lack of money or other resources?	30 days

Source: USDA, Economic Research Service using World Bank, Living Standards Measurement Survey data.

Table A-4

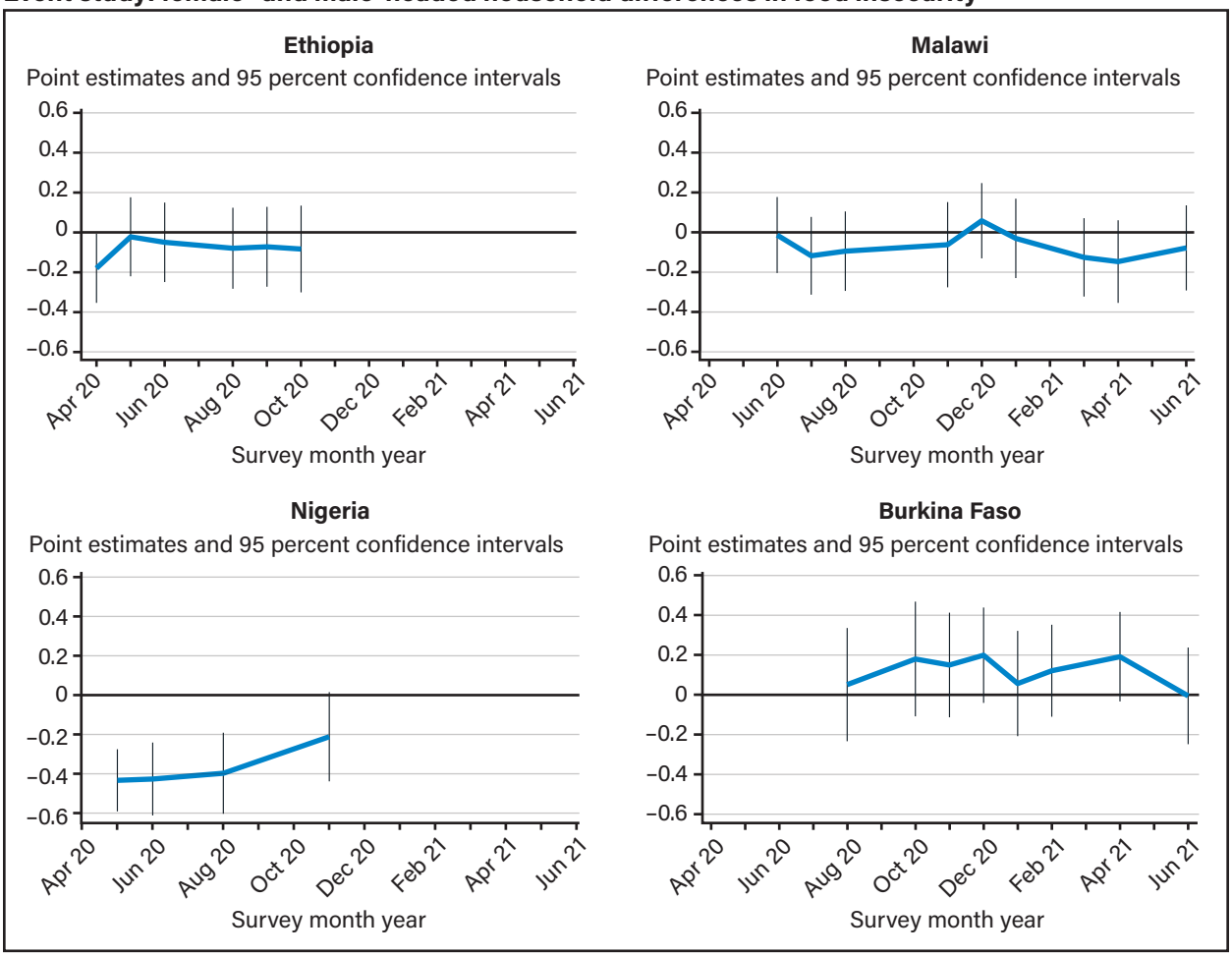
Food Insecurity Experience Scale (FIES) questions in Nigeria

	Pre-COVID-19 surveys		COVID-19 surveys	
FIES	Question	Recall	Question	Recall
FS1	Have you or any other adult in your household worried about not having enough food to eat because of a lack of money or other resources?	30 days	Have you or any other adult in your household been worried about not having enough food to eat because of a lack of money or other resources?	30 days
FS2	Have you or any other adult in your household been unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?	30 days	Have you or any other adult in your household been unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?	30 days
FS3	Have you or any other adult in your household eaten only a few kinds of foods because of a lack of money or other resources?	30 days	Have you or any other adult in your household eaten only a few kinds of foods because of a lack of money or other resources?	30 days
FS4	Have you or any other adult in your household had to skip a meal because there was not enough money or other resources to get food?	30 days	Have you or any other adult in your household had to skip a meal because there was not enough money or other resources to get food?	30 days
FS5	Have you or any other adult in your household restricted consumption in order for children to eat?	30 days	Have you or any other adult in your household eaten less than you thought you should because of a lack of money or other resources?	30 days
FS6	Have you or any other adult in your household borrowed food or relied on help from a friend or relative?	30 days	Has your household run out of food because of a lack of money or other resources?	30 days
FS7	Have you or any other adult in your household restricted consumption in order for children to eat?	30 days	Have you or any other adult in your household been hungry but did not eat because there was not enough money or other resources for food?	30 days
FS8	Have you or any other adult in your household gone without eating for a whole day because of a lack of money or other resources?	30 days	Have you or any other adult in your household gone without eating for a whole day because of a lack of money or other resources?	30 days

Source: USDA, Economic Research Service using World Bank, Living Standards Measurement Survey data.

Figure A-3

Event study: female- and male-headed household differences in food insecurity



Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with the standardized raw Food Insecurity Experience Scale (FIES) score, by country and wave. When the coefficient is positive, it implies female-headed households experienced a larger increase in the given measure of food insecurity since before the pandemic, relative to male-headed households. When the coefficient estimate is negative, it implies male-headed households experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Table A-5

COVID-19 and standardized raw Food Insecurity Experience Scale (FIES) score

	Urban/rural areas	Female-/male-headed households
	Panel A: Burkina Faso	
COVID	−0.085	−0.205***
	(0.046)	((0.047)
Urban	0.378***	
	(0.061)	
COVID x Urban	−0.155*	
	(0.066)	
Female		0.065
		(0.098)
COVID x Female		0.118
		(0.11)
Observations	17,974	17,974
R-squared	0.061	0.051
Baseline mean	−0.256	−0.009
	Panel B: Ethiopia	
COVID	0.1	0.089
	(0.064)	(0.056)
Urban	−0.038	
	(0.065)	
COVID x Urban	−0.087	
	(0.072)	
Female		0.258**
		(0.085)
COVID x Female		−0.082
		(0.089)
Observations	21,008	21,008
R-squared	0.11	0.114
Baseline mean	0.012	−0.063
	Panel C: Malawi	
COVID	−0.393***	−0.355***
	(0.052)	(0.053)
Urban	−0.494***	
	(0.068)	
COVID x Urban	0.096	
	(0.076)	
Female		0.346***
		(0.079)
COVID x Female		-0.069
		(0.086)
Observations	16,102	16,102
R-squared	0.047	0.036
Baseline mean	0.095	-0.092

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	Panel D: Nigeria	
COVID	0.304***	0.307***
	(0.046)	(0.043)
Urban	0.255***	
	(0.067)	
COVID x Urban	-0.220**	
	(0.071)	
Female		0.470***
		(0.082)
COVID x Female		-0.370***
		(0.086)
Observations	9,235	9,235
R-squared	0.227	0.233
Baseline mean	-0.068	-0.08

* = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Notes: The dependent variable is the standardized raw FIES score weighted using household survey weights. The baseline mean represents the pre-pandemic mean of the outcome variable in the comparison area—e.g., rural areas in the first column and male-headed households in the second column. Each regression includes round fixed effects and a set of indicator variables to control for when households skip or refuse to answer a specific FIES question. Robust standard errors clustered at the household level are reported in parentheses.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Table A-6
COVID-19 and mild food insecurity

	Urban/rural areas	Female-/male-headed households
	Panel A: Burkina Faso	
COVID	0.047*	−0.025
	(0.023)	(0.022)
Urban	0.229***	
	(0.028)	
COVID x Urban	−0.094**	
	(0.029)	
Female		0.003
		(0.042)
COVID x Female		0.071
		(0.042)
Observations	17,974	17,974
R-squared	0.039	0.019
Baseline mean	0.53	0.685
	Panel B: Ethiopia	
COVID	0.318***	0.322***
	(0.027)	(0.023)
Urban	−0.051	
	(0.028)	
COVID x Urban	-0.025	
	(0.03)	
Female		0.124***
		(0.036)
COVID x Female		−0.055
		(0.037)
Observations	21,008	21,008
R-squared	0.13	0.13
Baseline mean	0.359	0.312
	Panel C: Malawi	
COVID	0.121***	0.167***
	(0.024)	(0.025)
Urban	−0.231***	
	(0.038)	
COVID x Urban	0.091*	
	(0.04)	
Female		0.178***
		(0.036)
COVID x Female		−0.109**
		(0.037)
Observations	16,102	16,102
R-squared	0.059	0.045
Baseline mean	0.666	0.574

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	Panel D: Nigeria	
COVID	0.258***	0.254***
	(0.024)	(0.023)
Urban	0.090**	
	(0.034)	
COVID x Urban	−0.075*	
	(0.035)	
Female		0.159***
		(0.037)
COVID x Female		−0.097*
		(0.038)
Observations	9,235	9,235
R-squared	0.091	0.096
Baseline mean	0.591	0.594

* = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Notes: The dependent variable is mild food insecurity weighted using household survey weights. The baseline mean represents the using household survey weights and the pre-pandemic mean of the outcome variable in the comparison area—e.g., rural areas in the first column and male-headed households in the second column. Each regression includes round fixed effects and a set of indicator variables to control for when households skip or refuse to answer a specific Food Insecurity Experience Scale (FIES) question. Robust standard errors clustered at the household level are reported in parentheses.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Table A-7
COVID-19 and moderate food insecurity

	Urban/rural areas	Female-/male-headed households
	Panel A: Burkina Faso	
COVID	−0.138***	−0.189***
	(0.02)	(0.021)
Urban	0.151***	
	(0.028)	
COVID x Urban	−0.079**	
	(0.029)	
Female		0.064
		(0.048)
COVID x Female		−0.021
		(0.052)
Observations	17,974	17,974
R-squared	0.059	0.051
Baseline mean	0.248	0.341
	Panel B: Ethiopia	
COVID	0.237***	0.215***
	(0.027)	(0.024)
Urban	0.016	
	(0.023)	
COVID x Urban	−0.062*	
	(0.028)	
Female		0.053
		(0.029)
COVID x Female		0.004
		(0.034)
Observations	21,008	21,008
R-squared	0.133	0.134
Baseline mean	0.139	0.131
	Panel C: Malawi	
COVID	0.343***	0.316***
	(0.025)	(0.024)
Urban	−0.086***	
	(0.026)	
COVID x Urban	−0.087**	
	(0.033)	
Female		0.063
		(0.033)
COVID x Female		0.043
		(0.039)
Observations	16,102	16,102
R-squared	0.123	0.113
Baseline mean	0.193	0.16

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	Panel D: Nigeria	
COVID	0.290***	0.284***
	(0.024)	(0.022)
Urban	0.128***	
	(0.034)	
COVID x Urban	–0.112***	
	(0.034	
Female		0.216***
		(0.04)
COVID x Female		–0.152***
		(0.042)
Observations	9,235	9,235
R-squared	0.332	0.337
Baseline mean	0.373	0.375

* = p < 0.10, ** = p < 0.05, *** = p < 0.01.

Notes: The dependent variable is moderate food insecurity weighted using household survey weights. The baseline mean represents the pre-pandemic mean of the outcome variable in the comparison area—e.g., rural areas in the first column and male-headed households in the second column. Each regression includes round fixed effects and a set of indicator variables to control for when households skip or refuse to answer a specific Food Insecurity Experience Scale (FIES) question. Robust standard errors clustered at the household level are reported in parentheses.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Table A-8
COVID-19 and severe food insecurity

	Urban/rural areas	Female-/male-headed households
	Panel A: Burkina Faso	
COVID	−0.046***	−0.056***
	(0.011)	(0.0097)
Urban	0.015	
	(0.015)	
COVID x Urban	−0.011	
	(0.016)	
Female		−0.003
		(0.023)
COVID x Female		0.014
		(0.024)
Observations	17,974	17,974
R-squared	0.014	0.014
Baseline mean	0.051	0.051
	Panel B: Ethiopia	
COVID	0.082***	0.067***
	(0.013)	(0.011)
Urban	0.007*	
	(0.0035)	
COVID x Urban	−0.026*	
	(0.01)	
Female		0.004
		(0.0036)
COVID x Female		0.028
		(0.015)
Observations	21,008	21,008
R-squared	0.025	0.027
Baseline mean	0	0
	Panel C: Malawi	
COVID	0.089***	0.059***
	(0.012)	−0.011
Urban	0.00	
	(0.00)	
COVID x Urban	−0.067***	
	(0.019)	
Female		0.00
		(0.00)
COVID x Female		0.068**
		(0.022)
Observations	16,102	16,102
R-squared	0.034	0.035
Baseline mean	0	0

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	Panel D: Nigeria	
COVID	0.083***	0.091***
	(0.014)	(0.012)
Urban	0.02	
	(0.017)	
COVID x Urban	−0.047*	
	(0.022)	
Female		0.073**
		−(0.028)
COVID x Female		−0.116***
		(0.031)
Observations	9,235	9,235
R-squared	0.092	0.094
Baseline mean	0.083	0.083

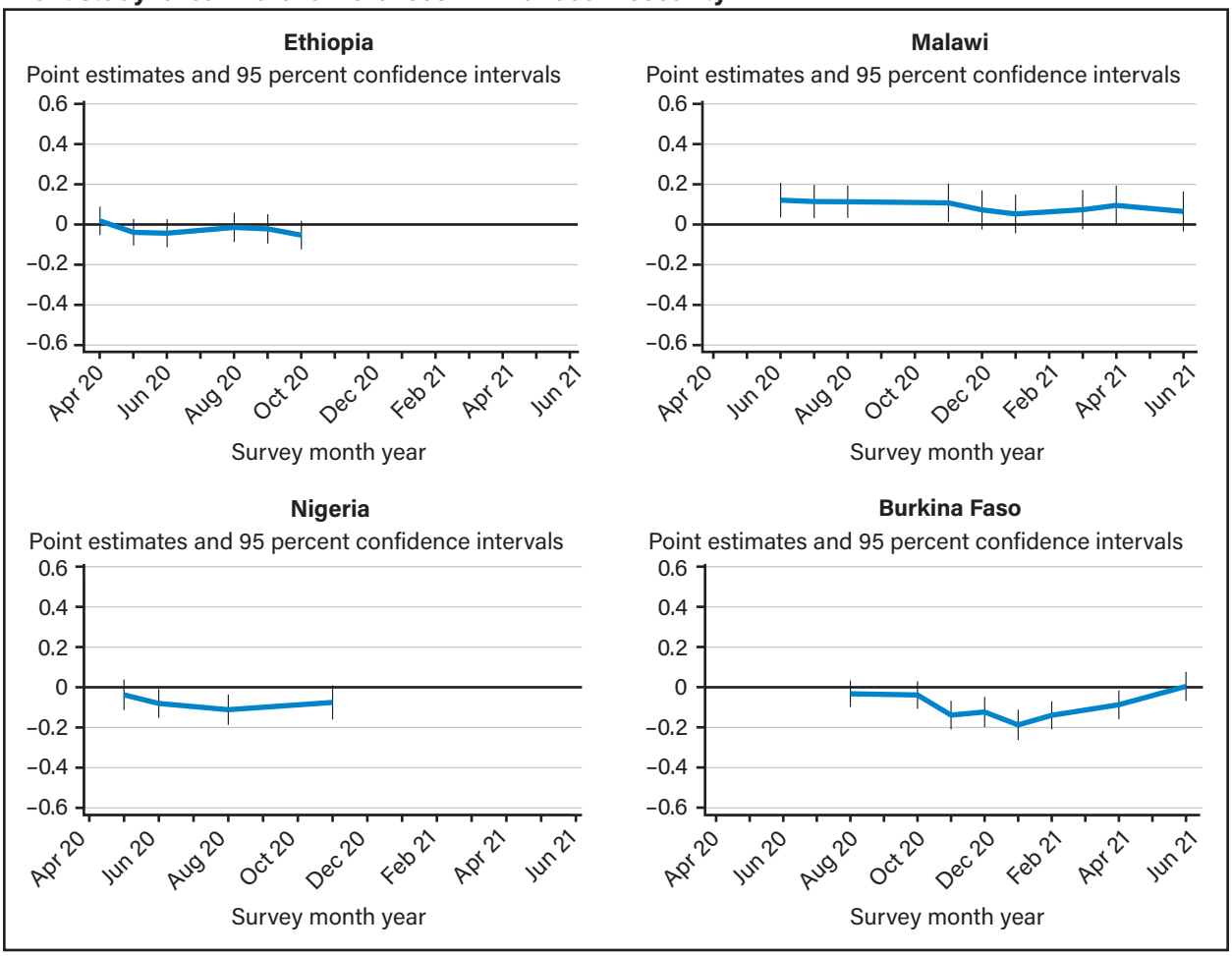
* = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Notes: The dependent variable is severe food insecurity weighted using household survey weights. The baseline mean represents the pre-pandemic mean of the outcome variable in the comparison area—e.g., rural areas in the first column and male-headed households in the second column. Each regression includes round fixed effects and a set of indicator variables to control for when households skip or refuse to answer a specific Food Insecurity Experience Scale (FIES) question. Robust standard errors clustered at the household level are reported in parentheses.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-4

Event study: urban-rural differences in mild food insecurity

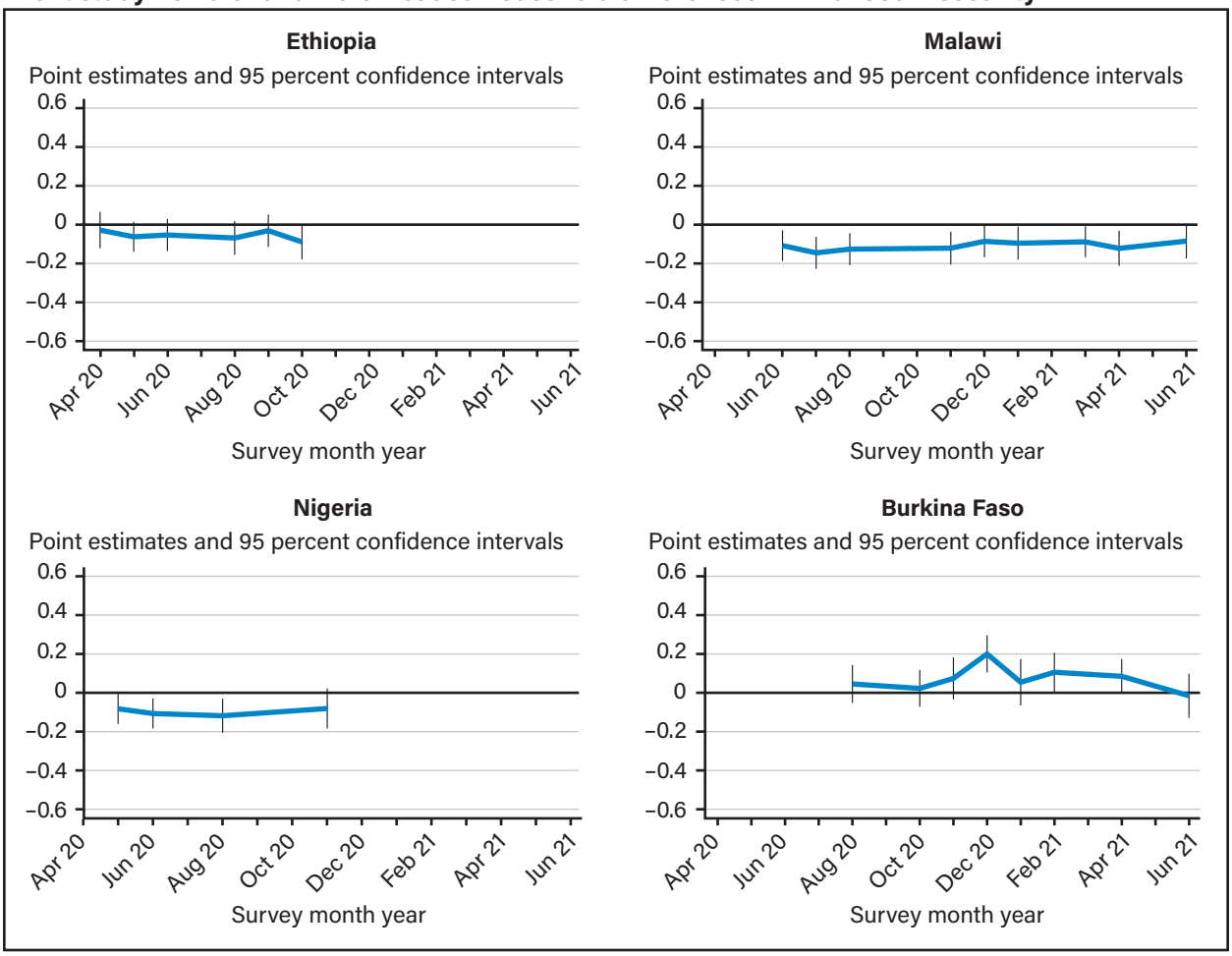


Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring mild food insecurity, by country and wave. When the coefficient is positive, it implies households in urban areas experienced a larger increase in the given measure of food insecurity since before the pandemic, relative to rural households. When the coefficient estimate is negative, it implies households in rural areas experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-5

Event study: female- and male-headed household differences in mild food insecurity

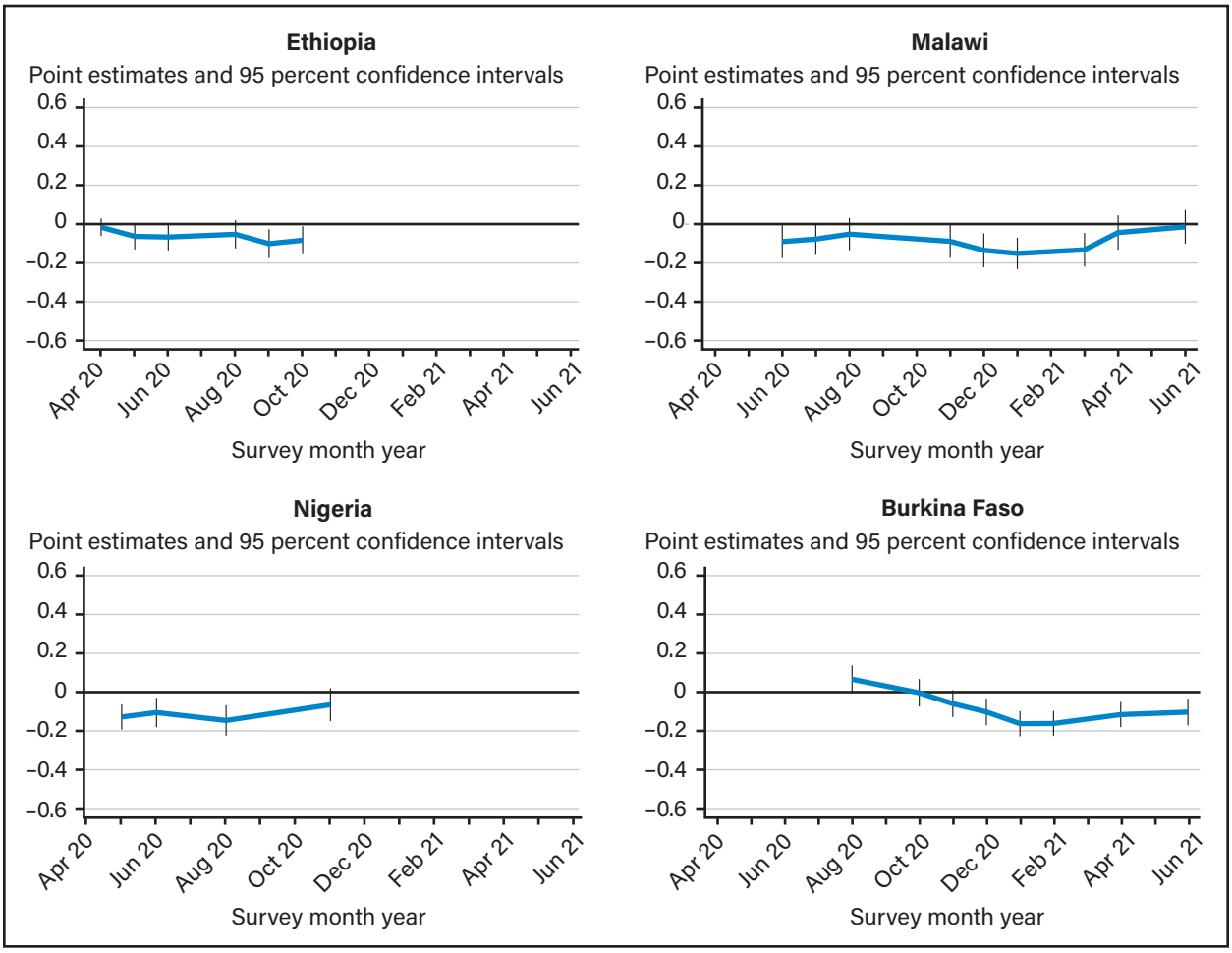


Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring mild food insecurity, by country and wave. When the coefficient is positive, it implies female-headed households experienced a larger increase in the given measure of food insecurity since before the pandemic, relative to male-headed households. When the coefficient estimate is negative, it implies male-headed households experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-6

Event study: urban-rural differences in moderate food insecurity

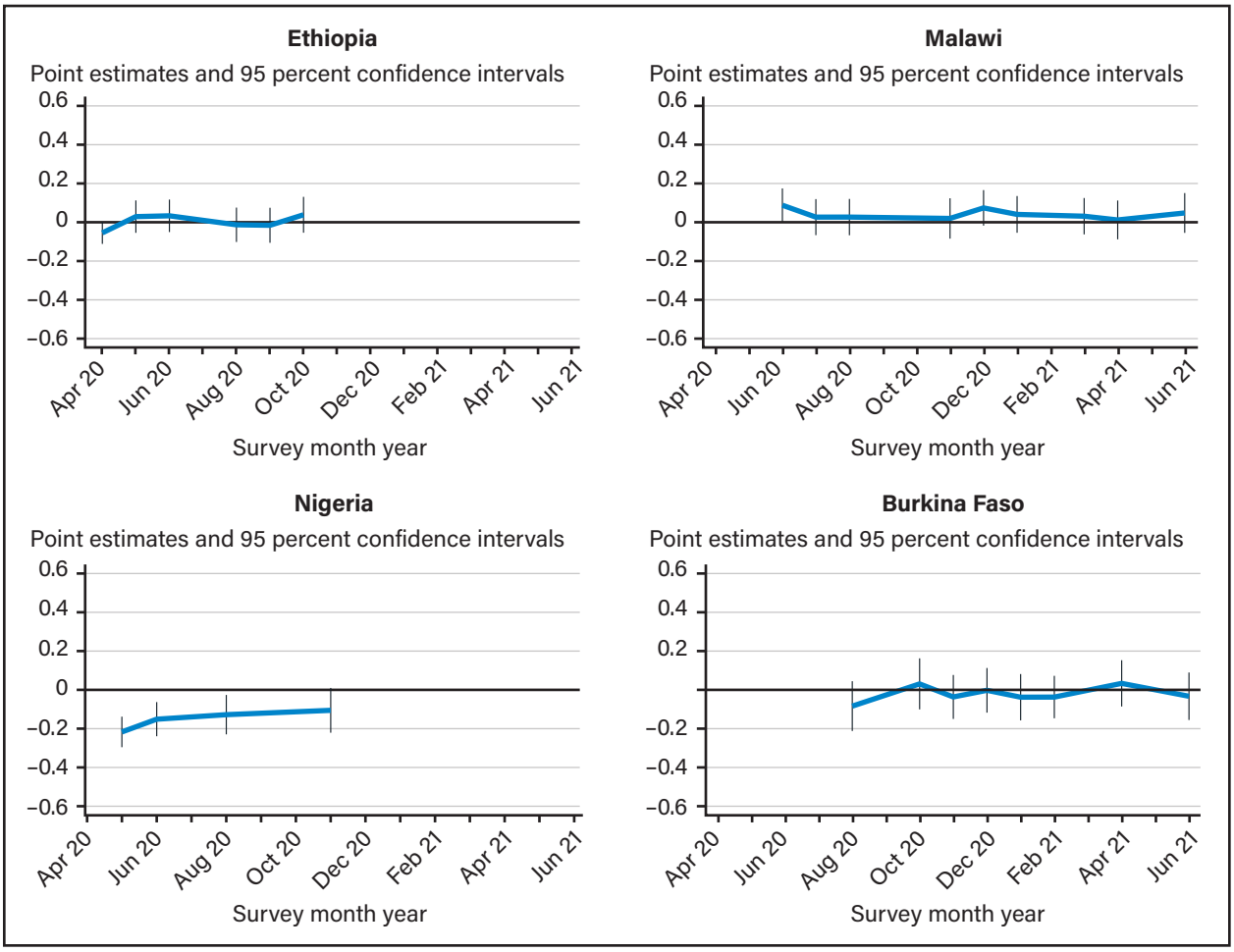


Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring moderate food insecurity, by country and wave. When the coefficient is positive, it implies households in urban areas experienced a larger increase in the given measure of food insecurity, since before the pandemic, relative to rural households. When the coefficient estimate is negative, it implies households in rural areas experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-7

Event study: female- and male-headed household differences in moderate food insecurity

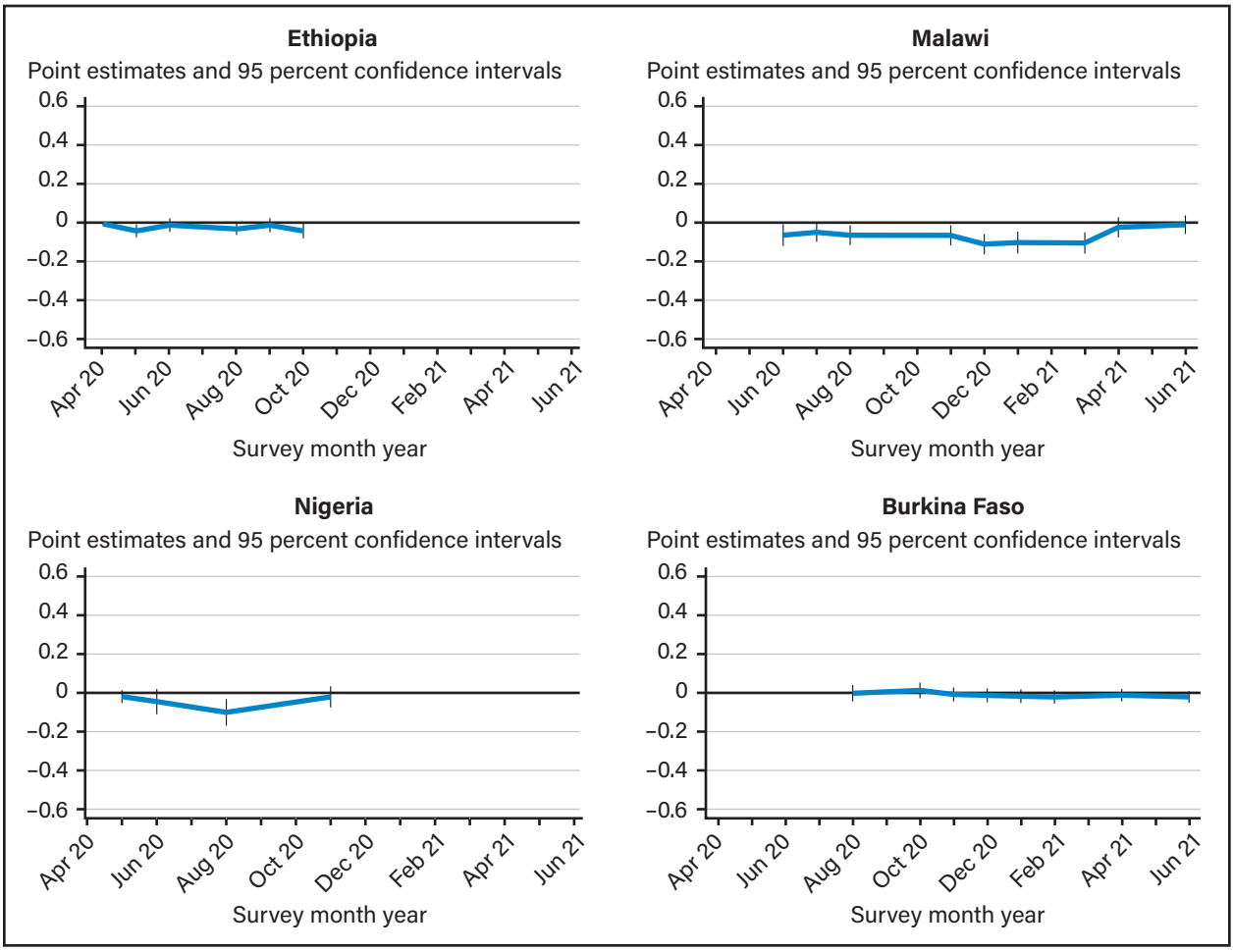


Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring moderate food insecurity, by country and wave. When the coefficient is positive, it implies female-headed households experienced a larger increase in the given measure of food insecurity since before the pandemic, relative to male-headed households. When the coefficient estimate is negative, it implies male-headed households experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-8

Event study: urban-rural differences in severe food insecurity

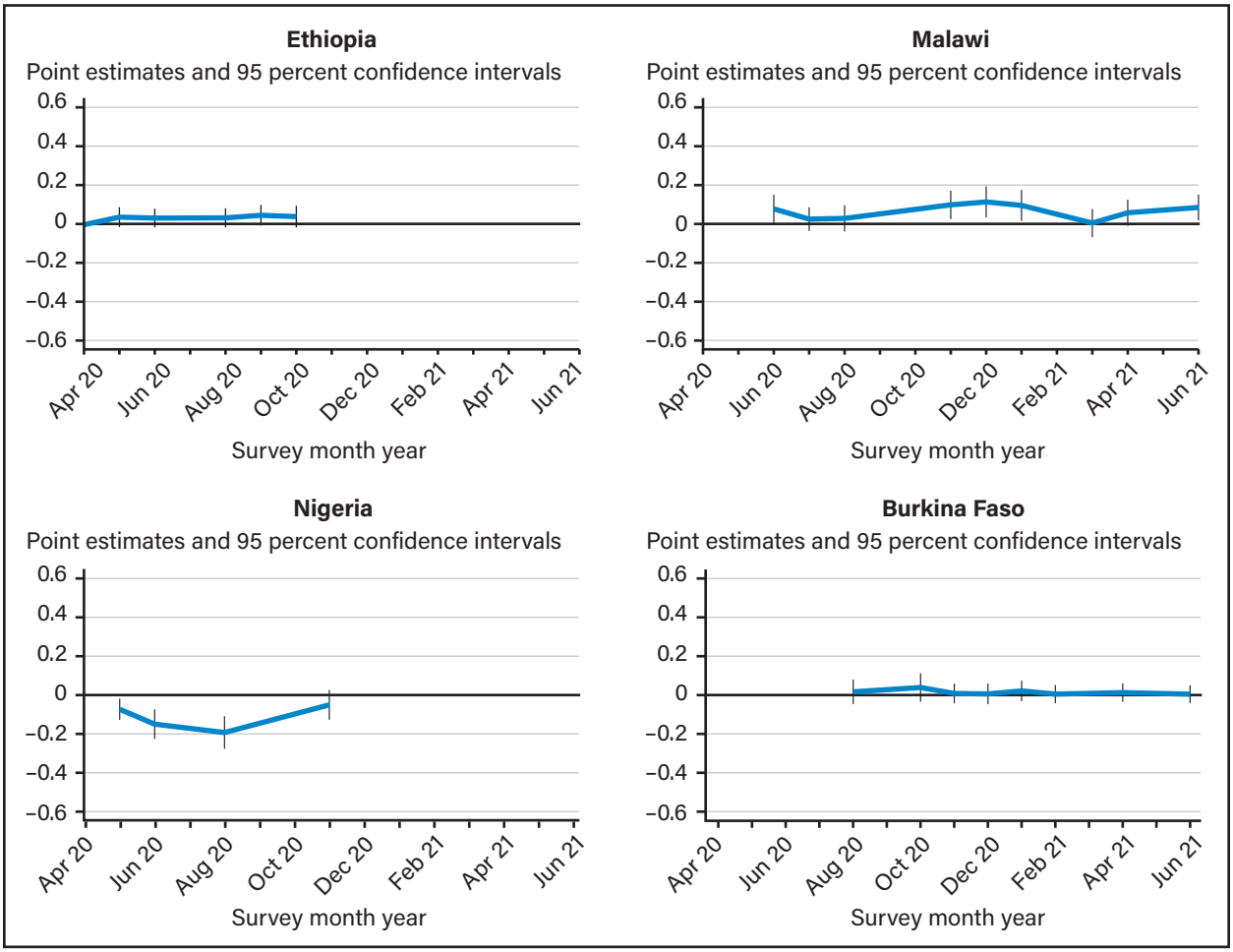


Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring severe food insecurity, by country and wave. When the coefficient is positive it implies households in urban areas experienced a larger increase in the given measure of food insecurity, since before the pandemic, relative to rural households. When the coefficient estimate is negative it implies households in rural areas experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.

Figure A-9

Event study: female- and male-headed household differences in severe food insecurity



Notes: This figure disaggregates estimates of differential trends in food insecurity, as measured with a binary indicator measuring severe food insecurity, by country and wave. When the coefficient is positive it implies female-headed households experienced a larger increase in the given measure of food insecurity since before the pandemic, relative to male-headed households. When the coefficient estimate is negative it implies male-headed households experienced a larger increase in food insecurity.

Source: USDA, Economic Research Service calculations using World Bank, Living Standards Measurement Survey data.