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Effects of COVID-19 on Regional and Gender Equality in
Sub-Saharan Africa: Evidence from Nigeria and Ethiopia

by Chie Aoyagi

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

African Department

**Effects of COVID-19 on Regional and Gender Equality in Sub-Saharan Africa:
Evidence from Nigeria and Ethiopia¹**

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Authorized for distribution by Mary B. Goodman

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Abstract

The labor structure in sub-Saharan Africa is characterized by a high share of informal employment in the rural agricultural sector. The impact of COVID-19 on female employment may not appear to be large as the share of such employment is particularly high among women. Nevertheless, widespread income reduction was observed both in rural and urban households. This could worsen the opportunities for women as husbands' control over the household resource is the norm. The paper also finds that rural children struggled to continue learning during school closures. Gender-sensitive policies are needed to narrow the gap during and post-pandemic.

JEL Classification Numbers: J4, I2, J7, R2

Keywords: Labor Market Structures, Education, Gender Segregated, Regional Household Behavior, Regional Labor Markets, Sub-Saharan Africa, Nigeria, Ethiopia

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I. INTRODUCTION

In the face of the COVID-19 crisis, there is increasing evidence that suggests existing gender inequalities in economic opportunities may worsen across the globe (Georgieva, et al. 2020). First, women are more exposed to the disease as there are more female frontline workers than male ones. Globally, women make up almost 70 percent of healthcare workers (OECD 2020). Second, women are more likely to hold temporary and part-time positions—the types of jobs employers tend to cut first in a downturn. Third, women are more likely to work in the sectors that are hardest hit by social distancing, such as leisure, hospitality, and retail sales. Finally, women face greater care work and housework responsibilities than men, and the burden on women increases during school closures (Alonso, et al. 2019). The disproportionate unpaid care work burden prevents women from fully being engaged in the labor market. Women in developing countries and especially women in sub-Saharan Africa may face additional risks that undermine gender equality.

First, lockdowns create a great challenge for the economically insecure working population, the majority of which lives in sub-Saharan Africa, with women hit particularly hard because of the lower income and the higher poverty rate. Data from the ILO database suggest that, in sub-Saharan Africa, 81 percent of female workers were under the threat of poverty before the pandemic, compared to 77 percent of male workers.²

Second, in sub-Saharan Africa, women's employment is predominantly in the informal sector that generally lacks basic social or legal protection and employment benefits. According to UN Women (2017), more than 70 percent of women in non-agricultural jobs are in the informal sector in sub-Saharan Africa.

Third, as cases of previous health crises in the region suggest, prolonged school closure may make girls' return to school more difficult and expose girls disproportionately to domestic, gender-based, and sexual violence. After the Ebola crisis, the share of girls not attending school nearly tripled in Liberia, and girls were 25 percent less likely than boys to re-enroll in Guinea (MalalaFund 2020). Previous studies found an increase in adolescent pregnancies in Sierra Leone during the Ebola outbreak largely attributed to the increased time spent with men due to school closure (Bandiera, Buehren, et al. 2020). Many of those pregnant students never returned to school. UNESCO (2020) estimates that globally, 11.2 million girls are at risk of not returning to school in 2020.

Lastly, health care spending may be reallocated away from the provision of sexual and reproductive health services for women, which are much needed in the region. Again during the Ebola outbreak, the maternal mortality rate spiked in West Africa because of lacking resilience in the health system (Sochas, Amos Channon and Nam 2017).

While the gender impact of the COVID-19 crisis spreads to multiple dimensions in sub-Saharan Africa, this paper focuses on gender differences in employment, household income,

² The data is the shares of employed workers, age 15+, who are either 'Near Poor', "Moderately Poor", or "Extremely Poor" in 2019.

and education of children during the early stages of lockdowns.³ The paper also sheds light on notable differences in the effects of pandemic between rural and urban populations, which could magnify the inequality of economic and educational opportunities across regions within a country. While official statistics lack timeliness to gauge the gender and regional impact, there are several phone surveys with nationally representative samples that can provide helpful insight. This paper contributes to the growing literature on the household-level impacts of the COVID-19 shock, with a special focus on two sub-Saharan African countries— Ethiopia and Nigeria.

This paper first looks at the general description of pre-COVID regional and sectoral distribution in sub-Saharan Africa using ILO statistics, and then, in the analytical part, the first round of the World Bank LSMS-ISA Program for High-Frequency Phone [Surveys](#) on COVID-19 is discussed. The World Bank phone surveys started in April 2020, and the data used here are the results of the first round for Ethiopia and Nigeria. While these two large countries in sub-Saharan Africa have distinct characteristics that require caution in interpreting the results of this study to apply to the rest of sub-Saharan Africa, the two countries have similarity with many other countries in sub-Saharan Africa, namely the large informal employment in the rural agricultural sector, the characteristic that could be the key to understand the impact of the pandemic on employment and education in the region.

The main results suggest that women—especially rural women—are on average less likely to lose employment due to lockdown than men, possibly because rural women were more likely to find themselves in informal employment in agriculture before the crisis hit. As other studies based on timely surveys find women are more likely to lose their jobs than men due to the COVID-19 crisis in other selected countries (but not all the countries studied), the gender impact might be very much country dependent. However, a more recent study using wider coverage of countries supports the hypothesis that the high share of own-account agricultural employment, especially among women, may minimize the pandemic’s labor impacts in low-income countries (Bundervoet, Davalos and Garcia 2021).

While the results suggest the rural/urban divide is a significant determinant of the labor market outcomes, a large share of households experienced a reduction in household income in both rural and urban areas. This might further undermine the opportunities for women because the husband’s control over the allocation of household resources is the norm in most parts of West and East Africa, although there has been a relatively high degree of separation of spouses in economic activities in West Africa (Verschoor, et al. 2019).

The study also finds that rural households are far less likely to have children engaged in learning activities during school closure than urban households. During the pandemic, parents’ involvement in supporting children’s continued education at home is more important than normal times. However, rural women are already spending more time caring for other household members than men or urban women, thus supporting children’s continuous learning at home may be especially challenging for them. According to surveys conducted by

³ In this paper, the term lockdown is used to describe various types of containment measures which include the closing of non-essential businesses under a state of emergency declared in Ethiopia on April 8, 2020.

UNDP after the onset of the pandemic, rural women in sub-Saharan Africa are on average spending almost six hours in a typical day to care for other members in the households compared to urban men spending three hours per day or rural men and urban women spending four hours per day (UNDP 2020-2021).⁴ This implies policies to support rural children's continued education should also focus on supporting mothers.

The rest of the paper is organized as follows. Section II presents an overview of labor market structure in sub-Saharan Africa pre-COVID. Section III discusses the impact of COVID-19 on the employment and education of children. Section IV provides concluding remarks and policy recommendations.

II. EMPLOYMENT STRUCTURE IN SUB-SAHARAN AFRICA

This section discusses the employment structure in sub-Saharan African countries by sex using ILO modeled estimates for 2019 downloaded from the [ILO database](#) covering 37 countries.^{5 6}

A. High share of employment in the rural agriculture sector

Globally, more women worked in the services sector pre-pandemic, which in this crisis has been hit harder than agriculture or industry because of reduced demand caused by lockdown and social distancing. Sub-Saharan Africa is not different as 42 percent of female employment was in the services sector compared to 34 percent for male employment in 2019. That is, five million more women were in the services sector than men. Like in other regions, the share of the services sector is higher in urban areas than rural areas, as 74 percent of female and 59 percent of male employment in urban areas were in the services sector in sub-

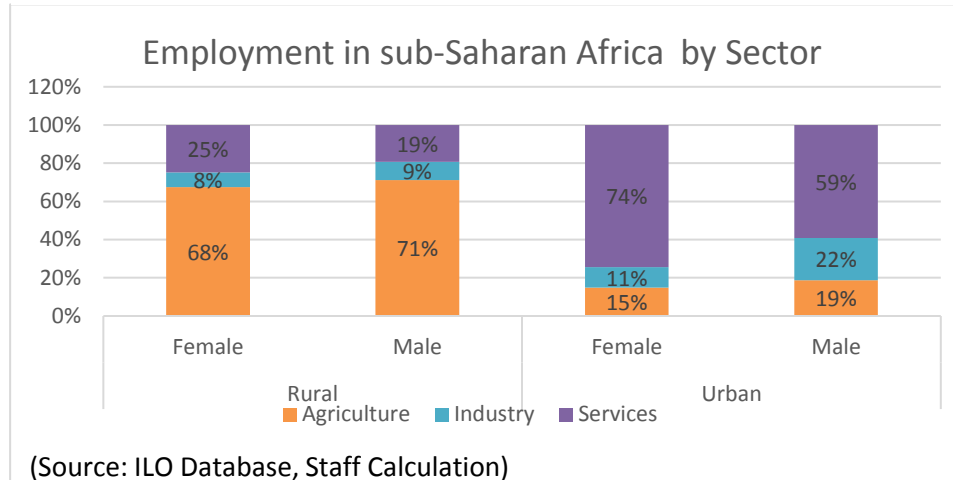
⁴ Numbers are the average of Kenya, Nigeria, Rwanda, South Africa, Uganda, and Zambia, calculated by Weronika Synak, Research Assistant, IMF.

⁵ The ILO modeled estimates contain both nationally reported observations and imputed data for countries with missing data. Further information on the methodology used to produce ILO modeled estimates is provided in the [methodological overview](#). Several factors can limit the comparability of statistics on employment between countries, including variations in the definitions used for the employment figures, treatment of particular groups of workers, and frequency of data collection. Labor force surveys are typically the preferred source of information for a particular country.

⁶ Countries covered are Angola, Burundi, Benin, Burkina Faso, Botswana, Central African Republic, Côte d'Ivoire, Cameroon, Comoros, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Kenya, Liberia, Lesotho, Madagascar, Mali, Mozambique, Mauritius, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Eswatini, Chad, Togo, Uganda, South Africa, Zambia, and Zimbabwe.

Saharan Africa (Figure 1). However, what makes sub-Saharan Africa stand out from the rest of the world is the low urbanization and high employment share in agriculture.

Figure 1 Employment in SSA by Sector



The share of agricultural employment has been particularly high in rural areas, with as much as 68 percent of female and 71 percent of male rural employment being in the agricultural sector in sub-Saharan Africa pre-pandemic— among the highest around the world (Figure 1). Furthermore, the presence of women in the agricultural sector seems to be higher in sub-Saharan Africa than in other parts of the world, as female agricultural workers in the region accounted for 23 percent of the world’s total female workers in the agricultural sector, while for men the share was only 16 percent.

The divide between women in urban and rural settings makes a difference in how the overall female employment has been affected by the pandemic. The aggregates statistics hide diverse experiences in terms of labor market structure and inequality. However, looking at a country-by-country basis, there exists a strong link between income per capita and the level of urbanization and the share of agriculture in total employment. That is female employment in low-income countries in sub-Saharan Africa is more likely to be rural and agricultural than middle-income countries in the region. On average, 48 percent of female employment was in rural areas in low-income countries, whereas the average rural share was 18 percent in middle-income countries in 2019 (Figure 2). Similarly, on average 54 percent of female employment was in agriculture in low-income countries, while the average agricultural share was 25 percent in middle-income countries (Figure 3).

Figure 2 Share of Rural Employment for Women in sub-Saharan Africa

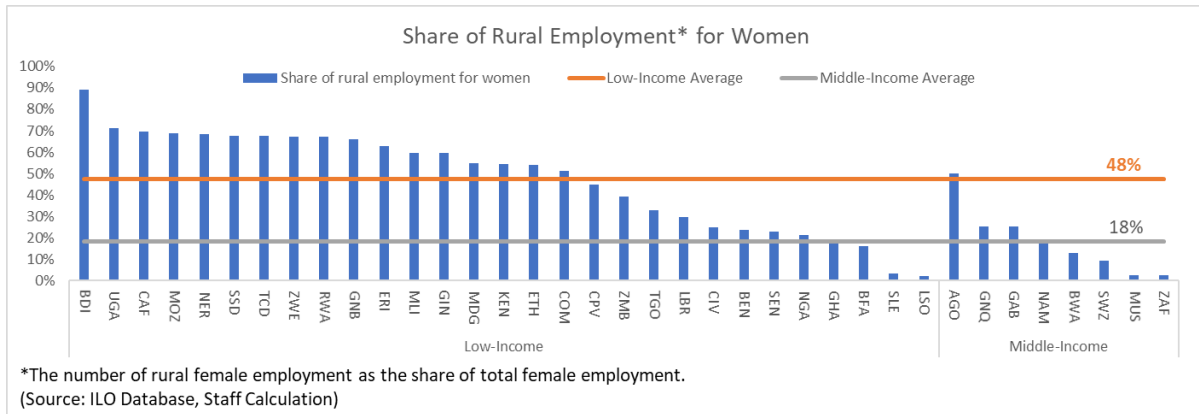
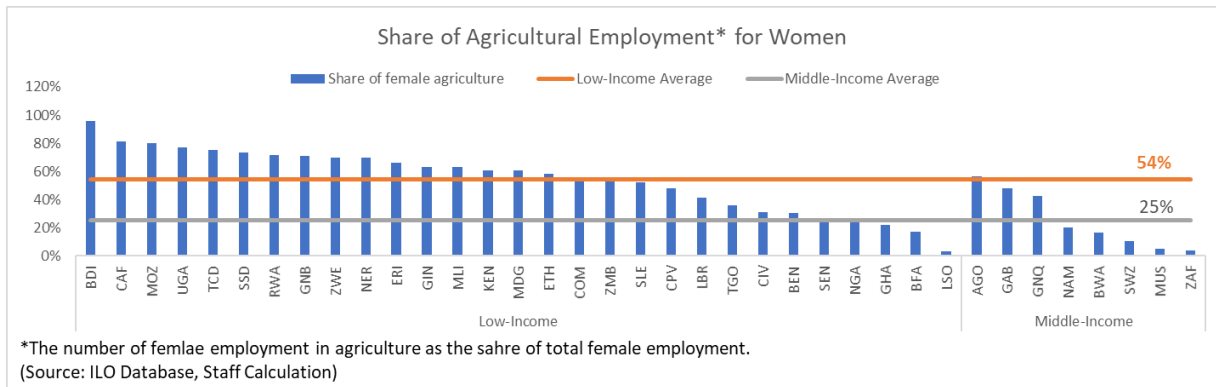


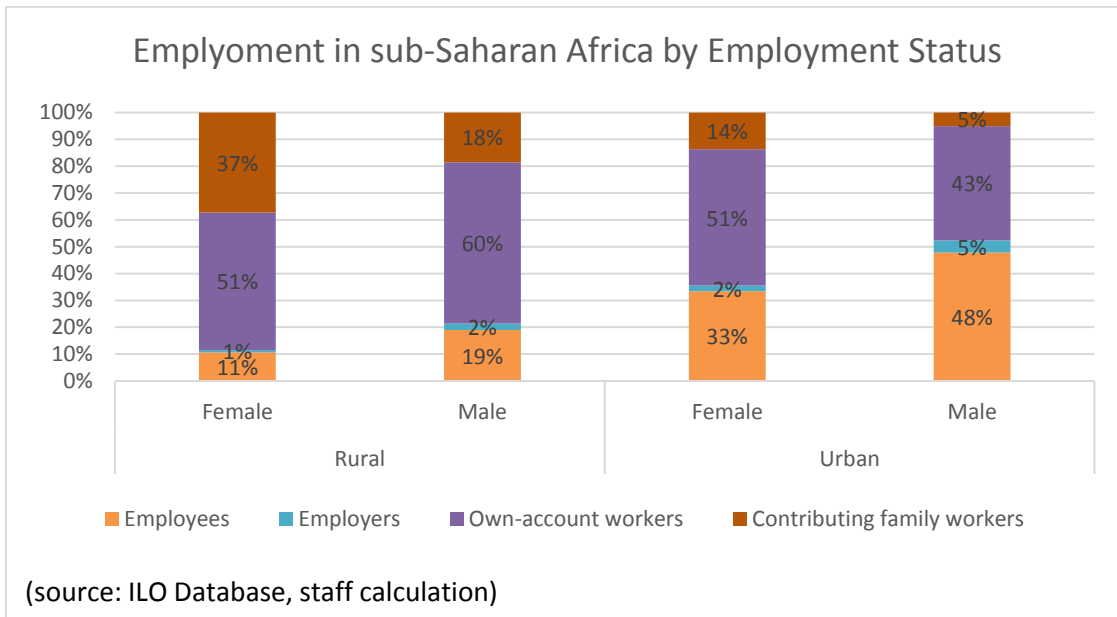
Figure 3 Share of Agricultural Employment for Women in sub-Saharan Africa



B. High share of informal employment

Most workers in sub-Saharan Africa are self-employed especially in rural areas, often in the informal sector. According to a paper by ILO (2018), as much as 85.8 percent of employment in Africa is informal. Own-account workers and contributing family workers together made up 88 percent for women and 78 percent of men in rural employment in sub-Saharan Africa, and women were twice as likely as men to be contributing family workers (Figure 4). Own-account workers and contributing family workers have a lower likelihood of having formal work arrangements and are therefore more likely to lack social safety net and benefits.

Figure 4 Employment in SSA by Employment Status



BOX1: Informality and Employment Status

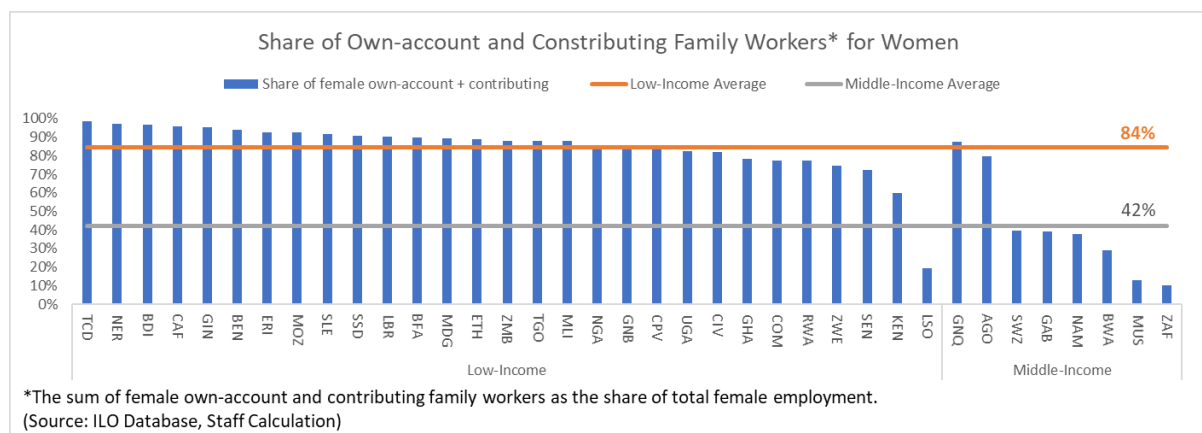
A person can simultaneously have two or more formal and/or informal jobs, so jobs rather than employed persons should be taken as the observation unit for informality. To measure informality, many countries use the criterion of non-registration of the enterprise as a corporation, or its non-registration with the tax authorities to define the informal sector, whereas the criterion of non-registration of the employees is mainly used to define informal employment. There are three types of informal jobs depending on the combinations of the sector and employment status of the job: i) informal employment in the informal sector, ii) formal employment in the informal sector, or iii) informal employment outside the informal sector.

The employment classification used in the ILO statistics classifies jobs into two main types: paid employment jobs (employees) and self-employment jobs (employers, own-account workers, and contributing family workers). Own-account workers are those workers who hold self-employment jobs and have no employees to work for them. While some own-account workers have formal jobs, most of the own-account workers are in the informal sector (i.e. do not register their business to the government) in sub-Saharan Africa. On the other hand, all contributing family workers have informal employment, irrespective of whether they work in formal or informal sector enterprises. The informal nature of contributing family workers is since they do not have explicit, written contracts of employment, and that their employment is usually not subject to labor legislation and/or social security regulations. Otherwise, family workers with a contract of employment

and/or wage would be considered as employees rather than as contributing family workers.⁷

Again, looking at a country-by-country basis, we can see a strong link between income per capita and the share of own-account and contributing family workers in total female employment, suggesting that the informality is particularly high among women in low-income countries in sub-Saharan Africa. On average, as much as 84 percent of female employment in low-income countries was in the status of either own-account or contributing family workers, while the share was 42 percent in middle-income countries among sub-Saharan Africa (Figure 5).

Figure 5 Share of Own-account and Contributing Family Workers in sub-Saharan Africa



C. Low tele-workability in Sub-Saharan Africa

Social distancing policies implemented to contain the spread of the disease have disproportionately affected workers in occupations that require physical presence at the workplace or those jobs that require a high level of personal proximity. Those workers are characterized as having limited scope for teleworking and may face a higher risk of reductions in hours or pay or losing employment. Data from the United States suggest that sectors with activities that are more likely to be performed from home saw a smaller reduction in employment following the virus outbreak (Bick, Blandin and Mertens 2020). The share of employees with tele-workable occupations in sub-Saharan Africa is believed to be much smaller than that in developed countries, but the statistics to understand the size of the tele-workable population is nonexistent.

Here, a back-of-the-envelope calculation of tele-workability of the working population in sub-Saharan Africa is attempted by applying the tele-workable share of the main occupation

⁷ More discussion on international standards on measuring informality can be found in ILO, 2013, “Measuring informality: A statistical manual on the informal sector and informal employment.”

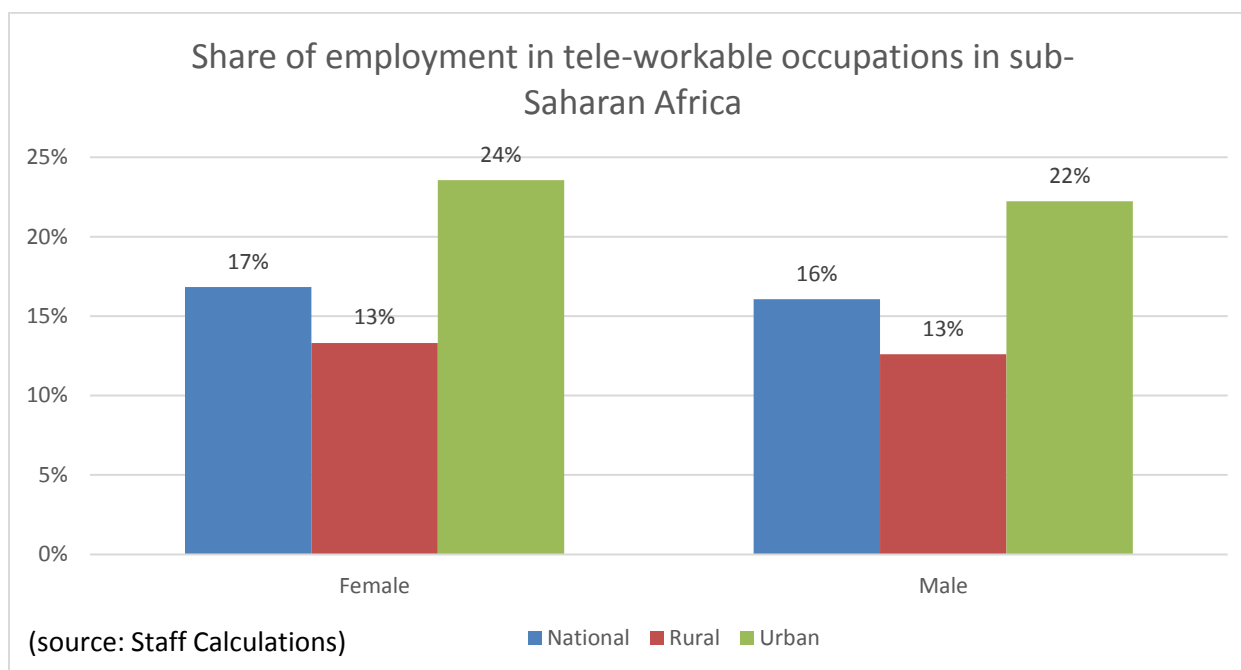
categories by Grobovsek and Poschke (2020) to the ILO employment statistics on the distribution of employment over occupations across sub-Saharan African countries. The ability to work from home vary across broad occupation groups, with elementary occupations—which account for more than 70 percent of rural employment in sub-Saharan Africa—having the lowest tele-workability.

As predicted by Dingel and Neiman (2020), the share of employment that can be done from home is significantly lower in sub-Saharan Africa than in richer countries. Overall, only 16 percent of workers in sub-Saharan Africa are estimated to have jobs that could potentially be performed from home, compared to about 40 percent in several developed countries (Dingel and Neiman (2020); Gottlieb, Grobovsek and Poschke (2020); Boeri, Caiumi and Paccagnella (2020); Fadinger and Schymik (2020)).

However, as noted by Grobovsek and Poschke (2020), due to the predominance of agricultural employment in rural areas, the ability of farmers to work from home, which is assumed to be about 8-10 percent here, significantly affects the estimation. If farmers are assumed to have a negligible ability to work from home, even less work in sub-Saharan Africa can be performed at home than estimated here. It is also plausible to assume that the shares of tele-workability shown will translate into much fewer telework jobs in practice given low internet access, especially in rural areas.

Looking at gender differences in tele-workability in the region, female workers are on average slightly more likely to be engaged in work activities that can be performed at home than male workers. Also, urban workers are more likely to be able to work from home than rural workers (Figure 6). Those findings are in line with a previous study using another group of countries (Brussevich, Dabla-Norris and Khalid 2020). However, one caveat is that in sub-Saharan Africa, the female tele-workability may be overestimated as there is a digital divide or lower access to the internet for women. Just 23 percent of women in sub-Saharan Africa have access to the internet compared to about 34 percent of men (IMF 2020). Lower access to the internet and digital devices in rural areas might also mean a wider regional gap in tele-workability between rural and urban areas than estimated here.

Figure 6 Share of Employment in Tele-workable Occupations in SSA



The lower overall tele-workability in sub-Saharan Africa implies that social-distancing policies may have been particularly challenging for workers in the region. After looking into the overall labor market structure for the region, the next section will zoom in on particular countries for more granularity.

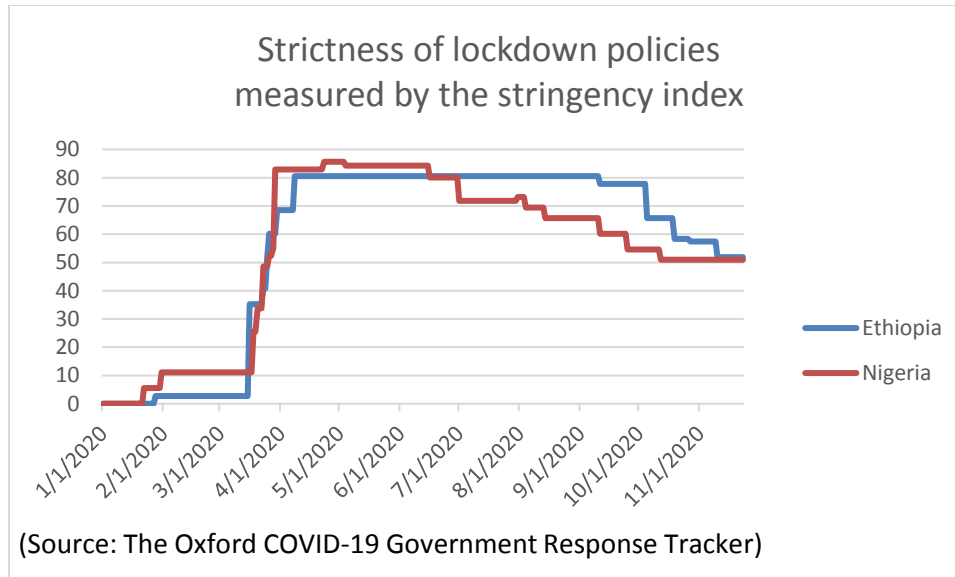
III. THE IMPACT OF COVID-19 ON THE EMPLOYMENT AND EDUCATION OF CHILDREN

In this section, the first round of the World Bank LSMS-ISA Program for High-Frequency Phone [Surveys](#) on COVID-19 is used to look into the cases for Ethiopia and Nigeria. The selection of countries is due to data availability as of July 11, 2020, although similar survey results for Uganda, Malawi, Burkina Faso, and Tanzania were expected to be disseminated thereafter. One caveat of this exercise is that the region is quite heterogeneous – in terms of both pre-pandemic characteristics and its pandemic experiences— and there is a limitation in applying the results from the two large countries to the rest of sub-Saharan Africa. Nevertheless, this case study would provide lessons that can also be useful to other countries in the region, especially to low-income countries with large informal employment in the rural agricultural sector.

Nigeria and Ethiopia have gone through tightening and easing of restrictions like many other countries in the region. The extent of lockdown measures between Nigeria and Ethiopia can be shown by the stringency index from the Oxford COVID-19 Government Response Tracker. The stringency index records the strictness of lockdown style policies that primarily restrict people's behavior on a scale of 0-100. Comparing the two countries when the lockdown policies are at the maximum strictness, Nigeria had stricter restriction policies than Ethiopia. On the other hand, the policies' peak strictness lasted for a shorter period in Nigeria

compared to Ethiopia (Figure 7). Nevertheless, the two countries' policy trajectories followed a similar path with rapid and sudden restriction in early 2020 followed by gradual easing later that year.

Figure 7 Strictness of Lockdown Policies in Ethiopia and Nigeria



The first round of Nigerian survey was conducted between April 20 and May 11, 2020, and coincided with a federally mandated lockdown that was initiated on March 30, 2020, while the Ethiopian survey was implemented between April 22 and May 13, 2020, and coincided with a state of emergency under Article 93 of the constitution which was declared on April 8, 2020.

The samples of households for the Ethiopian and Nigerian surveys were drawn from the samples of households interviewed in the 2018/2019 round of the Ethiopia Socioeconomic Survey (ESS) and the Nigeria General Household Survey (GHS) respectively. The extensive information collected in the ESS and GHS panel just over a year before the pandemic provides a rich set of background information on the households to assess the differential impacts of the pandemic. However, only the Nigerian baseline survey has been disseminated as of July 2020. Thus, in the regression analysis following the inferential statistics, the sample is restricted to households covered in the Nigerian surveys.

A. Inferential Statistics

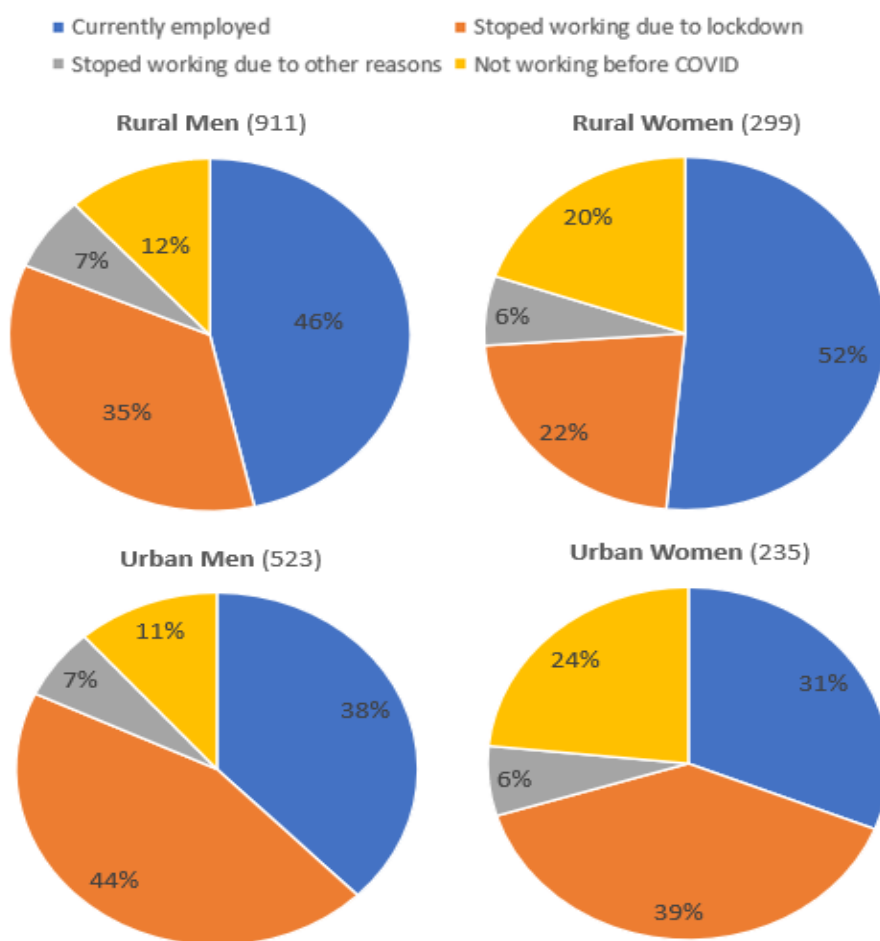
1. Labor Market Outcome

An extremely large share of employment was lost due to the pandemic. Here the focus is on the labor market outcomes of 1968 survey respondents in Nigeria and 3249 of those in Ethiopia (See Appendix A for sample characteristics). In both Nigeria and Ethiopia, a majority of people who stopped working during the early stages of the lockdown reported

they lost their job or closed the business due to the lockdown, although the severity is much greater for Nigeria, which implemented stricter containment measures than Ethiopia.

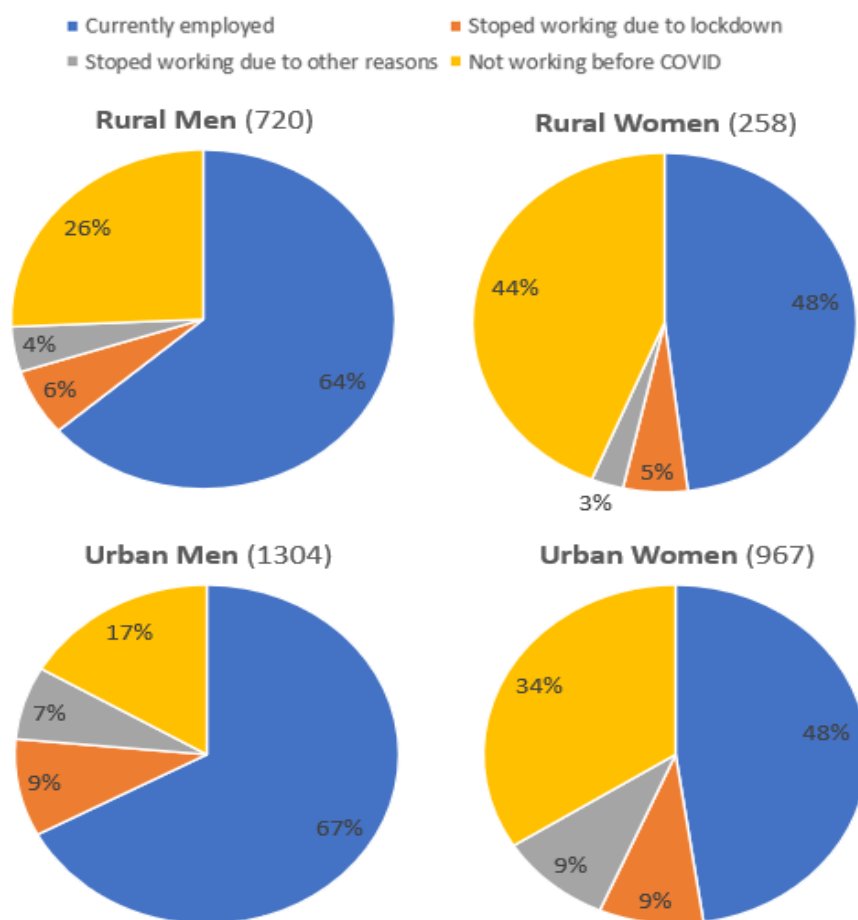
The notable differences in employment status are observed between rural and urban respondents, as well as between male and female respondents. On one hand, urban areas seem to have a higher share of people who stopped working due to the lockdown. On the other hand, for both rural and urban areas, the share of men who lost their employment due to the lockdown is higher than those of women. This means that rural women were the least affected by employment losses in both countries (Figure 8, Figure 9). This, however, might be the result of widespread informal employment in agriculture among women, especially rural women, for which a loss in activity would not appear as lost employment.

Figure 8 Nigeria: Employment Status after Lockdown



Note: Numbers in parentheses are the number of observations.
(Source: WB COVID-19 Phone Survey, Staff Calculation)

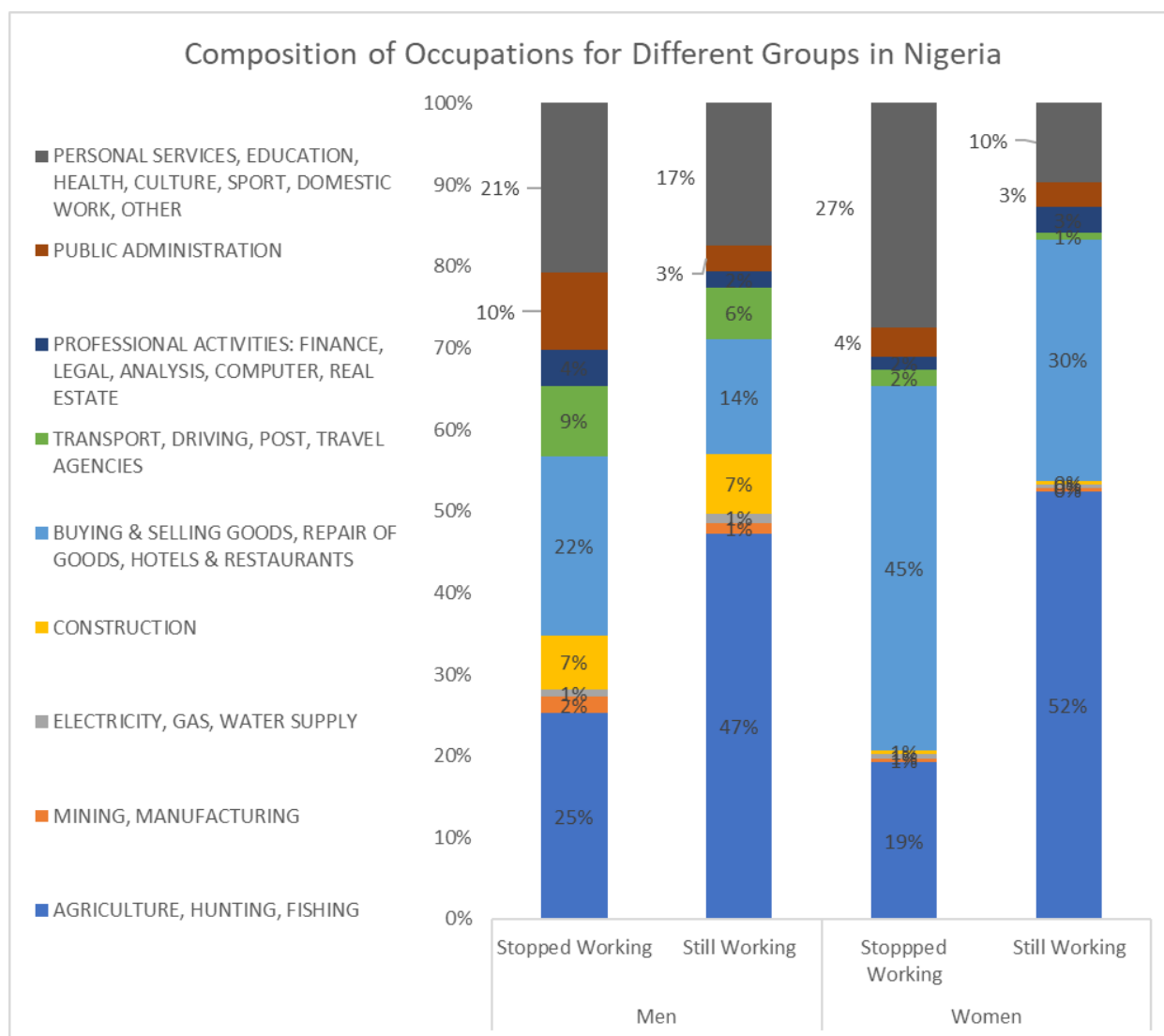
Figure 9 Ethiopia: Employment Status after Lockdown



Note: Numbers in parentheses are the number of observations.
(Source: WB COVID-19 Phone Survey, Staff Calculation)

One of the reasons why rural employment has been less affected may be found in the high share of agricultural employment. In Nigeria, 96 percent of rural households receive income from household farms, compared to 56 percent of urban households. In Ethiopia, the share is 75 percent for rural households, compared to 13 percent for urban households. There is some evidence that suggests that for both men and women, agricultural employment was more resilient. The evidence for the sectoral differences is from the comparison of occupational composition for people who are currently working vs. those who stopped working after the outbreak. The shares of agricultural workers are higher for currently working groups while the shares of personal services, etc. are lower for currently working groups for both sexes. The shares of agricultural workers in still-working vs. no-longer-working groups are 47 percent vs. 25 percent for men (22 percentage point difference) and 52 percent vs. 19 percent for women (33 percentage point difference) in Nigeria. Similar patterns hold for Ethiopia.

Figure 10 Nigeria: Composition of Occupations for Different Groups

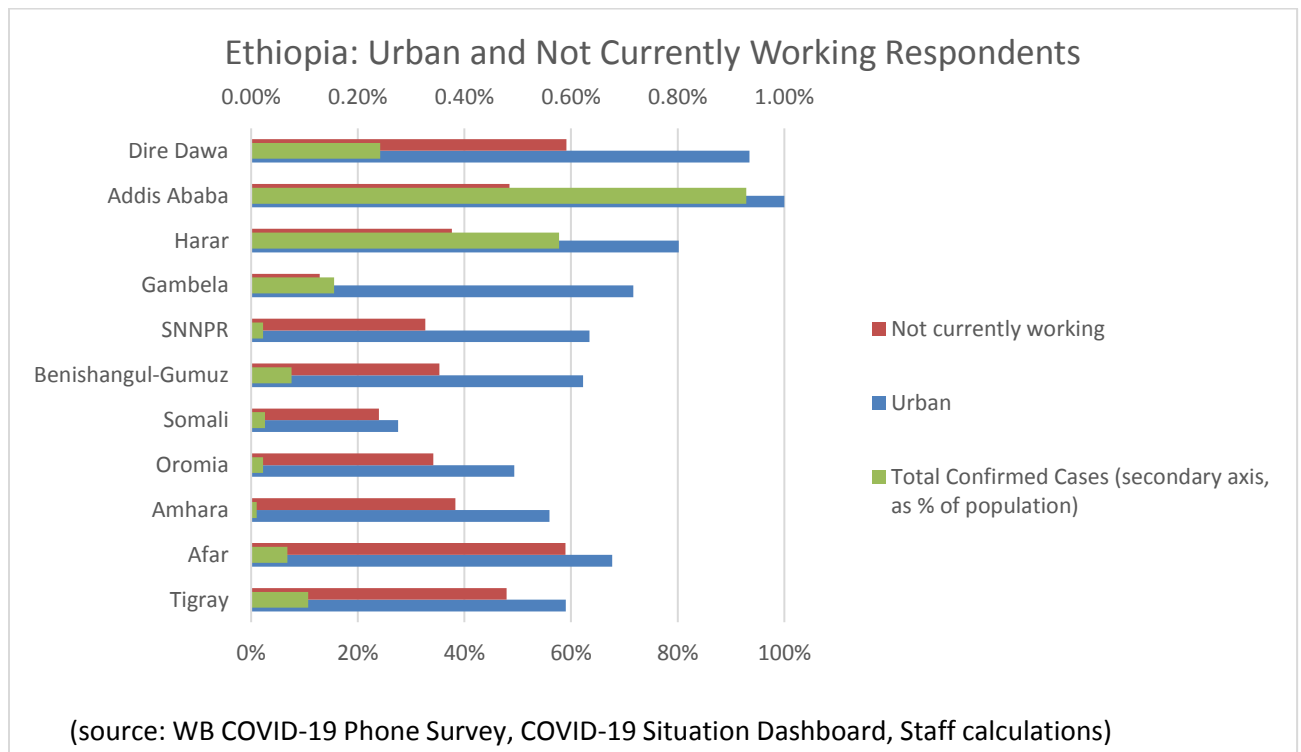


Source: WB COVID-19 Phone Survey, Staff calculations.

There are structural and pandemic-specific reasons for the uniqueness of the rural employment outcomes. Even before the pandemic, rural unemployment across countries in Sub-Saharan Africa was typically lower than urban unemployment. The ILO estimates of the unemployment rates for workers age 15 and older for 2019 suggest that in Nigeria, the unemployment rate of rural women was 5.7 percent and that of rural men was 4.9 percent, compared to 13.1 percent for urban women and 11.1 percent for urban men. The same figures for Ethiopia show a similar trend, as the rural unemployment rate was only 1.7 percent for women and 0.8 percent for men, compared to urban unemployment of 6.8 percent for women and 4.2 percent for men. Furthermore, rural employment may have been less affected by the lockdown because of the lower enforcement of the restrictions in remote areas or exemptions of most agricultural and related activities that are considered essential.

There seems to be a positive correlation between lockdown policies and unemployment, thus the regional variation in policy implementation might explain part of the reason for the higher unemployment rate in urban areas. In Ethiopia, regional governments have intermittently put in place curfews and lockdowns depending on the number of reported cases, rather than a nationwide lockdown. While the information on specific regional policies is hard to obtain, the share of confirmed cases can be used as a proxy for the containment measures being taken. The confirmed cases as a share of the population are higher for Dire Dawa (city), Addis Ababa (city), and Harar regions.⁸ Those areas also have a high urban rate and a high share of people not currently working (Figure 11). In Nigeria, there is a less clear trend between the urban rate and the rate of currently not working respondents by state, possibly because of the time of the survey, which was conducted between April 20 and May 11, when all states were under regional or nationwide containment measures. However, higher unemployment rates are observed in states where lockdowns are imposed earlier than the rest (FCT, Lagos (implemented lockdown on March 30), and Bauchi (April 2) and Kano (April 16)) (Figure 12).⁹

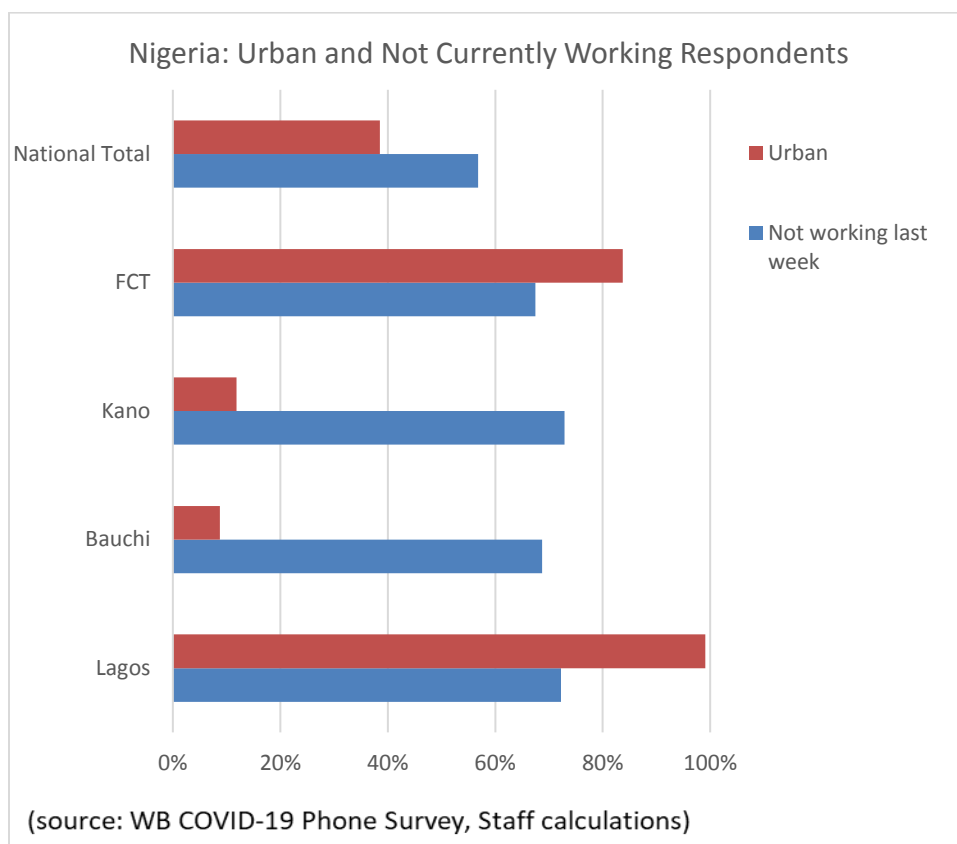
Figure 11 Ethiopia: Urban and Not Currently Working Respondents



⁸ The total number of confirmed cases by region was taken from the COVID-19 Situation Dashboard (<https://datastudio.google.com/u/0/reporting/d752d09c-737f-4934-8e31-32c1dd8daf8f/page/ICONB>) accessed on October 2, 2020.

⁹ Insurgency and farmer-herders clashes in these regions also significantly contributed to job losses and reduced income during the period.

Figure 12 Nigeria (national and selected states): Urban and Not Currently Working Respondents



The result that female employment was less affected by the pandemic than male employment might be counter-intuitive, as women tend to work more in the services sector, which was hit particularly hard by containment measures as discussed above. Whether women are more or less likely to lose employment due to the COVID-19 crisis seems to be country-dependent. Using timely surveys, other studies find women to be significantly more likely to lose their jobs in the United States, United Kingdom, Italy, and China but not in Germany, Japan and Korea (Adams et al. (2020), Dang and Nguyen (2021), and more recently the same WB phone surveys for Uganda find that more women lost their job than men but not for Malawi (Weber, Palacios-Lopez and Contreras-Gonzalez 2020).

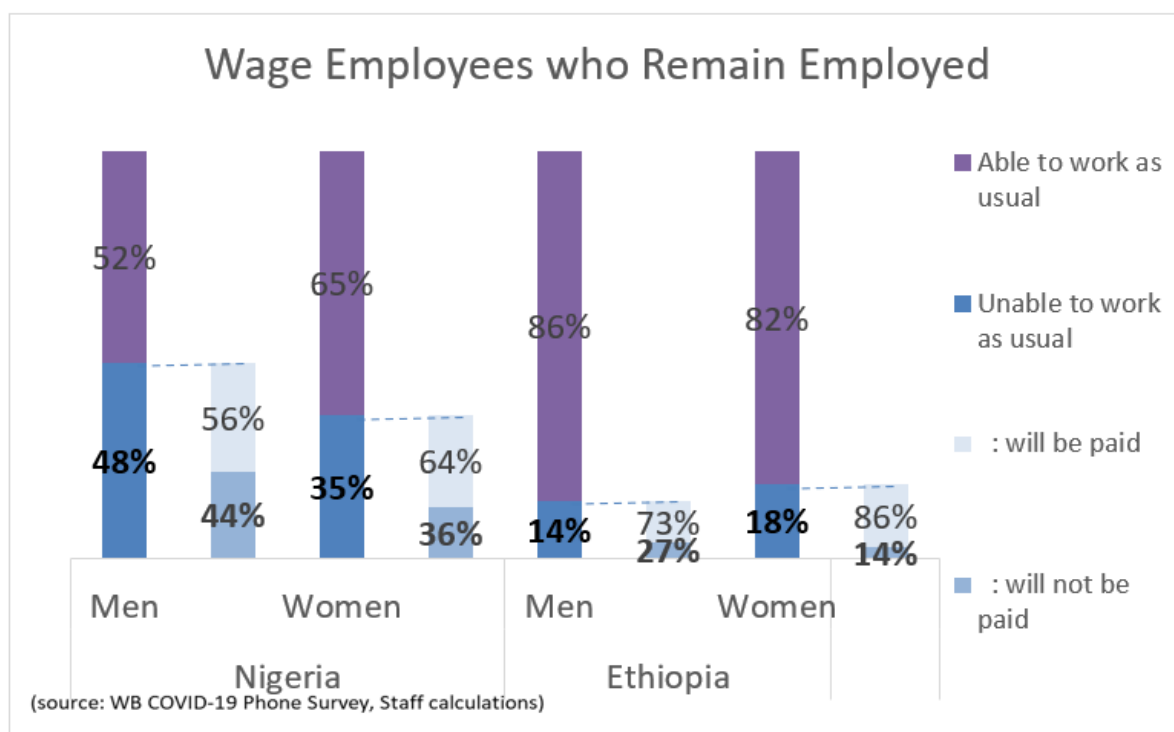
One possible reason why female employment in Ethiopia and Nigeria appears to be less affected than male employment could be that the high share of women was working as own-account or contributing family workers in agriculture—a situation typically observed in low-income sub-Saharan African countries. As seen in the previous section on employment status, the share of own-account and contributing family workers are particularly high among rural women. Evidence from a harmonized data set of surveys for 34 countries by Bundervoet, Davalos, and Garcia (2021) supports this hypothesis as they argue that the lower job losses in low-income countries during the early stages of lockdowns is likely explained by an employment structure that is dominated by agriculture and own-account work. As seen

above, in Nigeria, more than half of women who are still working are indeed in agricultural employment (Figure 10). Those jobs may not appear as “lost” just because self-employed do not give up working entirely even if returns to their efforts decrease substantially.

Unfortunately, it is hard to disentangle the work share of a family business by individual level from the household surveys because multiple job holders seem to be particularly common among own-account and contributing family workers. However, even in the case that family businesses are relatively secure employment for women, it does not mean those are decent jobs or that women are better off than men. Contributing family workers are in informal employment and therefore more likely to be less or non-paid and to lack social security and other benefits.

Lockdowns may also cause problems for those who managed to maintain their employment. In Nigeria, 48 percent of men and 35 percent of women who continue working as wage employees reported they were not able to work as usual. Among those who work in somewhat unusual ways mostly due to lockdown, 44 percent of men and 36 percent of women reported that they would not get paid. In Ethiopia, among those who kept their job as wage employees, 14 percent of men and 18 percent of women were unable to work as usual. And for those who were unable to work as usual, 27 percent of men and 14 percent of women reported they would not get paid (Figure 13).

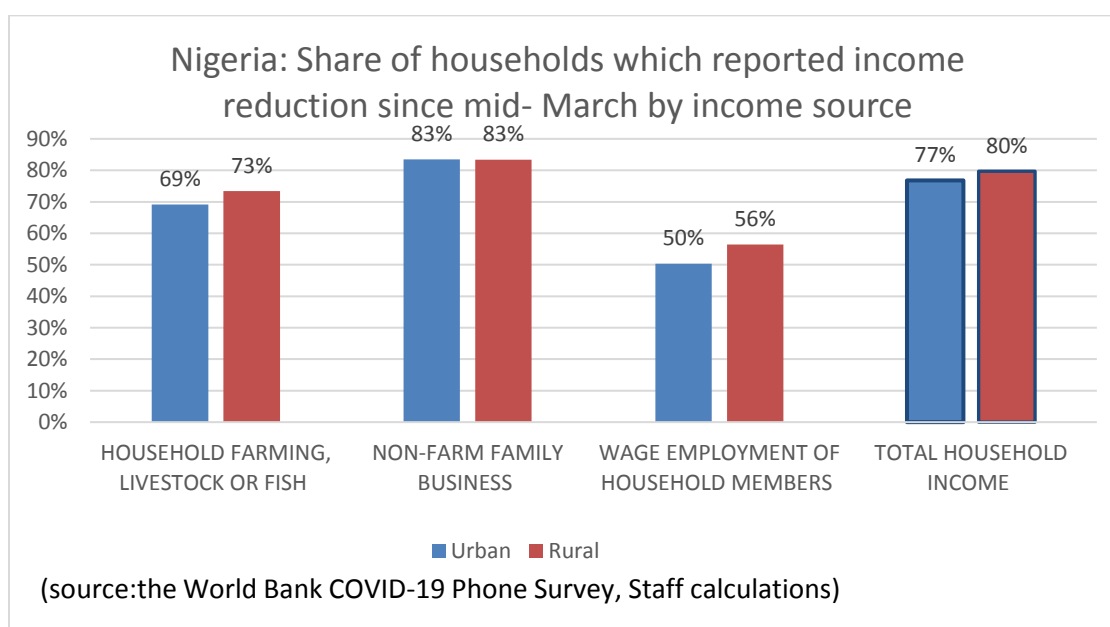
Figure 13 Wage Employees who Remain Employed in Ethiopia and Nigeria



Moreover, looking at household income, even though employment loss was less severe in rural areas than in urban areas, income reductions are widespread. In both Nigeria and Ethiopia, the share of households that reported a reduction in total household income since

the outbreak is equally high between rural and urban areas— about 80 percent in Nigeria and about 60 percent in Ethiopia (Figure 14 and Figure 15). Among the top three most common income sources, household farming and non-farm family businesses are more likely to face reduced income than wage employment, implying the vulnerability of the informal sector and own-account and contributing family workers.^{10 11} Again, it may adversely affect women in particular because of their dependence on family farming and family businesses and their initially lower income and higher poverty rate compared to men. As the husband's control over the allocation of household resources is the norm in most parts of West and East Africa (Verschoor, et al. 2019), a reduction in household income might further reduce economic opportunities for women in the region.

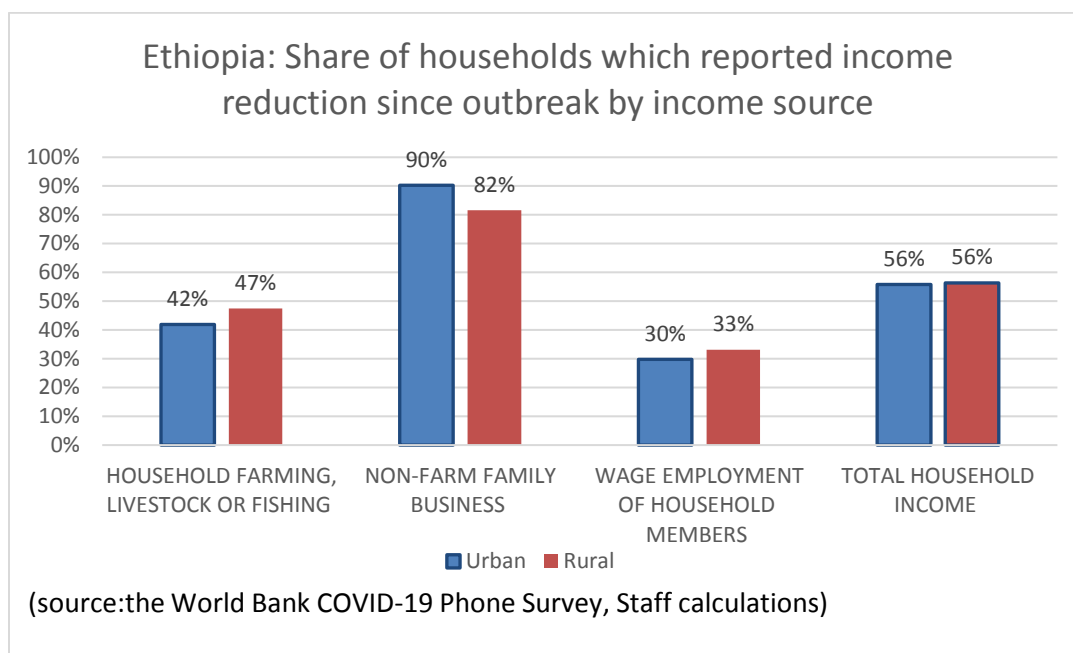
Figure 14 Nigeria: Share of Households with Reduced Income by Income Source



¹⁰ It should be noted that in Nigeria, occurrence of banditry, insurgency, farmers/herders' clashes, and border closure before the pandemic significantly affected many formal and informal businesses in some regions.

¹¹ There may be multiple factors behind the larger real income losses of households in farming and non-farming family businesses than wage workers. For one reason, social insurance is rarely available for family workers. Another reason is that self-employed workers are more exposed to demand shocks, restrictive measures, and to a lesser extent, supply shocks. The Nigerian survey shows that among family businesses that experienced revenue decline after the lockdown was introduced, 65% reported the main reason was the closure of business and 20% reported the main reason was reduced number of customers. Only 2% of them attributed the main revenue-reducing reason to be input unavailability. On the other hand, many farmers reported they could not farm normally because of the stay-home advice (58% of farmers) or the restriction of movement (39% of farmers). Only 3% of farmers reported the inputs were not available for farming.

Figure 15 Ethiopia: Share of Households with Reduced Income by Income Source



2. Educational Outcomes

One important lesson learned from the recent Ebola health crisis in West Africa is that school closures could cause lasting effects, particularly on girls' educational outcomes. While it is too early to tell if that is the case this time, it is possible to see whether children continued learning at home during school closure.

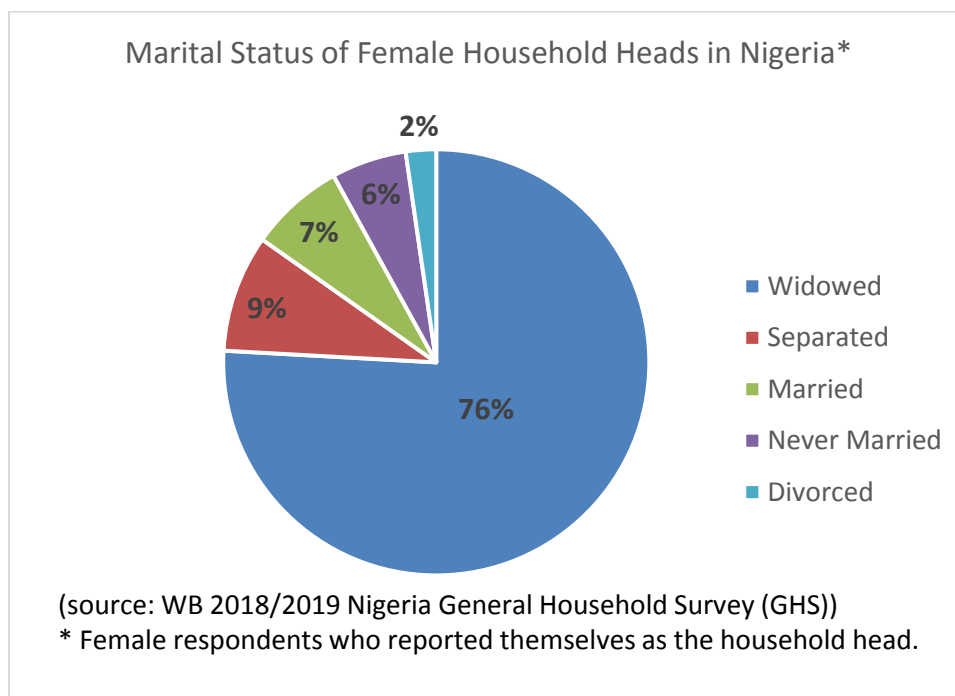
On March 16, 2020, Ethiopia closed all primary and secondary schools. Likewise, Nigeria closed schools nationwide from March 26, 2020. The school closures for both countries continued for about six months until Ethiopia and Nigeria reopened schools on October 19 and on October 12 respectively. The surveys coincided with the school closures and asked for those who have primary/secondary school children at home whether the children are engaged in any educational activity after schools have closed.

Unfortunately, the surveys did not ask which child—either a girl or a boy—continues learning. So, in this paper, the gender difference is observed in terms of the household head, not of the children in the family.¹² The gender of household heads is important with regards to policies to support children's education for vulnerable families during school closure. It is beyond the matter of gender inequality because female-headed households are different in many ways from average households not because they are female, but because of what leads these women to become heads of household. Among the household heads who completed the Nigerian survey, only 17 percent are women (See Appendix A for the share of household heads among respondents). In the 2018/2019 survey, 76 percent of the female respondents

¹² The surveys asked respondents to report each household member's relationship to the household head. The majority (but not all) of respondents identified themselves as the household head (see Appendix A).

who reported themselves as the household head were widows, nine percent were separated, and two percent were divorced (Figure 16). This implies single mothers who raise children without the help of other adults living with them are more common than single fathers in that circumstance. According to [BFA Global](#), households with dependents and a single adult were about three times as likely to have a female head in Nigeria.

Figure 16 Nigeria: Marital Status of Female Household Heads



In this section, the observations consist of 1204 households in Nigeria and 1917 households in Ethiopia in which there are one or more primary/secondary school children and the main respondent of the households completed relevant parts of the questionnaire. Cross-country comparison between Nigeria and Ethiopia may not be appropriate because the Nigerian survey asks broader types of learning activities outside of schools than the Ethiopian survey, thus resulting in a much higher share of households reported to have children learning.^{13,14}

Regardless of the difference in overall likelihood of home-based learning, one common trend between the two countries is that urban households are more likely to have children engaged in learning activities at home during school closure than rural households. The gender of household heads does not seem to matter except maybe for the case of rural Nigerian households where female-headed households are less likely to have children engaged in

¹³ The observations are restricted to the cases where the main respondent of the survey is the household head because the gender of the household head is not known in the survey unless they are the survey respondents.

¹⁴ For example, the Nigerian survey includes “reading by themselves” and “taught by parents or other family members” as independent categories of learning activities, while the respondents of the Ethiopian survey would need to report them as “other learning activities” if they wish to.

learning. The educational gap between rural and urban areas was observed even before the pandemic. For example, the net school attendance ratio for primary school was 72 percent for urban children and 51 percent for rural children in Nigeria (Demographic and Health Survey 2018). Yet, these results imply the urban-rural gap in learning activities is widening during the pandemic. The fact that rural children do not have the same internet connectivity, rural schools are less equipped to offer remote learning, and rural children are more likely to be expected to work to support their household makes it more difficult for those children to continue learning during school closure.

Table 1 Ethiopia: Share of Households with Children Engaged in Learning Activities

Rural		Urban	
Male-headed	Female-headed	Male-headed	Female-headed
14%	17%	44%	41%

Table 2 Nigeria: Share of Households with Children Engaged in Learning Activities

Rural		Urban	
Male-headed	Female-headed	Male-headed	Female-headed
60%	49%	74%	74%

B. Regression Results for Nigeria

In this section, background information of the households and respondents from the 2018/2019 survey are matched with the COVID-19 survey for Nigeria, to analyze the gender differences in the marginal effect of the lockdown on employment loss and children's education. The observations are further restricted to those who have matched with the baseline surveys by sex and age of the COVID-19 survey respondents.

As said above, because of the data availability of the baseline survey, only Nigerian data is used for the regression analysis. Although not intentional, as Nigeria experienced the greater effect of lockdown in terms of the employment loss as discussed above, the use of Nigerian data is in favor of examining the impact of lockdown with a higher variation in the observation.

Probit models are used to model binary outcome variables, whether 1) the employment is lost due to lockdown and 2) primary/secondary school children in the household are engaged in learning activities during school closure. The basic specification of the models assumes that the conditional probability takes the normal form such as:

$$Y_i^* = Pr(Y_i = 1|X_i) = \Phi(X_i\beta), \quad (1)$$

where for each individual i , Y is a binary outcome variable that takes a value 0 or 1 (e.g. 1 is when employment is lost). X is an $L \times 1$ vector where L is the number of explanatory variables which are expected to influence the outcome variable, β measures the effects of corresponding X (i.e. $X_1, X_2, \dots$, or X_L) on Y , and $\Phi(\cdot)$ is the cumulative distribution function (CDF) of the standard normal distribution.

The model parameters (i.e. β) can be estimated via the standard maximum likelihood estimation (MLE) method.

1. Labor Market Outcome

To find gender differences in labor market outcomes during the pandemic, the model is specified by filling in $X\beta$ in the equation (1) where Y_i^{*L} is the probability of an individual losing their job/closed their business due to lockdown given X_i :

$$Y_i^{*L} = \Phi(\beta_0^L + \beta_1^L \textit{female}_i + \beta_2^L \textit{urban}_i + \beta_3^L \textit{educated}_i + \beta_4^L \textit{nonfarm}_i + \beta_5^L \textit{age}_i + \beta_6^L \textit{age}_i^2) \quad (2)$$

Where dummy variables *female*, *urban*, *educated*, and *nonfarm* take the value 1 if the individual is female, lives in an urban area, has obtained high school or higher education, and works in a non-agricultural sector, respectively, and otherwise take the value 0. The continuous variable *age* captures the individual's age and the square term is included to consider non-linear effects at different age levels.

The selection of explanatory variables are restricted by the survey data availability and in line with the other studies which used WB COVID-19 phone surveys for other countries, such as Cucagna and Romero (2021) which also used urban, education, and industry dummies and age in years, as well as other variables to explain employment loss of male and female workers separately for selected Latin American countries; and Bundervoet, Davalos and Garcia (2021) which also used age, gender, sector of employment, and education of respondents, and rural vs urban location of the household to explain the employment loss in low and middle-income countries across the world.

Table 3 below shows the result of the simplest model with no interaction term, specified by equation (2). All variables are significant at 1 percent. A likelihood ratio (LR) chi-square test rejects the null hypothesis that all β s are simultaneously equal to zero and concludes the overall model is statistically significant with the p-value less than .000.

Table 3 Probit Estimates for Simple Model (1): Employment Loss

Dependent Var: Employment Loss

VARIABLES	(1) Employment Loss
female	-0.273*** (0.0694)
urban	0.172*** (0.0630)
educated	0.221*** (0.0684)
nonfarm	0.578*** (0.0707)
age	0.0355*** (0.0117)
age ²	-0.000404*** (0.000117)
Constant	-1.620*** (0.293)
Observations	1,922
Standard errors in parentheses	LR chi2(6) = 148.79
*** p<0.01, ** p<0.05, * p<0.1	Prob > chi2 = 0.0000

First, the negative coefficient of the female dummy indicates that women are on average less likely to have lost employment due to lockdown. As discussed above, one possible reason could be that women are more likely to be own-account and contributing family workers, often non-paid and informal, than men and thus those specific jobs may not appear as “lost” just because self-employed do not fire themselves. While the anecdote and observations of other countries support this hypothesis (Bundervoet, Davalos and Garcia 2021), it is difficult to test. Unfortunately, something like an informal worker variable cannot be added in the regression, because of the lack of information about the employment status of those people who stopped working due to lockdown in the survey. It should also be noted that the lower likelihood of employment loss of women should not mask the unequal damages in economic opportunities that women may have experienced due to shocks in the family business or family farms.

Another unobserved factor that could affect the gender impact of the pandemic is the increased responsibility to care for house and family, especially child care needs due to closures of schools and daycare centers, which disproportionately affected female employment globally (Alon, et al. 2020). Similar phone surveys in Latin America suggest that the presence of school-age children at home is linked with a rise in job losses among females but not among males (Cucagna and Romero 2021). As circumstances surrounding working mothers vary across countries, the gender impact of the crisis can be very much country dependent. For example, a country with a low share of own-account agricultural

employment among women may still experience fewer female job losses than male job losses, because of sufficient support available for working mothers in the country.

As seen in the previous section, the ratio of women who were “not working before COVID-19” is much higher than that of men in Nigeria, thus this could also deflate the female probability of losing employment in terms of its share to the total respondents. In other words, the negative coefficient of the female dummy might just reflect the fact that women cannot “lose” a job that they do not have. To address this issue, the sample of respondents who were “not working before COVID-19” are excluded from the dataset, but the results still support the same conclusion that women are less likely to have lost their job or closed the business due to lockdown (see robustness check in Appendix B).

Another argument is that many subsistence farmers in sub-Saharan Africa do not have a market job, thus may be misreporting employment status and creating a measurement error problem. As a robustness check, the subset of the sample excluding subsistence farmers is used. Subsistence farmers are identified using the baseline 2018/2019 survey as family farmers who consume all their agricultural products for themselves rather than selling the agricultural products. The size of the sample excluding subsistence farmers is about 10 percent smaller than the original. Notably, the exclusion of subsistence farmers in the regression analysis did not change the main findings for the female variable as well as other variables (see robustness check in Appendix C).

Second, positive coefficients of urban and nonfarm variables suggest that if the individual lives in an urban area or worked in a non-agricultural sector, the probability of losing their employment is higher than otherwise. These findings are in line with the general observations discussed above. Urban areas might have faced stricter containment measures, and the type of employment more affected by the lockdown is concentrated in non-agricultural sectors.

Third, the positive sign of the coefficient of the educated variable, indicating the person has high school equivalent or higher education, might seem contradictory to the fact that we saw major epidemics globally hurt employment prospects of those with only a basic education. However, the result stands in an alternative specification where a dummy variable for incompleteness of primary education was used instead of the one for high school or up in this specification (see robustness check in Appendix D). The result suggests that people with less or no education are more likely than people with the education to remain employed. This may be because people with little education are often poor, live from hand-to-mouth, and are not covered by the safety net; therefore, they cannot afford to stop working.

One piece of information that is lacking in the survey and thus not analyzed in this paper is the effect of the pandemic on the informal sector, which is widespread in Africa and might be the underlying mechanism of gender or education effects in this analysis. According to the 2018/2019 baseline survey, while 70 percent of wage workers who have high school equivalent or higher education have a written employment contract or a letter of appointment for the job—indicating the formality of the job, only 30 percent of those who have less education have such formal jobs. However, we must consider that wage employment is more common for males and those who have basic educations than females and those with little or

no education. Informality is higher among self-employed. The survey shows that nearly 90 percent of non-farm own-account businesses are informal, or not officially registered with the government. However, it is hard to distinguish which worker in each household is informal and which one is not, so the detailed analysis on how the informal sector has been affected by the lockdown may need to wait until more data becomes available.¹⁵

Finally, the regression result shows a positive coefficient of age and a negative coefficient of squared age. This means older workers are more likely to lose their job or close the business but the negative effect of being old declines with age.

To provide quantitative interpretations of the above probit estimates, the average marginal effects of explanatory variables are reported as below (Table 4). The marginal effects (dy/dx) are a numerical derivative for continuous covariates and incremental effects for dummy variables. Because of the age^2 , the average marginal effects depend on age level. For example, on average, being a woman is associated with a reduced probability of losing employment by 0.0887 at age 20 and by 0.0974 at age 40. Living in an urban area or having high school or higher education are associated with increased probabilities of being unemployed due to lockdown by 0.06-0.08. The sign of aging effects changes at age 50, indicating the younger are more likely they remain employed while at age 50 and 60, the opposite is true. Overall, the average marginal effects of the nonfarm dummy, the dummy variable of non-agricultural employment, are the largest, ranging from 0.185 to 0.207 depending on the age level.

Table 4 Average Marginal Effects: Employment Loss

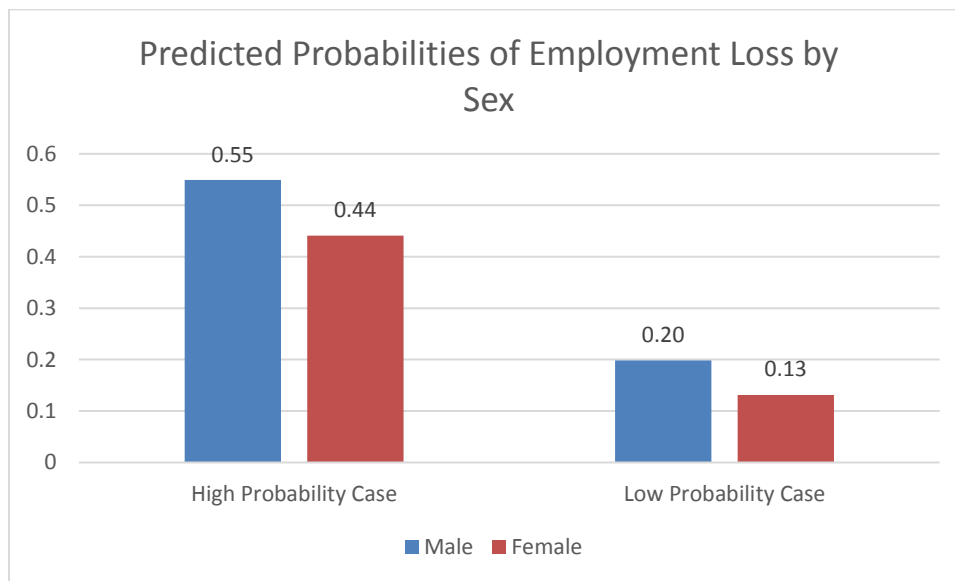
VARIABLES	At age 20	At age 30	At age 40	At age 50	At age 60
female	-0.0887*** (0.0224)	-0.0950*** (0.0235)	-0.0974*** (0.0241)	-0.0972*** (0.0240)	-0.0941*** (0.0232)
urban	0.0585*** (0.0217)	0.0619*** (0.0228)	0.0632*** (0.0232)	0.0631*** (0.0232)	0.0614*** (0.0227)
educated	0.0726*** (0.0219)	0.0776*** (0.0235)	0.0795*** (0.0243)	0.0793*** (0.0243)	0.0768*** (0.0235)
nonfarm	0.185*** (0.0226)	0.200*** (0.0228)	0.207*** (0.0237)	0.206*** (0.0238)	0.198*** (0.0229)
age	0.00647*** (0.00213)	0.00400** (0.00172)	0.00115 (0.00109)	-0.00177** (0.000768)	-0.00457*** (0.00116)
Observations	1,922	1,922	1,922	1,922	1,922

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

¹⁵ BOX 1 discusses more on informality and employment status.

To take a closer look at the gender difference, predicted probabilities of losing employment for a male and a female at age 40 are calculated using the above regression results, specifically for two hypothetical cases—a high probability case and a low probability case. In the high probability case, the person (either a male or a female) is assumed to have characteristics that are associated with a higher probability of losing employment, such as living in an urban area, having high school or higher education, and engaging in non-farm work. In the low probability case, the person is assumed to have none of those characteristics that are associated with a higher probability of losing employment. In the high probability case, the male probability of losing employment is 0.55 while the female probability of it is 0.44. In the case of the low probability case, the male probability of losing employment is 0.20 while the female probability of it is 0.13 (Figure 17).

Figure 17 Predicted Probabilities of Employment Loss by Sex



(Source: Staff Calculations)

Next, to see how the effects of *urban*, *educated*, and *nonfarm* changes by sex, equation (2) is expanded to include the interaction terms between those variables and *female*. The estimates of the expanded model are reported in Table 5.

Table 5 Probit Estimates for Expanded Model (2): Employment Loss

Dependent Var: Employment Loss

VARIABLES	(2) Employment Loss
female	-0.630*** (0.181)
urban	0.121* (0.0735)
female x urban	0.194 (0.144)
educated	0.202** (0.0791)
female x educated	0.0735 (0.159)
nonfarm	0.517*** (0.0795)
female x nonfarm	0.278 (0.178)
age	0.0367*** (0.0118)
age ²	-0.000416*** (0.000118)
Constant	-1.574*** (0.294)
Observations	1,922
Standard errors in parentheses	LR chi2(9) = 154.97
*** p<0.01, ** p<0.05, * p<0.1	Prob > chi2 = 0.0000

While the signs of coefficients of all non-interaction terms are the same as before and are statistically significant at 10 percent or higher, the three interaction terms are not significant by themselves. However, what matters is that separately performed Wald test rejected the null hypotheses that the coefficients of 1) *female*, 2) *urban*, *educated*, or *nonfarm*, and 3) the respective interaction term, which is *female* × *urban*, *female* × *educated*, or *female* × *nonfarm* are simultaneously equal to zero, meaning including these variables create a statistically significant improvement in the fit of the model. Table 6 shows model statistics including model selection indices— Akaike's information criterion (AIC) and Bayesian information criterion (BIC). The BIC favors the simple model, whereas the AIC marginally favors the expanded model with interaction terms. Considering the small differences between the models in either case and that the BIC penalizes model complexity more heavily, these

indices do not provide evidence to believe either model is better than the other, thus suggesting both models could provide meaningful information.

Table 6 Model selection indices, AIC and BIC

<u>Akaike's information criterion (AIC) and Bayesian information criterion (BIC)</u>						
Model	N	ll(null)	ll(model)	df	AIC	BIC
(1) simple	1,922	-1256.49	-1182.093	7	2378.187	2417.115
(2) expanded	1,922	-1256.49	-1179.006	10	2378.012	2433.623

Note: BIC uses N = number of observations. ll(null) is the log likelihood for the constant-only model, ll(model) is the log likelihood for the model, and df is the number of degrees of freedom.

Next, to understand the cross-effect of sex and 1) regional, 2) educational, and 3) sectoral divide, predicted probabilities of losing employment for different groups are reported in Table 7. The baseline case of the model is set as all the dummy variables taking the value 0 and age is fixed at 40.

Table 7 Predicted Probabilities of Employment Loss

1) <i>Regional Divide</i>		
	Urban	Rural
Male	0.258***	0.221***
Female	0.139***	0.081***
2) <i>Educational Divide</i>		
	Highschool+	Less than High School
Male	0.285***	0.221***
Female	0.131***	0.081***
3) <i>Sectoral Divide</i>		
	Non-Agriculture	Agriculture
Male	0.400***	0.221***
Female	0.273***	0.081***

*** p<0.01, ** p<0.05, * p<0.1

Note: The baseline is rural, less than high school, and agriculture, unless noted. Age is set at 40.

In the first block 1) *Regional Divide*, the effects of living in an urban area is calculated separately for male and female. For example, a man in an urban area with baseline characteristics in other aspects—that is, having less than a high school degree and working in the agricultural sector—has a 25.8 percent probability of losing his employment due to the lockdown. On the other hand, an urban woman of the same characteristics has a 13.9 percent probability of losing her employment.

Likewise, in the second block 2) *Educational Divide*, having high school or higher education implies a 28.5 percent and a 13.1 percent probability of losing employment for men and women respectively who have the same baseline characteristics in other aspects—that is, living in a rural area and in agricultural employment.

Lastly, in the third block 3) *Sectoral Divide*, working in a non-agricultural sector means a 40 percent and a 27.3 percent employment-loss probability for men and women respectively with other baseline characteristics—living in a rural area, having less than a high school education.

Notice that in the rightmost column, the numbers are constant across divide 1)-3) with the probability of employment loss for male (22.1 percent) and women (8.1 percent) because for all cases the all non-age variables are at value 0 except for female dummy (female=1 for women). In other words, the cases are for male/female who lives in a rural area, with less than high school education and working in the agricultural sector.

In summary, the predicted employment-loss probabilities are much lower for women than for men across different groups. The predicted employment-loss probabilities for women range from 8 percent to 27 percent, whereas those for men range from 22 percent to 40 percent at age 40. The probabilities might be lower for younger people as the positive sign of age coefficient in Table 5 suggests, but the order of the magnitude is the same across different age levels.

2. Educational Outcome

Moving to the educational outcome during the pandemic, the model is specified by filling in $X\beta$ in the equation (1) where Y_i^{*E} is the probability of children in the individual i 's household being engaged in any learning activities during school closure given X_i :

$$Y_i^{*E} = \Phi(\beta_0^E + \beta_1^E \text{fem_head}_i + \beta_2^E \text{urban}_i + \beta_3^E \text{educated}_i + \beta_4^E \text{nonfarm}_i + \beta_5^E \text{age}_i + \beta_6^E \text{age}_i^2), \quad (3)$$

where the dummy variable **fem_head** takes the value 1 if the individual is the female head of the household, and the other explanatory variables are defined as above. Like the employment regression specified as equation (2) above, this specification is similar to Bundervoet, Davalos and Garcia (2021) which analyzed the children's continued learning in 29 countries. The probit estimates are reported in Table 8 below.

Table 8 Probit Estimates for Simple Model (3) Child Learning

Dependent Var: Children engaged in any learning activities during school closure

VARIABLES	(3) Child Learning
fem_head	-0.345*** (0.0852)
urban	0.124** (0.0612)
educated	-0.0744 (0.0644)
nonfarm	0.145** (0.0651)
age	0.0612*** (0.0111)
age ²	-0.000612*** (0.000110)
Constant	-1.484*** (0.275)
Observations	1,922
Standard errors in parentheses	LR chi2(6) = 58.44
*** p<0.01, ** p<0.05, * p<0.1	Prob > chi2 = 0.0000

All variables are significant at five percent or above, except the educated variable which is not significant.

First, the negative coefficient of the female-head dummy indicates that children in the household headed by a female are on average less likely to have engaged in learning activities during school closure. This is in line with the fact that female-headed families are in special circumstances and often where a widowed/divorced mother and her children are living alone thus facing greater challenges ensuring home-based learning for the children.

Second, the positive sign of the urban dummy suggests that if the individual lives in an urban area, the probability of having children in their household engaged in learning activities is higher than in a rural area. Children in rural areas have been lagging academically even before the pandemic, but this result implies that with the lack of infrastructure or support necessary to continue learning during school closure, the urban-rural gap would widen.

Third, the positive sign of the non-farm variable means if the individual works in a non-agricultural sector, children in his/her household are more likely to be engaged in home-based learning. It might be because children who need to help their family on the farm face

more challenges to continue learning during school closure than children who do not need to work on the farm.

Lastly, the positive coefficient of age and the negative coefficient of age-square means that the older the individual is the more likely they have children at home continue learning, but the age effect of the individual declines with their age.

Table 9 reports the average marginal effects at different age levels of the survey respondent. Female-headed households have on average 0.12-0.14 points lower probabilities than male-headed households to keep educating the children during the pandemic. On the other hand, in this model, urban households and households with a non-agricultural worker have on average 0.04-0.06 points higher probabilities for children's learning. The magnitude of the urban effects found here is similar to the average of 29 low-income and middle-income countries analyzed in Bundervoet, Davalos and Garcia (2021), that children in urban areas were 0.06 points more likely to continue learning, all else equal.

Table 9 Average Marginal Effects: Children Engaged in Learning Activities

VARIABLES	At age 20	At age 30	At age 40	At age 50	At age 60
fem_head	-0.116*** (0.0263)	-0.131*** (0.0309)	-0.136*** (0.0328)	-0.136*** (0.0332)	-0.136*** (0.0329)
urban	0.0445** (0.0221)	0.0485** (0.0240)	0.0489** (0.0241)	0.0486** (0.0240)	0.0489** (0.0241)
educated	-0.0267 (0.0233)	-0.0291 (0.0252)	-0.0293 (0.0253)	-0.0292 (0.0252)	-0.0293 (0.0253)
nonfarm	0.0512** (0.0226)	0.0565** (0.0252)	0.0574** (0.0257)	0.0572** (0.0257)	0.0574** (0.0257)
age	0.0131*** (0.00194)	0.00956*** (0.00180)	0.00484*** (0.00114)	1.14e-05 (0.000803)	-0.00481*** (0.00123)
Observations	1,922	1,922	1,922	1,922	1,922

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As a robustness check, coefficients obtained from separate regressions that explain whether children are engaged in a specific subset of learning activities are shown in Table 10. The types of learning activities covered in the table are whether children in the household (i) were taught by parents or other family members, (ii) were studying or reading on their own, (iii) completed homework provided by the teacher, (iv) used mobile learning apps, (v) watched educational TV programs, (vi) Listened to educational programs on radio, and (vii) had a tutor. The survey also includes "other types of learning activities" but it is not shown here.

In those seven regressions, some variables lost significance. First, the coefficients of the female head variable are only significantly negative for children's probability of learning through homework or TV, but not for other learning activities. Second, the coefficients of the

urban variable are significantly positive for most learning activities except learning through radio and tutoring. Third, the coefficients of the non-farm variable are insignificant for most learning activities except learning through radio—for which being in the non-farm household is negative rather than positive for learning—and through tutoring. The negative effect of non-farm may be explained by the popularity of radio among farmers. Having an adult working in non-agricultural work is positively correlated with learning through tutoring. Fourth, coefficients of the household heads' educational level are significant and positive for three out of seven learning activities. Parents' education levels are found to be positively correlated with children's continued learning in other countries as well, and this implies the pandemic may have lowered intergenerational mobility in education (Bundervoet, Davalos and Garcia 2021). Lastly, the age of the respondent is not significantly correlated with children's engagement in most learning activities except tutoring, for which the coefficients indicate the negative (respondent's) age effect, but the effect gets weaker in the older age group. Overall, variables correlated with the tutoring probability are quite different from other learning activities. This may be explained by the fact that tutoring is not a preferable option for most people during the pandemic as people try to minimize interaction outside of the household members.

Table 10 Robustness Check: Simple Model (3)' by Type of Learning Activities

VARIABLES	(i) Parents	(ii) Self	(iii) Homework	(iv) Apps	(v) TV	(vi) Radio	(vii) Tutor
fem_head	-0.11	0.10	-0.32**	0.03	-0.35**	-0.15	-0.15
urban	0.45***	0.28***	0.21**	0.20*	0.47***	0.09	-0.08
educated	0.13*	0.01	-0.06	0.27*	0.37***	0.08	-0.30***
nonfarm	-0.02	-0.11	0.03	0.16	-0.07	-0.17*	0.27**
age	0.00	0.00	-0.02	-0.01	-0.01	0.02	-0.03*
age ²	0.00	0.00	0.00	0.00	0.00	0.00	0.00*
Constant	-0.40	-0.22	-0.62	-1.88***	-1.31***	-1.73***	-0.50
Observations	1,442	1,442	1,442	1,442	1,442	1,442	1,442
LR chi2(6)	51.49	18.52	14.43	11.48	48.8	43.14	51.49
Prob > chi2	0.000	0.0051	0.0252	0.0747	0.000	0.000	0.000

(Note) Shaded numbers are statistically significant coefficients.

*** p<0.01, ** p<0.05, * p<0.1

It is worth noting that from these survey data it is not clear how household income would affect children's learning during the pandemic, although household income and wealth are expected to be a major determinant of parents' involvement in children's education and final educational outcome of the children. In the UK, primary and secondary- school-aged children whose parents belong to the highest income quintile spent about 30 percent more time on

educational activities during April-May 2020 compared to children in lower-income households (Andrew, et al. 2020). According to one study by UNICEF, in most countries around the world, household wealth is positively correlated with parental involvement in home-based education of the children (Mishra, et al. 2020), which is more critical than ever for children's continuous learning during the COVID-19 pandemic.

Trying to analyze the effect of household income in Nigeria, information from the baseline survey 2018/2019 on the amount of their regular income from the past 12 months is used as an additional explanatory variable in the main regression (see robustness check in Appendix E). The addition of household income variable, with or without household size controlled, did not change the main findings. That is, male-headed, urban, and non-farm households are more likely to have children engaged in learning activities at home. Household income itself is not significant in these specifications. Once the amount of time spent on learning opportunities is considered, rather than binary response available in the survey of whether children are engaged in any learning activities at all, the household income might have a significant effect, but this information is not available.

IV. CONCLUSION AND POLICY RECOMMENDATIONS

The statistics on pre-pandemic employment structure in sub-Saharan Africa show a large share of agricultural employment in rural areas. The statistics also show women are more likely to be own-account and contributing family workers than men. Those employment statuses are often linked to high informality in Sub-Saharan Africa.

Both the inferential statistics and the regression in this paper point to the fact that the regional divide (rural vs. urban) plays a crucial role in determining employment outcomes. Rural workers were more likely to remain employed, while widespread income reduction was observed in both rural and urban households. The impact on female employment may not appear to be large, particularly in rural areas, but this dynamic tends to mean that those specific jobs may not appear as "lost" just because self-employed do not give up working entirely even if returns to their efforts decrease substantially. Rural women were the most vulnerable group with a lack of decent employment and a high poverty rate, and they might be most severely affected by the shock to the household income.

On the education side, the analyses find strong evidence of the urban-rural gap that rural children are less likely to be learning during school closure. There is also some evidence that vulnerable households, such as female-headed households and households with less-educated adults, are more severely impacted and thus need more support for children's continuous education than others. With rural women already spending long hours caring for other family members during the pandemic and possibly lacking the time and ability to teach their children, communities, infrastructure, and policies to support those families are urgently needed.

While these main results are from phone surveys of households in Ethiopia and Nigeria, a similar regional and gender divide probably exists in other countries in sub-Saharan Africa. Indeed, reflecting the different challenges women and men are facing, governments have

taken gender-sensitive policies as a response to the COVID-19 crisis. Social protection and labor market measures that target women's economic security or address unpaid care, as well as fiscal and economic measures that provide support to female-dominated sectors of the economy, are examples of gender-sensitive policies.

According to a report by UNDP-UN Women (2020), across the sub-Saharan African region, 63 percent, or 29 out of the 46, countries and territories analyzed have taken a total of 113 gender-sensitive measures in response to COVID-19. Still, there is room for expanding and scaling-up policy measures to support women and families to narrow regional and gender inequalities. At the global level, 85 percent of countries and territories studied have taken gender-sensitive measures, suggesting sub-Saharan Africa is less likely to have such measures than other regions.

First, policies that are immediately implementable to face crisis include cash transfers that can be directed more towards households hit by the shock. In general, social cash transfers play a key role in sub-Saharan countries where unemployment insurance does not exist and informality is pervasive. As the empirical findings in this paper suggest, in the face of the COVID-19 crisis, it might make sense to strengthen cash transfers more in urban areas by linking the cash transfers with the rise of unemployment in the local labor market. While cash transfers and in-kind support that prioritize women as the main recipients are the most common gender-sensitive social protection programs that sub-Saharan African governments have implemented, the overall coverage is small compared to other regions in the world. The coverage of cash transfers has increased over the past month across the globe, but it remains two percent of the population in Africa, compared to 15 percent of the world's population (Gentilini, et al. 2020).

Second, policies to enhance female human capital and to provide decent jobs need to be expanded. In Nigeria, an innovative scheme called “Jobs for Youths and Women Post-COVID” has been launched aiming to boost the capacity of women in artisanal employment and Micro, Small, and Medium Enterprises through training in digital skills. The scheme also supports job creation by directing labor in a national public infrastructure project and facilitates the provision of start-up capital and entrepreneurship skills for youths and women. This kind of initiative is important to address informality and to link female employment to growth opportunities, and thus many other sub-Saharan African countries could be benefitting from similar policies. Training women and girls would also help mitigate lasting effects on educational inequality. In Sierra Leon, various life-skills and livelihood training provided to girls during the Ebola crisis in high disruption areas seem to have helped them return to school after schools reopened (Bandiera, Buehren, et al. 2019).

Third, the more structural and medium to long-run policies include improving digital infrastructure and access to devices and the internet. Eradicating the digital divide is critical for women and the rural population to take advantage of education, skill-building, new jobs, and financing opportunities. Making a digital device available to everyone can also set up the platform for digital cash transfers which can be fast, contactless, and can reach informal workers more efficiently. Digitalization would also help more workers to work from home while keeping in line with social distancing. A recent study suggests large marginal gains

from fast internet access in sub-Saharan Africa (Hjort and Poulsen 2019). During the recovery phase from the COVID-19 crisis, greater internet accessibility could provide more jobs for women in the services sector and would support inclusive growth. This is supported by an earlier study on the phased arrival of submarine cables to the region, which found that the shift to more employment in services is two and half times larger for women than men ([IMF 2020](#)).

Lastly, formal employment-linked policies to support unpaid care in the COVID-19 response need to be strengthened. Those policies include the provision of paid family leave, cash-for-care programs, flexible and shorter work-time arrangements, or continued provision of childcare services, including for essential workers. Such measures are extremely scarce in sub-Saharan Africa, accounting for only two percent of the gender-sensitive measures by the governments (UNDP-UNWomen 2020). Even after schools reopen, women continue to shoulder the increased burden of childcare, elderly care, and housework as people are encouraged to stay home to contain the spread of the virus. Policies to support caregiving not only facilitate female participation in formal jobs but would also free up the resources of mothers and could positively influence the learning of their children. Such measures would be particularly helpful for female-headed households, as the results from the regression analysis found on the lower learning activities by children in households headed by a female adult.

Regardless of where a woman lives or how she is employed, policies need to reflect the significant role that women often have in their homes and communities and the impact that has on future generations. Supporting women not only provides important short-term economic benefits. It is a vital strategy for building a more prosperous future.

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VI. APPENDIXES

A. Sample Characteristics

In the analytical sections of this paper, the first round of the World Bank LSMS-ISA program for High-Frequency Phone Surveys on COVID-19 is used to look into the cases for Ethiopia and Nigeria. For both countries, the sample consists of the main respondents of the surveys who completed the relevant parts of the questionnaire. For the regression analysis, the sample is further restricted to those who have matched with the baseline surveys (i.e. the 2018/2019 round of the Nigeria General Household Survey) by gender and age and has relevant background information. In both Nigerian and Ethiopian surveys, 82 percent of respondents in the sample dataset reported themselves as household heads while nine percent of respondents identified themselves as a spouse of the household head.

Appendix Table 1 Nigeria: Sample of Inferential Statistics; Labor Market Outcomes

	Sample	Sex	Mean age	% of HH Head	% of Spouse
Men	1434	73%	46.4	93%	0%
Women	534	27%	46.8	54%	33%
Total	1968	100%	46.5	82%	9%

Appendix Table 2 Ethiopia: Sample of Inferential Statistics; Labor Market Outcomes

	Sample	Sex	Mean age	% of HH Head	% of Spouse
Men	2,025	62%	38.4	92%	1%
Women	1,224	38%	36.2	66%	23%
Total	3249	100%	37.6	82%	9%

B. Robustness Check: Exclusion of Respondents Not Working Before COVID-19

Appendix Table 3 Robustness Check with Reduced Sample: Employment Loss

Dependent Var: Employment Loss

VARIABLES	(1) ['] Employment Loss	(2) ['] Employment Loss
female	-0.177** (0.0763)	-0.622*** (0.188)
urban	0.143** (0.0683)	0.0760 (0.0787)
female x urban		0.267* (0.162)
educated	0.221*** (0.0731)	0.215** (0.0837)
female x educated		0.0266 (0.177)
nonfarm	0.866*** (0.0737)	0.773*** (0.0827)
female x nonfarm		0.427** (0.186)
age	0.0118 (0.0131)	0.0130 (0.0132)
age ²	-0.000102 (0.000133)	-0.000115 (0.000134)
Constant	-1.258*** (0.321)	-1.192*** (0.323)
Observations	1,650	1,650
LR chi2	205.18	216.39
Prob > chi2	0.0000	0.0000

Note: The sample of respondents who were “not working before COVID-19” are excluded from the dataset.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

C. Robustness Check: Exclusion of Respondents Who Are Subsistence Farmers

Appendix Table 4 Robustness Check with Reduced Sample: Employment Loss

Dependent Var: Employment Loss

VARIABLES	(1)'' Employment Loss	(2)'' Employment Loss
female	-0.273*** (0.0719)	-0.649*** (0.188)
urban	0.152** (0.0659)	0.104 (0.0774)
female X urban		0.179 (0.150)
educated	0.247*** (0.0717)	0.222*** (0.0833)
female X educated		0.0932 (0.166)
nonfarm	0.570*** (0.0740)	0.504*** (0.0834)
female X nonfarm		0.293 (0.185)
age	0.0382*** (0.0123)	0.0396*** (0.0124)
age2	-0.000434*** (0.000123)	-0.000447*** (0.000124)
Constant	-1.668*** (0.308)	-1.617*** (0.309)
Observations	1,746	1,746
LR chi2	137.20	143.21
Prob > chi2	0.0000	0.0000

Note: The sample of respondents who were determined as subsistence farmers are excluded from the dataset.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

D. Robustness Check: Alternative Education Variable

Appendix Table 5 Robustness Check with an Alternative Education Variable: Employment Loss

Dependent Var: Employment Loss

VARIABLES	(1)''' Employment Loss	(2)''' Employment Loss
female	-0.269*** (0.0694)	-0.622*** (0.159)
urban	0.176*** (0.0629)	0.124* (0.0733)
female X urban		0.174 (0.143)
incomplete primary education	-0.396** (0.160)	-0.544*** (0.206)
female X incomplete primary education		0.419 (0.331)
nonfarm	0.596*** (0.0704)	0.530*** (0.0794)
female X nonfarm		0.328* (0.176)
age	0.0330*** (0.0117)	0.0341*** (0.0117)
age2	-0.000381*** (0.000117)	-0.000392*** (0.000118)
Constant	-1.398*** (0.286)	-1.350*** (0.287)
Observations	1,922	1,922
LR chi2	144.70	152.16
Prob > chi2	0.0000	0.0000

Note: Incomplete primary education variable is a binary variable indicating either the respondent has no education or has not completed all 6 years of primary education.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

E. Robustness Check: Inclusion of Household Income Variable

Appendix Table 6 Robustness Check with Household Income Variable with/without Household Size Controlled: Child Learning

Dependent Var: Children engaged in any learning activities during school closure
(3)'' with hh_size controlled (3)'' without hh_size controlled

VARIABLES	Child Learning	Child Learning
fem_head	-0.163* (0.0891)	-0.350*** (0.0853)
urban	0.211*** (0.0628)	0.129** (0.0613)
educated	-0.0590 (0.0651)	-0.0707 (0.0645)
nonfarm	0.135** (0.0658)	0.148** (0.0652)
age	0.0454*** (0.0114)	0.0612*** (0.0111)
age2	-0.000477*** (0.000113)	-0.000609*** (0.000110)
hh_income	-1.14e-07 (7.11e-08)	-9.18e-08 (7.54e-08)
hh_size	0.0712*** (0.00865)	
Constant	-1.575*** (0.279)	-1.489*** (0.275)
Observations	1,922	1,922
LR chi2	130.58	60.31
Prob > chi2	0.0000	0.0000

Note: HH_income variable is a continuous variable measuring the regular household income from the past 12 months in the local currency from the 2018/2019 round of the Nigeria General Household Survey (GHS). HH_size variable is a continuous variable measuring the number of household members from the GHS.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1