Leaving No Women Behind: Evaluating the Impact of the COVID-19 Pandemic on Livelihood Outcomes and Inequities in Access to Health Services and Necessities in Kenya and Ethiopia

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List of abbreviations and acronyms

CATI	Computer-Assisted Telephone Interview
CCI	Corrected Concentration Index
CI	Concentration Indices
COVID-19	Corona Virus Disease 2019
CSA	Central Statistical Agency
DHS	Demographic and Health Survey
ESS	Ethiopia Socioeconomic Survey
GDP	Gross Domestic Product
HFPS	High Frequency Phone Surveys
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
IHS	Integrated Household Surveys
IMF	International Monetary Fund
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
LSMS	Living Standards Measurement Study
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
OOP	Out-of-Pocket
PCA	Principal Components Analysis
PP	Percentage Points
SSA	Sub-Saharan Africa
UNDP	United Nations Development Programme
WHO	World Health Organization

Abstract

The COVID-19 pandemic has revolutionized the way we live and has brought about the twin crises of sickness and the need for an optimal mix of policies crafted to alleviate its impact on the population. There is little evidence on the impact of the pandemic on livelihood outcomes and inequities in access to health services and necessities and on whether female-headed families fare worse compared to their male-headed counterparts in Kenya and Ethiopia. We use data from high frequency phone surveys conducted in Kenya and Ethiopia to examine the aggregate impact of the pandemic on incomes, consumption patterns, food insecurity, and inequities in access to health services and necessities. Overall, the pandemic resulted in dramatic increases in food insecurity, reduced incomes and consumption, and increased inequities in access to health and necessities, especially for women living in female-led households. For example, living in a female-headed household was associated with an approximate 10% increase in the probability that an adult would go hungry, 9.88% increase in the likelihood of skipping a meal, and 17% increase in the prospect that a child would skip a meal in the seven days leading to the phone survey in Kenya. In Ethiopia, living in a female-headed household was associated with an approximate 24.35% increase in the probability that an adult would go hungry, 18.89% chance that an adult would skip a meal, and 26.67% probability of running out of food. Families with children and of low socioeconomic status prior to the pandemic experienced even worse outcomes. Inequities in access to health services were mostly pro-rich and appeared to be larger among female-headed families even though the difference between groups did not appear to be statistically significant in Kenya. Additionally, female-headed families from low socioeconomic positions had greater difficulty accessing necessities during the pandemic in both countries. These findings are mostly explained by the decreases in incomes due to COVID-19 alongside the pre-existing differences in socioeconomic status among the population. These results have important implications to public policy and planning for future pandemics in Kenya and Ethiopia.

Key words: *COVID-19; Livelihoods; Food insecurity; Inequity; Health and necessities; Kenya; Ethiopia.*

Acknowledgments

1. Introduction

The 'Global Strategy for Women's, Children's and Adolescents' Health 2016–2030' is a global strategy to ending all preventable maternal, newborn, and child-related deaths, including stillbirths, by 2030, as well as improving the overall health and wellbeing of women and their children (Unicef, 2020). Yet, as the world grapples to cope with the devastating impacts of the coronavirus pandemic (thereafter, COVID-19), this global commitment to ensure the health and wellbeing of women is seriously under threat. In several low-income countries where social safety nets may be limited, women may be more vulnerable to the ensuing implications of the pandemic. To evaluate the differential impact of the COVID-19 pandemic on livelihoods and inequities in health and access to necessities during the pandemic, we use longitudinal data collected by the World Bank and primarily focused on tracking the impact of the pandemic. Women from vulnerable positions within the households are likely to fare poorly during pandemics as they may be faced with the burden of looking after their children while at the same time being resource constrained.

As the spread of the COVID-19 virus increased, governments across the globe implemented several measures including lockdowns, curfews, social distancing, and wearing masks among many others in a bid to contain the virus and thwart further harm to the population. While such policies are implemented with the greater good in mind, they inevitably result in undesirable consequences, especially when implemented against the backdrop of poor social safety net programmes. Countries in Africa, including Kenya and Ethiopia, may be impacted as they face resource constraints and even supplement their health budgets with foreign assistance (Bau et al., 2022). The healthcare system in Kenya comprises of public, private, faith-based, and non-governmental organization (NGO) systems. Nearly 48% are public and operate under the Ministry of Health, 41% are private, 8% are faith-based health services, and 3% are operated by NGOs (Mohiddin & Temmerman, 2020). Health care in public facilities is free for some services, such as maternity care; and for those with national health insurance, in-patient treatment is also free. About 20% of Kenyans have some form of health insurance coverage, including national health insurance, but differences occur by region (Mohiddin & Temmerman, 2020). The health system faces huge coordination and planning challenges between all the different parts of the system, both at the local and national levels. The Ethiopian healthcare system consists of primary health centres, clinics, and hospitals. Hospitals are only available in major

cities with full-time physicians, with most of these hospitals being in the capital city Addis Ababa. Access to modern health care is somewhat limited, and in many rural areas it is virtually non-existent. Majority of the health facilities in the country are owned by the government. The country is ranked 92 out of 95 on the UNDP Human Poverty Index, making it one of the poorest in Africa. An estimated three-quarters of the population still lack access to clean water, and four persons out of five live without proper sanitation (WOrld Health Organisation, 2021). One of the main concerns in the country now is with regards to maternal mortality, malaria, tuberculosis, and HIV/ AIDS, coupled with a lack of clean water and better sanitation.

Recent research has emerged showing that restrictions imposed by governments to minimize the spread of the virus such as lockdowns, are more likely to disproportionately impact women in many respects (Hamadani et al., 2020). For example, women, particularly those living in low-income countries, are more likely to be impacted economically since a larger fraction are in precarious or unstable employment situations which include the informal sector, entertainment industry, arts sector, and domestic services, among others (Azcona et al., 2020). A great number of other women is also employed in poorly paid front-line positions, for example, community health workers who continue to tackle risky tasks such as COVID-19 surveillance, contact tracing, vaccinations, and monitoring quarantine and isolation centres, and yet these important workers are often lowly or irregularly paid with inadequate protective equipment (Bhanupriya & Saumya Tewari, 2020; Lotta, Wenham, Nunes, & Pimenta, 2020; Nepomnyashchiy, Dahn, Saykpah, & Raghavan, 2020). People in precarious work are less likely to afford health insurance, have limited access to health care services and are susceptible to inferior quality water, housing and food, all essential ingredients to health and wellbeing. Other research has shown that the pandemic has exacerbated the risk of intimate partner violence against women (Hamadani et al., 2020), and impacted access to sexual and reproductive health by women and girls (Cousins, 2020).

The goal of this paper is to examine the aggregate impact of the pandemic on livelihood outcomes (income and consumption, and food insecurity), and quantify inequities in access to health services and necessities in Kenya and Ethiopia during the COVID-19 pandemic. Our empirical analysis relies on high frequency phone surveys data collected by the World Bank in partnership with the local governments and the University of California, Berkely, to track the socioeconomic impacts of the COVID-19 pandemic, which is part of a bi-monthly panel survey that targets nationals of the respective counties (Kenya and Ethiopia in this case) and started in May 2020. We find that the pandemic is associated with income losses, increased food insecurity and a pro-rich distribution in access to health services, and a pro-poor distribution in difficulty in access to necessities in both Kenya and Ethiopia. The aggregate effects we observe appear to be much greater among female-headed families with children and from low socioeconomic status prior to the pandemic. The greater impacts of the pandemic among families of low socioeconomic position prior to the pandemic is consistent with the notion that the pandemic is being experienced against the backdrop of existing socioeconomic disparities across many dimensions—that is, as a syndemic.

2. An overview of healthcare financing in Kenya and Ethiopia

Kenya

The healthcare system in Kenya is mostly funded through a mix of public sector (i.e., government), private sector, donor (mostly non-governmental organizations and faith-based organizations), and out-of-pocket payments (Masaba, Moturi, Taiswa, & Mmusi-Phetoe, 2020). In 2013, the country decentralized or devolved the system of governance to allow county governments to have greater control and discretion of health spending decisions (Dutta, Maina, Ginivan, & Koseki, 2018). The national government plays a pivotal role in overseeing the efficient and equitable allocation of healthcare funds. A schematic summary of the flow of health funds at the county level in Kenya is provided as supplementary file (see Figure S3). A solid green line indicates a monetary transfer, whereas a solid red line indicates in-kind transfers to healthcare facilities. Control over budget allocation decisions is shown by a dotted green line. The national treasury distributes the equitable share and conditional grants financed by general taxation to the county revenue fund, which also receives funding from local taxes and revenue earned by public facilities from user fees and claims reimbursements (unless the county has facilities authorized to retain fees charged). Conditional grants paid by donors are usually directed to a special purpose account at the county level. Also, county governments pay for a variety of facility costs directly, such as staff salaries and pharmaceuticals, and so on, in all counties, and are responsible for releasing funds from conditional grants to level 2 and level 3 facilities.

   In 2018, Kenya's current health expenditure per capita (US$) was estimated to be US$88.4 (Njuguna & Pepela, 2019), current health expenditure as a percentage of Gross Domestic Product (GDP) was 5.17% (World Bank, 2021). While the country has made headway in lowering out-of-pocket (OOP) health care expenditures, more work is needed to guarantee that households are financially protected against the costs of accessing health care. Out-of-pocket spending accounts for 27.7% of overall health spending (Ministry of Health, 2019). This type of spending creates a substantial financial strain on the poor and vulnerable households, exacerbating the likelihood of catastrophic health costs, which annually forces over half a million Kenyans into poverty (Dutta et al., 2018). The country's private health industry, particularly the private providers and pharmaceutical manufacturing sectors, is expanding in tandem with the population's demand for health care. The number of providers is growing,

and the services offered are becoming more robust and competitive with those offered by the government. Most Kenyans frequently choose to use private providers because they believe the service is of greater quality, offers more privacy, and is faster or more convenient. However, disparities in access to private providers remain between urban and rural areas with people in urban areas having better access compared to their rural counterparts (Dutta et al., 2018).

Ethiopia

In Ethiopia, government budget (including on-budget donor support), off-budget donor aid, and private out-of-pocket spending are the three main sources of funding for the health sector. A summary of the funding channels used by government and other development partners to funnel resources from the federal level to districts (also called woredas) is also given as a supplementary file (see Figure S4). As is the case in Kenya, the public sector remains a major player and an overseer of health sector funding. A summary of current health expenditures (% of GDP), current health expenditure per capita (US$), and OOP as a percentage of current health expenditures is given as a supplementary file (see Figure S5). In 2018, the current health expenditures per capita in Ethiopia were estimated to be US$24.23—a figure that is about 3.6 times lower than that for Kenya and indicative of a relatively lower spending on health per person in real terms. There is a positive and rising trend in current health expenditures per capita in both countries, with Kenya having a much faster increase (as shown by a much steeper slope) compared to Ethiopia's rather sluggish or steady rise. Current health expenditures, when expressed as a percentage of GDP, represent the total resources devoted to health in relation to the country's income. In 2018, Ethiopia's current health expenditures (% of GDP) stood at stood at 3.3% when compared to Kenya's 5.2%. The trends appear to indicate a significant drop in the share of health spending relative to GDP in Ethiopia since 2010, while Kenya has shown a somewhat steady decline since 2010 until 2017 and appear to be on the upward trajectory again from 2018. Both countries have shown commendable commitment towards reducing OOP—one of the major contributors of poverty among households, especially those living in rural and remote areas (Dutta et al., 2018). Over the years, Kenya appears to experience a more pronounced reduction in the OOP (% of current health expenditures) compared to Ethiopia. In 2000, the OOP (% of GDP) for Kenya was around 47% vs. 36%, while in 2018, the figure stood at 23.6% vs. 35.5% for Kenya and Ethiopia, respectively. Thus, the OOP as a percentage of current health expenditures has declined by an estimated 50% when compared to its 2000 level compared to only 1.4% reduction for Ethiopia. However, it is worth noting that, from the peak of 46.5% in OOP that Ethiopia reached in 2011, there has been a significant reduction in the OOP by an estimated 49.2% in 2018. The reduction in OOP is a welcome development as these are a significant barrier to accessing health services in low-income countries (Borghi, Storeng, & Filippi, 2008; Pearson, Gandhi, Admasu, & Keyes, 2011).

3. Conceptual framework

Pandemics and inequalities

The coronavirus pandemic has challenged several spheres including the longstanding structural drivers of health inequities, such as growing economic disparities, poor working conditions, and poor governance, among others. These crucial determinants of health are intertwined with social class, cultural background, educational attainment, and several other factors during the COVID-19 pandemic to exacerbate the prevailing social vulnerabilities especially for women and their children in low-income countries such as in sub-Saharan Africa (SSA). This research seeks to answer the following research question: "Did the COVID-19 pandemic have a disproportionately greater impact on the livelihood outcomes and inequities in access to necessities for individuals living in female- versus male-headed families in Kenya and Ethiopia?" To answer this important question, we delve into the literature to understand the transmission mechanism of pandemics and how they could potentially exacerbate livelihood outcomes and health inequalities particularly among the vulnerable groups of the population in resource-poor countries. Since the COVID-19 pandemic is occurring against the backdrop of existing social and economic disparities in several outcomes including those linked to food insecurity, general health, and maternal and child health, its impact is perceived to be greater among individuals with already poor outcomes. Recent research has suggested the need for precise and more nuanced approaches to tackling the pandemic since the severity of impact is likely to be exacerbated by the pre-existing disparities, suggesting instead that the COVID-19 is in fact not a pandemic but rather a syndemic (Horton, 2020). The pre-existing unsatisfactory outcomes are themselves collectively patterned and connected with the social determinants of health (Bambra, Riordan, Ford, & Matthews, 2020) including several other barriers to seeking health care. These other barriers are not limited to lack of health insurance coverage, unemployment, food insecurity, and domestic violence among other factors. The notion of the "syndemic" was initially developed in the 1990s by Merrill Singer to simplify the associations between HIV/AIDS, violence and substance abuse in the United States of America (Singer, 2009). Proving that the COVID-19 pandemic is occurring as a syndemic is not a straight-forward undertaking. Given the limitations in our data, we are only able to partially show that the impact of the COVID-19 pandemic on livelihood outcomes and inequality is exacerbated among individuals who are in more vulnerable positions within the household (i.e., those from lower socioeconomic status, with children and from rural communities).

Figure 1: The syndemic of the corona virus (COVID-19), livelihood outcomes, inequities in access to health services and necessities and the social determinants of health
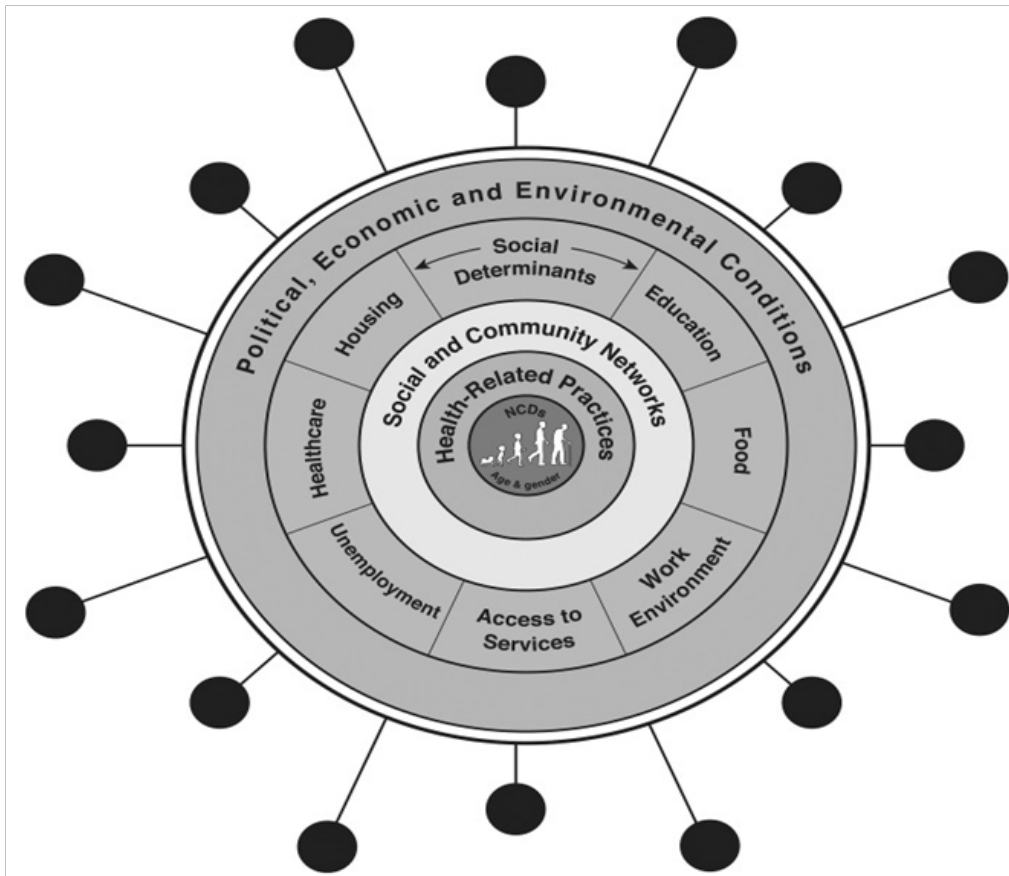
Source: Adapted from Singer (2009) and Dahlgren and Whitehead (1991).

According to the theory of social determinants of health, pandemics such as COVID-19 are more likely to impact the features of the socioeconomic and political context through high prevalence rates and levels of mortality and morbidity (World Health Organization, 2010). Job losses are expected during pandemics such as the COVID-19. The immediate impact of these job losses is to reduce overall household income. A reduction in overall household income puts the household at an increased risk for food insecurity (Bordi, Knowles, Sitko, & Viberti, 2021). The COVID-19 pandemic in SSA can be seen in this light, with its associated effect on nearly all aspects of the economies as countries respond through several containment measures including mandated lockdowns, curfews, and social distancing, among others. The magnitude of the impact of the pandemic will depend on the historical, political and social contexts in which they occur, including the demographic mix of the country (World Health Organization, 2010). In the context of low-income countries, these effects might include burgeoning external debts as countries will attempt to borrow capital to ease

the stresses causes by the pandemic on the health system (Paremoer, Nandi, Serag, & Baum, 2021). The International Monetary Fund (IMF) has recently echoed calls for governments to implement austerity measures given the challenges associated with meeting the extraordinary financing needs following a global pandemic (Fund, 2021). These austerity measures have a potential effect of entrenching the commercialization of health care, as well as inhibit the implementation of policy strategies targeted at reducing health inequalities between and within countries.

COVID-19 pandemic, inequalities and gender

The COVID-19 pandemic is more likely to exert social, psychological, health, and economic repercussions on communities, making some people more vulnerable to its negative effects on their livelihoods and wellbeing outcomes more than others. Insecure housing, restricted access to health care, poverty, gender disparities, racial segregation, food insecurity, changed patterns of consumption, and loss of income and employment are among the factors influencing susceptibility to the COVID-19 pandemic and the impact of health and wellbeing outcomes (Braveman & Gottlieb, 2014; Maness et al., 2021; World Health Organization, 2008). The social determinants of health are a concept that encompasses all these aspects. The social determinants of health are defined by the WHO as the "conditions in which people are born, grow, live, work and age" and "the fundamental drivers of these conditions". These life circumstances are in turn influenced by the distribution of income, power, and resources at both the local, national, and global levels. Premature death and disease are greatly influenced by social determinants of health, particularly among vulnerable groups such as women, children, the elderly, and minorities. Moreover, the impact of COVID-19 is less likely to be uniform across countries and even within the same country. Women, children, and the elderly are amongst the most vulnerable groups of the population.

Global and national crises, including pandemics like COVID-19, can highlight socioeconomic and health inequalities, especially those that were previously unknown or hidden (Clouston, Natale, & Link, 2021). Recent experiences from pandemics seem to suggest that inequalities are indeed exacerbated by infectious disease epidemics depending on several factors including where people live, their socioeconomic status, and gender among other factors (Furceri, Loungani, Ostry, & Pizzuto, 2021). We know from previous evidence that women living in rural areas or the urban poor (Magadi, 2004), ethnic groups, those in poverty, lowly educated, and the less wealthy are at a greater risk of experiencing unsatisfactory health outcomes (Makate & Makate, 2017). Women living in rural areas are more likely to struggle with access to health services given the well-known shortage of health facilities and health care workers in these areas (Miseda, Were, Murianki, Mutuku, & Mutwiwa, 2017). Moreover, women living in these areas are also exposed to the social determinants of health such as poor sanitation, unclean water, and poor housing, which all work together to exacerbate inequalities in health (Bambra et al., 2020). For example, women from low

socioeconomic groups are at an elevated risk of having poor quality housing such as living in slums, which can increase the likelihood of exposure to numerous diseases like cholera. The overcrowding in these places also exerts pressure on sanitation facilities which in turn increases the burden of disease and consequently exacerbates inequalities. Recent evidence has also shown that women living in female-headed families are at an elevated risk of experiencing poor food security and wellbeing outcomes (Bau et al., 2022). Using data from India, Bau et al. (2022) show that women from vulnerable positions within the household, including those with children, are more likely to experience poor food security and mental wellbeing outcomes.

One of the global measures recommended to minimize the spread of the COVID-19 virus was the implementation of lockdowns. Research has emerged showing that such measures have disproportionately impacted women and girls in several aspects (Hamadani et al., 2020). Women, particularly those living in low-income countries, are more likely to be impacted economically since a larger fraction are in precarious or unstable employment, which include the informal sector, entertainment industry, arts sector, and domestic services, among others (Azcona et al., 2020). A great number of other women is employed in poorly paid front-line positions, for example, community health workers who continue to tackle risky tasks such as COVID-19 surveillance, contact tracing, vaccinations and monitoring quarantine and isolation centres, and yet these important workers are often lowly or irregularly paid with inadequate protective equipment (Bhanupriya & Saumya Tewari, 2020; Lotta et al., 2020; Nepomnyashchiy et al., 2020). People in precarious work are less likely to afford health insurance, have limited access to health care services, and are susceptible to inferior quality water, housing and food, all essential ingredients to health and wellbeing. Other research has shown that the pandemic has exacerbated the risk of intimate partner violence against women (Hamadani et al., 2020), and impacted access to sexual and reproductive health by women and girls (Cousins, 2020).

In this study, we examine the impact of the pandemic on livelihood outcomes and inequities in access to health services and necessities during COVID-19 in Kenya and Ethiopia. We probe whether the pandemic impacted individuals from female versus male-headed families differently in these two countries. In essence, the inequities we measure reflect unmet needs for health care access to necessities during the pandemic. Individuals with unmet needs in health care are those who had reported having an illness, needed to go for routine medical check-ups, or needed medicine in the four weeks preceding the high frequency phone surveys but did not have these needs fulfilled due to the disruptions caused by COVID-19 (Dutta et al., 2018). Individuals with unmet needs for necessities are those who indicated that they were unable to secure enough essential food items such as staple foods among others because of the disruptions caused by the pandemic. Unmet needs for health are a common indicator of health care access and widely adopted in several developed countries (OECD, 2019). It is also considered a practical technique for identifying the barriers to health care needs through asking people directly whether their health care needs have been met, including the reasons why these have not been met. In several

African countries, including Kenya, documenting and addressing unmet health care needs is an important consideration for health policy planners (see, for example, (Dutta et al., 2018)). In a recent report for Kenya, Dutta et al. (2018) suggested that unmet health care needs have increased and have now exceeded their 2007 level. The prevalence of unmet health needs declined from 22.8% in 2007 to 12.7% in 2013 but increased further to 28% in 2018. In a recent report for Ethiopia, the COVID-19 pandemic is thought to have resulted in a 20,738 increase in adolescents with unmet needs for contraceptive care. This translated to an estimated 8,884 unintended pregnancies among adolescents and costing the Ethiopian health system more than US$250,000 in a single year (Seme et al., 2021)—funds that could otherwise be channelled to health system improvement. Thus, focusing on inequities in unmet needs is of importance and addressing unmet health care needs and unmet needs in other necessities can help enhance health system efficiency and effectiveness of social protection measures.

4. Data and methods

Data sources

This study uses longitudinal data from high frequency phone surveys conducted in Kenya and Ethiopia by the World Bank in partnership with the local governments. In Kenya, the survey is called the "rapid response telephone survey". These surveys commenced in May of 2020 and continued every month thereafter. The purpose of these telephone surveys is to interview a nationally representative sample of households to gauge the socioeconomic impact of the COVID-19 pandemic on livelihoods and thereby inform a targeted response. The same households had previously been interviewed via face-to-face and before COVID-19 pandemic. All surveys (pre and post COVID-19 pandemic) have been supported through the World Bank's Living Standards Measurement Study (LSMS) – Integrated Household Surveys (IHS). The surveys were designed such that they are representative of the population using cell phones at the national, regional/provincial, and urban/rural levels. In Kenya, the sample is randomly drawn from all households that were interviewed as part of the 2015/16 Kenya Integrated Household Budget Survey (KIHBS). The 2015/16 KIBS forms the pre COVID-19 data set for Kenya. This data set was requested, with permission granted to use the data by the Kenya National Bureau of Statistics (KNBS). In Ethiopia, The Socioeconomic Survey 2018–2019 forms the pre COVID-19 data set.

The high frequency phone surveys collect an array of information including household background, service access, employment, food security, income loss, transfers, health, and COVID-19-related knowledge. For Kenya, we use all the available six waves of the data collected between 14 May 2020 and 7 July 2020 (wave 1) and between 14 July 2021 and 3 November 2021 (wave 6). In Ethiopia, we use all the available 12 waves of the data collected between 22 April 2020 and 13 May 2020 (wave 1), and between 1 June 2021 and 20 June 2021 (wave 12). All surveys used were conducted using computer-assisted telephone interview (CATI) techniques.

We complement the high frequency phone surveys data with other nationally representative data collected as part of the LSMS initiative by the World Bank. For Kenya, we use data from the 2015/16 Kenya Integrated Household Budget Surveys, while for Ethiopia we rely on data from the Socioeconomic Surveys collected in 2018/2019, also collected as part of the LSMS initiative by the World Bank. These two data sets form the baseline data (pre COVID-19 data sets). The HFPS build on the

national longitudinal data sets for the respective countries, and all draw a sub-sample that was representative of households with access to a working phone. These data allow us to assess the level of health inequities prior to the COVID-19 pandemic.

Measuring access to health services during the COVID-19 pandemic

Questions pertaining to access to health care services are included in the high frequency surveys. Specifically, we restrict the analysis to only individuals with current need for services. To do this, we exclude those individuals who answered "No" when asked "In the past 30 days (four weeks), have you or any member of your household needed medical treatment or needed to make routine visits to a health facility? Including check-ups, chronic illnesses, emergency visits? We also extend the definition to include individuals who had stopped their usual activities because of illness in the four weeks preceding the survey. The concept of horizontal equity in this study is based on finding evidence of a wealth gradient in whether those having a need for the health services received those services during the period under study. We create a series of binary indicators or dummy variables to capture use of health care services for those in need of such services in the 30 days of each of the respective months when the survey rounds were conducted. We considered several outcomes including prenatal check-ups; birth/delivery; routine health check-ups; check-ups for chronic conditions, e.g., cancer, heart disease or lung disease, among others; HIV/AIDS related; check-ups for children; COVID-19 tests; malaria; and others.

Food insecurity outcomes during the COVID-19 pandemic

The high frequency phone surveys asked several questions concerning the food security situation of individual households during the pandemic. The reference period for these questions was 30 days. However, questions were also asked on the number of adults and children that had either gone to bed hungry, skipped meals or gone for entire days without food in the household and over the past seven days. Specifically, the questions asked were of the following form: *"In the past seven days, how many days have adults in your household…. (1) gone to bed hungry? (2) skipped meals or cut the amount of meals? (3) gone entire days without food?"* We focus on the questions that aimed to know whether the individual respondent or any other adult member from their household: (i) worried about the possibility that the household would not have enough food to eat because of a lack of money or other resources, (ii) had to go to bed hungry because of lack of money or other resources, (iii) had to skip a meal or reduce the amount of meals due to lack of money or other resources, and (iv) had ran out of food because of lack of money or other resources. In Kenya, the surveys also asked whether any children in the household had skipped a meal

or reduced the amount of meals due to lack of money or other resources. We use the responses to these questions to create individual dummy variables that equals one if a respondent had answered yes to a question (or had indicated having one or more days they had gone hungry, skipped a meal or entire days with no food) and zero otherwise, and thereby creating outcomes reflecting hunger, food running out, skipping meals by adults, skipping meals by children, and worrying over the prospect of inadequate food in the household. These indicators are also consistent with those commonly used in prior literature (Dasgupta & Robinson, 2022).

Measuring access to necessities during the COVID-19 pandemic

The measures for what we call necessities in this paper were not consistently captured in the two countries. For Kenya, we used the responses to questions that aimed to capture whether the individual respondent or any member from their household needed medical treatment or needed to make routine visits to a health facility (this included check-ups, chronic illnesses, emergency visits, among others), able to access the medical treatment they needed, able to buy medicine, able to access staple food like maize or beans, and were able to pay for rental accommodation. We use responses to these questions to create several dummy variables that equals one if an individual had experienced any difficulty with access to either of these or zero if they had not experienced any difficulty with access to such life essentials during the pandemic. The reference period for which these questions were asked among Kenyan respondents varied from within one week to within the last 30 days.

In Ethiopia, we focused on a set of questions that aimed to capture difficulty with access to several life necessities within the last seven days preceding the phone survey. Specifically, each respondent was asked the following question: "In the last week, has your household been able to buy enough of (i) medicine, (ii) Teff/injera, (iii) wheat in any form (flour, grain, or bread), (iv) maize, and (v) edible oil?" Also, respondents were asked whether they were able to access medical treatment (for those who needed it). We use responses to this question to create six dummy indicators to reflect access to health services, difficulty in access to enough medicines, enough teff/injera, enough wheat, enough maize, and enough edible oil.

Furthermore, for the questions regarding access to health services or necessities, respondents were asked a follow-up question to elicit the specific reasons why they were unable to access the service, medical treatment or necessity. We use responses to these questions as explanations to further identify the impact of the pandemic on livelihood outcomes and inequities in access to health services and necessities. For example, sample responses why respondents were unable to go for health consultations included the following: fear of getting infected due to coronavirus, long waiting times, consulting doctor not available or bust due to high demand, access to hospital denied, and for other reasons. The reasons why individuals were unable to

access medical treatment included a lack of money, no medical personnel available, health facilities not having enough supplies, and turned away because facility was full. Also, the reasons why respondents were unable to access basic necessities during the pandemic included that price had gone up, income had decreased, supply had decreased, and that markets had closed among others.

Measuring income losses and/consumption during the COVID-19 pandemic

The high frequency phone surveys include a separate section on income loss. In Kenya, each respondent was asked whether during the past 14 days, his/her household had to sell livestock or other households' assets to generate income (such as vehicles, furniture, kitchen or electronic equipment, and tools), took a loan for use on household consumption, the kind of loan they had taken (i.e., whether from a friend/relative, commercial bank, among others), whether they had their business closed, had to rely on credit purchases, or reduced food consumption in a bid to cope with the effects of the pandemic. These questions indicate an immediate response to the impact of the COVID-19 pandemic in Kenya. In Ethiopia, the questions in round one asked respondents whether income from several sources including overall household income, business, farm, other sources, and remittances had increased, stayed the same, reduced, or was completely lost 100% following the COVID-19 outbreak. Questions in subsequent surveys (round 2 onwards), ask respondents whether since the last phone call, income from the same sources noted earlier had increased, stayed the same, reduced or completely lost 100%. These questions capture the aggregate impact of the COVID-19 pandemic on income losses in Ethiopia. We use responses to these questions to create several dummy variables reflecting income losses or consumption losses.

Empirical strategy

The study evaluates the gendered impact of the COVID-19 pandemic on livelihoods (income, consumption, and food insecurity) and inequity in access to health services and necessities in Kenya and Ethiopia. In this study, we use the gender of the head of household as an indicator for gender. We test whether individuals living in female-headed families fare worse when compared to those living in male-headed families. To fulfil the aims of the study, the empirical analysis proceeds in two steps. First, we explore the relationship between household headship and livelihood outcomes accounting for variables that reflect potential vulnerability within households in Kenya and Ethiopia. On this end, we assess whether women from female-headed households experience worse outcomes during the pandemic compared to their counterparts in male-headed families. In this instance, vulnerability relates to those individuals from families with children, low levels of education, lower pre COVID-19 socioeconomic

status level, and who live in rural communities. We use a linear probability model that uses pooled survey data from the high frequency phone surveys conducted in Kenya and Ethiopia. The model we estimate takes the following form:

$$Y_{iarct} = \beta_1 children_i + \beta_2 female\_head_i + a_a + \delta_r + w_t + \Gamma X_i + \varepsilon_{iarct} \qquad (1)$$

Where: ^{i} represents the individual respondent, a represents her age, r represents her region of residence, c is her county of residence, Y_{iarct} measures the outcome variable (income losses, lost consumption, and food insecurity outcomes), $children_i$ is a categorical variable with four categories and representing the number of children in the household (1= no children, 2=1-2 children, 3=3-4 children, and 4=5 or more children), $female\_head_i$ denotes whether the respondent resides in a family or household where the head is female. Previous research suggests that households with children are more likely to experience food insecurity (Coleman-Jensen, McFall, & Nord, 2013; Magaña-Lemus, Ishdorj, Rosson, & Lara-Álvarez, 2016). In all the estimated specifications, we include age fixed effects a_a, region fixed effects δ_r, and survey fixed effects w_t. The vector of additional control variables X_i incorporates the respondent's level of education (no education, primary education, and secondary or higher education) since a higher level of schooling is associated with a lower prospect of food insecurity (Mutisya, Ngware, Kabiru, & Kandala, 2016). We also include controls for whether the respondent had lost a job during COVID-19, and lives in a rural or urban area. To minimize omitted variable bias, we include pre-pandemic socioeconomic status represented by an asset index with five quintiles (poorest (quintile 1), poorer, average, richer, and richest (quintile 5)). We follow Filmer and Pritchett (2001) in generating a household asset index using principal components analysis (PCA). Survey respondents were asked questions regarding ownership of several assets prior to the pandemic, including radio, mattress, charcoal jiko, refrigerator, television, landline, or computer/laptop before March 2020. In further analysis, we use this pre-pandemic household wealth measure to assess whether the pandemic had a greater impact on households who were already in poor or more vulnerable positions. The standard errors, ε_{iarct}, are clustered at the county or enumeration area level.

Second, we estimate socioeconomic status-related inequity in access to health services, buying enough medicines, medical treatment, and ability to buy enough stock of other life essentials, such as maize, wheat, edible oil, and teff/injera) during the pandemic. In the high frequency phone surveys data, respondents were asked questions regarding whether they or any member from their household had needed medical treatment or needed to make routine visits to a health facility including for check-ups, chronic illnesses, and emergency department visits, among others. There were also questions on the specific reasons why they needed treatment, including why they could not receive treatment. We use concentration indices (CI) to measure horizontal inequity in access to health services and other essentials during the pandemic across the distribution of household wealth. The concentration index is defined in reference to the concentration curve and is defined as twice the area

between the concentration curve and the reference line or line of equality. Formally, the CI is defined as follows:

$$CI = \frac{2 \times cov(h_i, r_i)}{\mu} \qquad (2)$$

Where: h_i represents the outcome variable of interest for each individual, μ represents its mean, $r_i = \dfrac{i}{N}$ is the fractional rank of individual i in the household wealth distribution, with i=1 representing the poorest individual household and $i = N$ for the richest, and $cov(.)$ is the covariance function. The calculation of the CI is done using a convenient formula where the index is defined in terms of the covariance between the outcome variable and the fractional rank of the individual in the household wealth distribution (Kakwani, Wagstaff, & Van Doorslaer, 1997). The CI is bounded between -1 and +1 The recent developments in the health economics literature has noted several limitations of the standard CI (Erreygers & Van Ourti, 2011). Most notably, Erreygers and Van Ourti (2011) point out that the measurement scale and boundedness properties of the outcomes of interest are violated under the CI approach. Two alternatives have been suggested that correct for the inconsistencies noted in the standard CI. For bounded variables, Wagstaff (2005) and Erreygers (2009) suggested two alternative normalizations of the standard CI. In this study, given that all our outcome variables are binary, we concentrate on the Erreygers (2009) normalization, which is the corrected concentration index (CCI). The CCI is proportional to the absolute concentration index and is defined as follows:

$$CCI = 4 \times \mu \times CI \qquad (3)$$

The concentration index is interpreted as follows: positive values of the CCI indicate that the outcome variable is concentrated among the relatively rich or wealthy (pro-rich inequality), while negative values of the index suggest that the outcome is highly concentrated among the relatively poor individuals.

Identifying the impact of the COVID-19 pandemic

The study evaluates the impact of the COVID-19 pandemic on livelihood outcomes and inequity in access to health services and necessities in Kenya and Ethiopia. We specifically test whether the pandemic had a disproportionately larger impact among female-headed families when compared to male-headed families. To identify the impact of the COVID-19 pandemic, we rely on the nature of the questions asked in the high frequency phone surveys that allow us to measure the aggregate impact of the pandemic as these relate to the changed circumstances following the onset of the pandemic. For Kenya, since we were unable to identify or match the pre COVID-19

data to the COVID-19 high frequency phone survey data, identifying the impact of the pandemic is somewhat complicated for some of our outcomes particularly those relating to food insecurity. The questions asked in the surveys refer to the prevailing situation or changed circumstances of the household in the past one week or two weeks within the last 30 days. This is a much shorter reference window and suggestive of the changed circumstances of the household following the emergence of the pandemic. We interpret these findings on the impact of the pandemic on food insecurity bearing in mind that what we document are mere associations indicating the prospect of experiencing poor outcomes among individuals from female-headed families during the COVID-19 pandemic. However, in some of the food insecurity outcomes, the survey question allows us to clearly identify the aggregate impact of the pandemic. For example, respondents were asked the following question: "*Compared to before March 2020, before the lockdown/pandemic, are you more/less/ equally worried about your household not having enough food?*"

For outcomes linked to income losses and difficulty with access to necessities, we are able to clearly identify the aggregate impact of the pandemic. In Kenya, the survey questions asked respondents on the specific coping strategies that the household adopted in response to the income losses prompted by the COVID-19 pandemic (as described earlier). The coping strategies such as the selling of personal assets, borrowing from friends or relatives, taking loans from financial institutions, delaying payment obligations, credited purchases, business closures, and reducing food consumptions, all clearly reflect the aggregate income losses following the onset of the pandemic. In Ethiopia, the questions on income losses clearly capture the aggregate impact of the pandemic as these reflect the changes in income from the onset of the pandemic and measured at a specific point in time.

Identifying the impact of the pandemic on access to health services and necessities was straight forward. Questions on access to these necessities refer to difficulties with access in the seven days prior to each survey with specific reasons also given. The specific reasons given for the difficulty in access to services can all be traced back to the impact of the COVID-19-related measures that were implemented in Kenya and Ethiopia.

5. Results

Summary statistics

Table 1 reports the weighted summary statistics for selected variables and using only the first wave of each country. Using the data for the first wave of the high frequency surveys for either county, we observed that the proportion of female-headed families was 24.38% and 30.09% in Ethiopia and Kenya, respectively. The average age of respondents was higher in Ethiopia 39.01 vs. 35.30 in Kenya. The proportion of households with no children was 22% in Ethiopia compared to 31.55% in Kenya. The majority of the households in both countries had at least 1-2 children, 45% in Ethiopia compared to 41% in Kenya. We observed a smaller fraction of households reporting to have five or more children, 8% in Ethiopia compared to 5% in Kenya. In terms of socioeconomic status of households prior to the COVID-19 pandemic, 16.69% compared to 26.88% of the households were classified as poorest (asset quintile 1) in Ethiopia and Kenya, respectively. In Kenya, only 6.47% of the households were classified as richest (asset quintile 5) compared to 22.96% in Ethiopia. The fraction of households living in rural area was comparable at 66% in either country.

Table 1: Weighted summary statistics for selected variables (using wave 1 data for Kenya and Ethiopia)

Variables	Ethiopia		Kenya	
	N	**Mean (%)**	**N**	**Mean (%)**
Age (years)	3249	39.01	10374	35.30
Female-headed family	995	24.38	2733	30.09
Able to read and write	2440	58.18		n/a
Never married	536	13.62		n/a
Married	2120	71.98		n/a
Divorced/widowed	547	14.40		n/a
Number of children in the household				
None	1107	22.24	3014	31.55
1-2 children	1459	45.33	4346	41.33
3-4 children	533	24.36	2305	21.89
5 or more children	150	8.07	709	5.22

Table 1 Continued

Variables	Ethiopia		Kenya	
	N	Mean (%)	N	Mean (%)
pre COVID-19 household wealth				
asset quintile 1 (poorest)	220	16.69	2912	26.88
asset quintile 2	217	18.60	1746	14.54
asset quintile 3	373	19.30	5082	52.10
asset quintile 4	649	22.45		0.00
asset quintile 5	1751	22.96	634	6.47
Rural resident	966	66.89	34759	66.52
Observations	3249		10374	

Note: Data comes from the first wave of the high frequency phone surveys for Kenya and Ethiopia.

Pre COVID-19 situation in Kenya and Ethiopia

To better understand the situation before the pandemic in both countries, we use data from the ESS, KIHBS, and DHS for both countries to explore whether female-headed households fare worse or otherwise compared to their counterparts. For brevity, we have provided the results in a supplementary file (Figure S1). The results we report in Figure S1 are generated from estimating Equation 1 using the pre-COVID data. We show that when a respondent lives in a female-headed family in the period before the pandemic, the odds that she or an adult in the household would go hungry was 1.27 times higher but not statistically significant in Ethiopia, while in Kenya it was 1.42 times higher and statistically significant. When the respondent lives in a female-headed household, she or an adult in her household is 1.41 and 1.63 times more likely to skip a meal in Kenya and Ethiopia, respectively, compared to her counterparts in male-headed families. In both countries, the odds of having to worry about the prospect of not having enough food are much greater among female-headed families compared to their male-headed counterparts (1.38 and 1.57 in Kenya and Ethiopia, respectively) and all statistically significant. The odds of severe food insecurity are 1.46 times higher among female-headed families. Considering data from the DHS, we compare maternal-related outcomes from female-headed families to those from women in male-led families. These results are also generated from a model of the form-specified in Equation 1.

We also used DHS data to explore the pre COVID-19 situation in both countries. We plot the point estimates from regression models estimated using Equation 1. For brevity, these results are provided as supplementary material (see Figure S6). The results using data for Kenya suggests that when the respondent woman lives in a female-headed family, they are more likely to have health insurance, report that distance to the nearest health facility is still problematic when seeking health care, and no education. They are also more likely to have a say on matters pertaining to their health, and less likely to be unemployed. In Ethiopia, we observed that when the

respondent is from a female-headed family, they are less likely to have no education, less likely to indicate whether distance to the nearest health facility is a problem to them, and less likely to be unemployed. Overall, the results seem to show that female-headed families do not seem to fare poorly in the pre pandemic period when we use DHS data for females in Kenya and Ethiopia.

COVID-19 pandemic and the vulnerability of women within the household

The results in Table 2 and Table 3, estimated using Equation 1, speak to the vulnerability of women during the COVID-19 pandemic in Kenya. In this instance, we explore the relationship between family structure and food security outcomes including outcomes linked to income and consumption losses during the pandemic in Kenya. We show that women who are in more vulnerable positions within the household were more likely to fare worse compared to their counterparts from male-led families during the pandemic. When the head of household is female, the probability of going hungry during the pandemic increases by 3.96 percentage points (pp) and is statistically significant at the 1% level. Given that the mean of the outcome variable in our analysis sample was 39.4%, the 3.96 pp effect represents an approximate 10% $\left(\frac{0.0396}{0.394}\right) \times 100$ i increase in the probability that the respondent or an adult from a female-headed family would go to bed hungry in the past seven days and during the pandemic in Kenya. The results indicate that having children within the households who are younger than 12 years of age is associated with a substantial and statistically significant increase in the probability that the respondent or any other adult from the household went hungry in the last seven days since there was inadequate money or other resources for food. Households with five or more children are 14.3 pp more likely to have any adult go hungry when compared to households with no children and statistically significant at the 1% level. There is a clear positive gradient suggesting that the prospect of hunger increases with the number of children in the household. This result captures the aspect of competition for resources within the household with more children indicating increased competition for food. The probability of an adult going hungry is exacerbated if an adult member from the household had been laid off or lost their job involuntarily since January of 2020. Having lost a job due to COVID-19 was associated with a 10.9 pp increase in the probability of going hungry during the pandemic period. Also, the pre COVID-19 socioeconomic status of the household, as measured by the household wealth index, is an important determinant of the probability of going hungry. We observed that, compared to families that were classified as richest (asset quintile 5), families in the bottom poorest quintiles are more likely to experience hunger during the pandemic. Being in the poorest asset wealth (quintile 1) before the pandemic was associated with a 16.3 pp increase in the probability of going hungry during the pandemic. The effects on hunger are also compounded when family resides in a rural area as compared to an urban locality (4.2 pp).

Table 2: Relationship between household structure and food insecurity outcomes during the pandemic in Kenya

Specification	Went hungry		Adult skipped meals		Child skipped meals		Worry over inadequate food	
	β	Std. error	β	Std. error	β	Std. error	β	Std. error
Female-headed family	0.0396***	0.0048	0.0342***	0.0047	0.0333***	0.0037	0.0341***	0.0104
Number of children								
1-2 children	0.0648***	0.0053	0.0719***	0.0052	0.1517***	0.0037	0.0637***	0.0114
3-4 children	0.1126***	0.0064	0.1218***	0.0063	0.2140***	0.0050	0.1009***	0.0132
5 or more children	0.1433***	0.0105	0.1443***	0.0104	0.2559***	0.0095	0.0818***	0.0209
Lost a job during COVID-19	0.1092***	0.0134	0.1459***	0.0133	0.0991***	0.0122	0.0708***	0.0188
pre COVID-19 household wealth								
asset quintile 1 (poorest)	0.1633***	0.0098	0.1575***	0.0094	0.1016***	0.0070	0.2450***	0.0206
asset quintile 2	0.1863***	0.0101	0.1434***	0.0097	0.1007***	0.0072	0.1762***	0.0216
asset quintile 3	0.0994***	0.0098	0.0951***	0.0095	0.0516***	0.0073	0.1661***	0.0196
asset quintile 4	0.1325***	0.0102	0.1114***	0.0098	0.0626***	0.0068	0.0000	.
Rural resident	0.0418***	0.0046	0.0130**	0.0045	0.0189***	0.0036	-0.0218*	0.0094
Age fixed effects	Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes	
Survey fixed effects	Yes		Yes		Yes		Yes	
Mean of the dependent variable	0.394		0.346		0.194		0.535	
Number of observations	46129		46134		46134		11292	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level.

Table 2 also indicates that when the respondent lives in a female-headed family, she or another adult from the same household is 3.42 pp more likely to skip a meal or cut the number of meals eaten in the past seven days prior to the survey and during the pandemic. The 3.42 pp effect represents an imprecise 9.88% increase in the probability that an adult from a female-headed family skips a meal. The effects on the prospect of skipping meals or cutting the number of meals eaten are also exacerbated when the family has children compared to when there are no children, when a household member had lost a job during the pandemic, family lives in a rural area, and when the family is of relatively low wealth compared to other families classified as rich prior to the pandemic. When the respondent lives in a female-led family, a child is 3.3 pp more likely to skip a meal. Given that the average probability that a child skipped a meal in our Kenyan sample was 19.4%, the 3.33 pp represents an approximate 17.16% increase in the probability that a child had skipped a meal in the seven days prior to the phone survey and during the pandemic. The probability that a child skips a meal is further exacerbated when the family has children in the household, someone in the family had lost a job, lives in a rural area and if the family was relatively poor prior to the pandemic. The results also show that, when the respondent lives in a female-headed family, she is 3.41 pp more likely to worry about not having enough food compared to the period before March 2020 and before the lockdown or pandemic. Since 53.5% of the respondents in the analysis sample indicated that they were increasingly more worried that their household would not have enough food, the 3.41 pp effect represents an imprecise 6.37% increase in anxiety over the prospect of the family not having enough food compared to the pre COVID-19 period.

Table 3 reports the results from estimating Equation 1 using the analysis sample for Kenya. Here, we are interested in examining whether families headed by a female respondent fare poorly in terms of income losses during the pandemic in Kenya. We include the same set of controls as in Table 2. The results show that, when the respondent lives in a female-headed family, there is a 2.4 pp decline in the probability that the household would have sold livestock to cope with the effects of the pandemic. It is possible that this result is reflecting the discrepancy in asset holdings (livestock) between male vs. female-led families or it could just be an indication of the reluctance among female-headed households to sell their livestock to mitigate the effects of the pandemic. This observation could be linked to the fact that as demand for such assets during the pandemic could be low, the market price could also be low hence the reluctance to sell their livestock during the pandemic.

Table 3: Relationship between household structure and livelihoods (lost incomes or consumption) in Kenya

Specification	Sold livestock		Took a loan		Borrowed from friends		Sold other assets		Business closed		Credited purchases		Reduced food consumption	
	β	Std. error	β	Std. error	β	Std. error	β	Std. error	β	Std. error	β	Std. error	β	Std. error
Female-headed family	-0.0240***	0.0025	0.0120**	0.0044	0.0249***	0.0042	-0.0046**	0.0016	0.0651*	0.0298	0.0388***	0.0064	0.0303***	0.0077
Age fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Survey fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Mean of the dependent variable	0.075		0.083		0.071		0.028		0.262		0.210		0.456	
Observations	46134		21596		21596		46134		1097		21596		21596	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. All regressions include indicators for the number of children in the household, having lost a job during the pandemic, pre pandemic household wealth level, and living in a rural area.

The point estimates in Table 3 also indicate that being from a female-led household is associated with a 1.2 pp increase in the probability of taking a loan for use on household consumption in the past 14 days prior to the phone survey. Given that the mean of the dependent variable was 8.3% in our sample, the 1.2 pp effect represents an imprecise 14.46% increase in the probability of taking a loan for use on household consumption. When the respondent lives in female-led family, the prospect of borrowing from friends increases by 2.49 pp and is statistically significant at the 1% level. Female-headed families were 0.46 pp less likely to sell other assets during the pandemic in Kenya. The point estimates also show that female-led families were 6.51 pp more likely to report having closed a business due to effects of lockdowns or curfews and 3.88 pp more likely to rely on credit purchases to cope with the effects of the pandemic. A female-led family was 3.03 pp more likely to report reducing food consumption during the pandemic and is statistically significant at the 1% level. Given that the mean of the dependent variable was 45.6% in our sample, the 3.03 pp effect represents an approximate 6.64% reduction in food consumption among female-headed families in Kenya during the pandemic.

Table 4 reports the point estimates from estimating Equation 1 using the data for Ethiopia. Living in a female-headed family is associated with a 2.07 pp increase in the probability that the respondent or an adult from their household went hungry and did not eat because there was not enough money or other resources for food in the past 30 days prior to the survey. Given that the mean of the dependent variable in our sample was 8.5%, the 2.07 pp effect represents an imprecise 24.35% increase in the prospect of going hungry during the pandemic in Ethiopia. The effects of the likelihood of hunger are also exacerbated when there are children in the household, respondent or other household member had lost a job due to the pandemic and were from a relatively poor family prior to the pandemic. These effects are statistically significant. Being able to read and write, reside in rural area, and being single appear to be negatively associated with the prospect of going hungry. The next column reports the point estimates exploring the likelihood that an adult would skip a meal during the pandemic. When the respondent lives in a female-headed family, she or another adult from their household is 4.42 pp more likely to have skipped a meal in the past 30 days prior to the telephone survey and during the pandemic in Ethiopia. This 4.42 pp effect represents an imprecise 18.89% increase in the probability of skipping a meal during the pandemic. The prospect of worrying that the household would not have enough food to eat because of lack of money was 7.2 pp higher among female-headed families compared to their counterparts. This 7.2 pp effect represents an imprecise 17.85% increase in the probability of anxiety over not having enough money or other food resources in the household in Ethiopia and during the pandemic. When the respondent comes from a female-headed household, the probability that the household had ran out of food because of lack of money in the 30 days prior to the survey was 5.36 pp higher when compared to male-headed families. This effect represents an approximate 26.67% increase in the probability that the household would run out of food due to lack of money in the 30 days prior to the phone survey.

Table 4: Relationship between household structure and livelihood outcomes linked to food insecurity in Ethiopia

Specification	Went hungry		Adult skipped meals		Worry inadequate food		Food ran out		Did not eat for a day	
	β	Std. error	β	Std. error	β	Std. error	β	Std. error	β	Std. error
Female-headed family	0.0207***	0.0062	0.0442***	0.0092	0.0721***	0.0106	0.0536***	0.0083	0.0153**	0.0051
Number of children										
1-2 children	0.0219***	0.0059	0.0419***	0.0085	0.0794***	0.0099	0.0570***	0.0077	0.0130**	0.0049
3-4 children	0.0393***	0.0082	0.0495***	0.0116	0.0705***	0.0132	0.0673***	0.0102	0.0242***	0.0068
5 or more children	0.0784***	0.0155	0.0714***	0.0201	0.1586***	0.0213	0.0969***	0.0174	0.0612***	0.0138
Lost a job during COVID-19	0.0861***	0.0226	0.1071***	0.0288	0.1951***	0.0305	0.1327***	0.0187	0.0686***	0.0127
Able to read and write	-0.0444***	0.0075	-0.1203***	0.0107	-0.1405***	0.0113	-0.0660***	0.0088	-0.0521***	0.0064
pre COVID-19 household wealth										
asset quintile 1 (poorest)	0.0777***	0.0123	0.2054***	0.0187	0.1693***	0.0199	0.0575***	0.0143	0.0600***	0.0109
asset quintile 2	0.1072***	0.0133	0.1788***	0.0187	0.1790***	0.0199	0.1053***	0.0154	0.0718***	0.0114
asset quintile 3	0.1243***	0.0109	0.2084***	0.0144	0.2175***	0.0153	0.1338***	0.0124	0.0835***	0.0090
asset quintile 4	0.0882***	0.0077	0.1561***	0.0105	0.1485***	0.0116	0.1174***	0.0091	0.0670***	0.0063
Marital status										
never married	-0.0336***	0.0079	-0.0585***	0.0113	-0.1017***	0.0133	-0.0678***	0.0100	-0.0154*	0.0063
divorced/separated/widowed	0.0074	0.0085	0.0474***	0.0123	0.0343*	0.0137	0.0164	0.0110	0.0145*	0.0070
Rural resident	-0.0712***	0.0079	-0.0894***	0.0108	-0.0651***	0.0121	-0.0660***	0.0095	-0.0258***	0.0066
Age fixed effects	Yes		Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes		Yes	
Survey fixed effects	Yes		Yes		Yes		Yes		Yes	
Mean of the dependent variable	0.085		0.234		0.404		0.201		0.070	
Observations	14278		14285		14281		17479		17479	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level.

The prospect of not eating for a day was 1.53 pp higher among female-headed households, representing an approximate 21.86% increase in the likelihood of not eating for the entire day. The observed effects were also exacerbated when the respondent came from a household with children, had lost a job due to COVID-19 crisis, and was from a relatively poor family before the pandemic started.

In Table 5, we report the aggregate impact of the pandemic on income in Ethiopia and assess whether female-headed families fare worse compared to their male-headed counterparts. Each respondent in the Ethiopian phone survey was asked the following question *"Since [LAST CALL], has income from [SOURCE] increased, stayed the same, reduced, or total 100 loss?"* We use responses to this question to indicate loss (reduced or 100 % loss) of total household income, business income, farm income, lost income from other sources, and lost remittances. The results show that being from a female-headed family was associated with a 2.73 pp increase in the probability of losing overall or total household income during the pandemic in Ethiopia. Given that the average fraction of households reporting losses in total household income was 38.8 %, the 2.73 pp effect represents an approximate 7.04% decline in total household incomes during the pandemic in Ethiopia. The effect on lost business income is also exacerbated when the head of the family is female when we control for pre pandemic socioeconomic status. When the respondent lives in a female-led household, the probability of reporting reduced business income was 1.29 pp and representing an approximate 53.75% decline in the probability of reporting reduced business incomes among female-headed families in Ethiopia and during the pandemic. Female-headed families also reported having lost remittances, a 1.41 pp increase, and represent an approximate 60.04% decline in the probability of remittance income.

Table 5: The effect of COVID-19 pandemic on lost incomes in Ethiopia

Specification	Lost household income		Lost business income		Lost farm income		Lost income all other sources		Lost remittances	
	b	se	b	se	b	se	b	se	b	se
Female-headed family	0.0273**	0.0095	0.0129***	0.0031	-0.0035	0.0197	0.0036	0.0039	0.0141***	0.0032
Age fixed effects	Yes		Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes		Yes	
Survey fixed effects	Yes		Yes		Yes		Yes		Yes	
Mean of the dependent variable	0.388		0.024		0.353		0.040		0.019	
Observations	17453		17479		4279		17479		17479	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. All the regression models included controls for the level of education, marital status, and place of residence (urban vs rural).

Access to essentials during the pandemic in Kenya and Ethiopia

Ethiopia: Figure 1 presents the results from estimating Equation 1 and representing the association between being a female head of household and several outcomes linked to difficulty in accessing enough medicine, wheat products (flour/grain/bread), edible oil, maize, and enough medical treatment during the COVID-19 pandemic in Ethiopia. The top panel presents the results estimated from a logistic regression model that includes the respondent's age fixed effects, region fixed effects and survey round fixed effects as well as other binary indicator variables for having lost a job during the pandemic and living in a rural area. The results suggest that female headed families generally fared worse in terms of access to enough medicine, wheat, teff/injera, and enough maize. Living in a female-headed family was associated with 1.31 times higher odds of having difficulty in buying injera/teff during the pandemic.

Figure 2: **Female-headed families experience worse livelihood outcomes compared to their male-headed counterparts in Ethiopia**

Note: The figure is a plot of the odds ratios from five multivariable logistic regression models estimated using Equation 1.

In Figure 2, female-headed families were 1.32 times more likely to have difficulty with buying wheat products during the pandemic. The odds of not being able to buy maize were 1.62 times higher among female-headed families compared to their male-headed counterparts. Being from a female-headed family is also statistically significantly associated with difficulty in buying edible oil during the pandemic. While the odds of not being able to buy medicine are 1.14 times higher among female-headed households, these are not statistically significant.

Figure 3: Some of the reasons why respondents were unable to buy essentials during the COVID-19 lockdown in Ethiopia

Figure 3 provides a summary of the reasons why individuals were unable to buy essentials during the COVID-19 pandemic in Ethiopia. The primary reason given was the fact that individuals had experienced a decline in regular income because of the pandemic with some reporting increases in prices of these essentials because of the pandemic-induced demand of such essential commodities. In a separate analysis, we also explore how female-headed families fare in terms of inability to pay for essentials. The results indicate that female-headed families in Ethiopia were 1.78 times more likely to have difficulty paying for having enough medicines during the pandemic and statistically significant at the 10% level (see Figure S2 in the supplementary material file). Also, female-headed families in Ethiopia were 1.28 times more likely to report having difficulty buying edible oil during the pandemic as a result of having experienced a decline in their regular income, and statistically significant at the 10% level.

Kenya: Figure 4 presents a summary of the results estimated via Equation 1 on whether female-headed families in Kenya fared worse in terms of access and the reasons for not being able to access life essentials such as medicine, staple food, medical treatment, going for health check-ups, and accommodation during the COVID-19 pandemic. The results show that female-headed families were 1.11 times more likely to face difficulty in buying enough medicine stocks for the household during the pandemic and statistically significant at the 10% level.

Figure 4: Female-headed families' access to essentials or reasons for not able to access essentials during the COVID-19 pandemic in Kenya
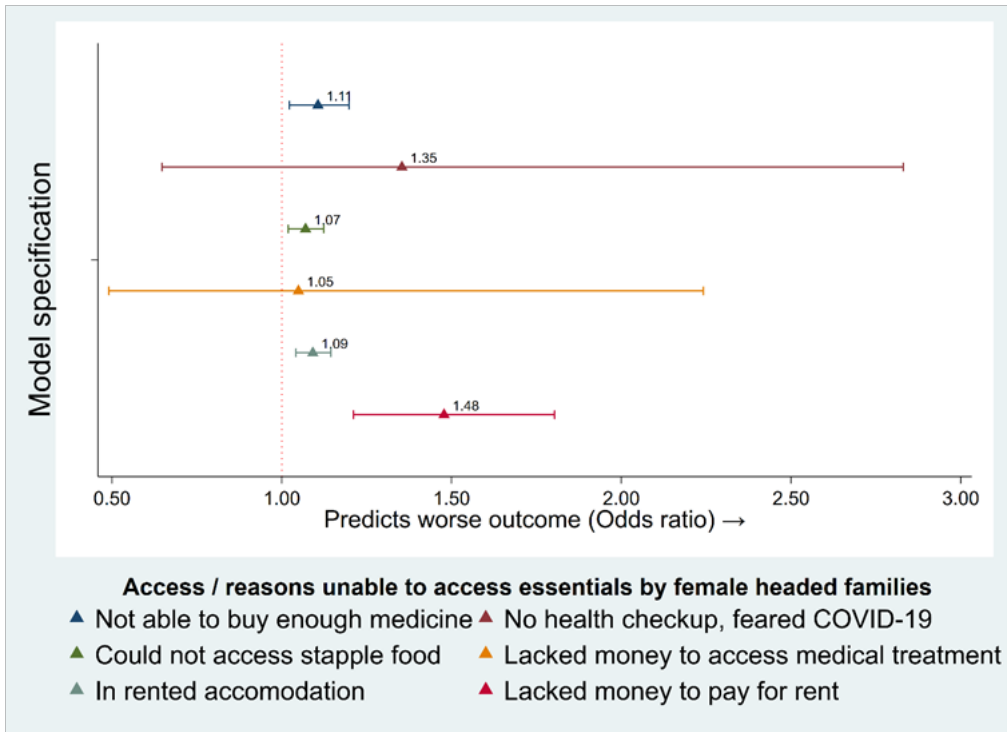

Figure 4 also shows that the odds of not being able to access staple food during the pandemic in Kenya were 1.07 times higher among female-headed families compared to their male-headed counterparts. The results also show that female-headed families in Kenya were 1.09 times more likely to be in rented accommodation, and 1.48 times more likely to lack the income to pay for the rent in the previous month.

COVID-19 and inequities in access to health services and other necessities

To get a bit of the context, we explore the extent of inequities in access to health services prior to the pandemic in both Kenya and Ethiopia (results available as a supplementary

material, Tables S1 and S2). The results for Ethiopia suggest that inequities in access to health services, health consultations, access to medical treatment, and visits to the health centre were not statistically different between female-headed and male-headed families. In Kenya, we also observed that female-headed families were not statistically significantly different from their counterparts in male-headed families in terms of access to health services. However, the need for health services was largely concentrated among the relatively poor with female-headed families having a greater burden of this inequity (supplementary Table S2).

Table 6 provides a summary of the results from estimating Equation 3 and using only data for Ethiopia. We quantified the inequities in access to health services using the concentration index for individuals in need of services and inequities in access to life essentials during the COVID-19 pandemic. The results indicate that, when the respondent lives in a female-headed family the inequity in access to health services during the pandemic is positive and statistically significant and almost twice as large compared to that in male-headed families (0.113 vs. 0.046). The positive CI indicates that access to health services among individuals who needed such services was largely concentrated among the relatively wealthy families. The z-statistic for comparison of the CIs for the two groups indicates a statistically significant difference in inequity in access to health services during the pandemic in Ethiopia. The results also indicate that the concentration indices for difficulty with access to teff/injera, wheat products, and edible oil was to the disadvantage of poor households and all statistically significant. However, testing for the differences between the two groups did not yield statistical significance. This suggest that both groups had their fair share of difficulties in accessing necessities during the pandemic in Ethiopia even though the magnitude of the CI indices seem to suggest that female-headed families were slightly disadvantaged.

Table 6: Inequities in access to health services and other necessities in Ethiopia during the COVID-19 pandemic

Outcome variables	Female-headed family	Male-headed family	Difference	z-value	CI-overall
Able to access health services	0.113**	0.046***	0.067	1.965	0.050
Unable to buy enough medicine	-0.129	-0.062*	-0.067	-0.562	-0.063
Unable to buy enough Teff/injera	-0.359**	-0.311***	-0.048	-0.411	-0.325
Unable to buy enough wheat	-0.253*	-0.275***	0.022	0.191	-0.268
Unable buy enough maize	-0.040	-0.048	0.008	0.079	-0.044
Unable to buy enough edible oil	-0.224*	-0.112**	-0.112	-1.098	-0.132

Notes: ***, **, and * implies statistical significance at 1%, 5%, and 10 % level, respectively. Difference – is the difference in the concentration indices for the two groups (female-headed vs. male-headed families). The z-value or statistic corresponds to the result of testing for the equality in the two concentration indices between female-headed and male-headed families.

Table 7 provides a summary of the results from estimating Equation 3 and using only data for Kenya. We quantified the inequities in access to health services using the concentration index for individuals in need of services and inequities in access to select necessities during the COVID-19 pandemic. The results show that, overall, there were no statistically significant differences in inequities between the two groups. However, looking at the groups individually, we noted that the magnitude of the quantified inequity was somewhat larger for female headed families. For example, the CI in access to health services was 0.043 and indicating a pro-rich distribution compared to 0.034 for male-headed families. When the respondent lives in a female-headed family, difficulties with paying for rental accommodation were largely concentrated among the poor female-headed families (-0.346 vs. -0.222).

Table 7: Inequities in access to health services and other necessities in Kenya during the COVID-19 pandemic

	Female-headed family	Male-headed family	Difference	z-value	CI-overall
Able to access health services (had a need)	0.043*	0.034	0.009	0.179	0.035
Able to buy medicines	0.022	0.028	-0.007	-0.272	0.026*
Able to access medical treatment	0.065*	0.032	0.033	0.646	0.036
Had no access to staple food	-0.047	-0.059	0.012	0.199	-0.055
Unable to go for health check-ups	-0.001	-0.000	-0.000	-0.447	-0.001
Unable to pay rent due to lost income	-0.346**	-0.222*	-0.124	-1.169	-0.264**

Notes: ***, **, and * implies statistical significance at 1%, 5%, and 10 % level, respectively.

Limitations to the study

There are several shortcomings of our analysis. First, our analysis does not uncover a causal relationship between the COVID-19 pandemic and livelihood outcomes and inequities in access to health services and other necessities. It is possible that our results could be subject to selection bias since the data we use may not be fully representative of the entire populations in Kenya and Ethiopia, but rather only representative of households that do have access to a working telephone or mobile phone. Second, many data sets, including the high frequency phone surveys, are still being collected only at the household level, and this constitutes a serious limitation for a proper gender analysis. In this instance, we are unable to know the intra-household food allocations, neither which specific family members in the household are going hungry or skipping a meal or their gender. Nevertheless, our analysis provides useful insights on the gendered impact of the pandemic in Kenya and Ethiopia.

What explains the vulnerability of female-headed families during the COVID-19 pandemic?

The key findings from this research show that individuals living in female-headed families were disproportionally impacted by the pandemic in both Kenya and Ethiopia. To better understand these findings, we explore selected characteristics of female-headed families in the period before the COVID-19 pandemic in both countries. Then, we estimate a series of linear probability models of the type described in Equation 1, where each characteristic serves as the outcome variable with individual age fixed effects, rural residence indicator and region fixed effects serving as additional control variables. Several of the characteristics we consider reflect on the household's permanent income situation prior to the pandemic or more generally, the socioeconomic status position of the household before the COVID-19 pandemic. For example, we consider ownership of several assets including radio, television, and appliances for cooking as well as the education level of adults in the household, health insurance coverage, literacy level, and marital status among other characteristics. These measures are potentially more informative about the prevailing living circumstances of people than the typical measures of living standards such as those based on consumption expenditures (Lastrapes & Rajaram, 2016).

Table 8 reports the results for Kenya. The results indicate that, before the pandemic in Kenya, female-headed families were 6.6 pp less likely to own a radio, 12.8 pp less likely to own a television, 2.1 pp less likely to own a computer/laptop/tablet, 3.9 pp more likely to have internet access at home, and 3.3 pp less likely to have completed secondary school education, all statistically significant. Overall, these results highlight pre-existing vulnerabilities among female-headed families which exacerbate the impact of the pandemic on their livelihood outcomes and inequality.

In Table 9, we report the results for Ethiopia. We found that, prior to the onset of the COVID-19 pandemic in Ethiopia, female-headed families were 8 pp less likely to own a radio, 8 pp less likely to own a television, 1 pp less likely to own a cylinder gas stove, 3.6 pp less likely to own an electric stove, 7.5 pp less likely to own a refrigerator, 41 pp less likely to have been married, 48.9 pp more likely to have been divorced/ separated or widowed, 14.2 pp less likely to have been able to read and write, 12.3 pp less likely to have had ever attended school, and 1.7 pp less likely to have had health insurance coverage. These estimates are all statistically significant at either the 1% or the 10% significance level and speak to the vulnerability of female-headed families as indicated by their lower socioeconomic status level before the onset of the COVID-19 pandemic. A cursory examination of the results appears to suggest a somewhat larger degree of vulnerability among female-headed families in Ethiopia when compared to those in Kenya. However, a formal check would have to be conducted to confirm this supposition.

Table 8: Relationship between being a female-headed family and the probability of having selected characteristics before the COVID-19 pandemic in Kenya

	No assets		Radio		Mattress		Charcoal Jiko		Refrigerator	
	β	SE	β	SE	β	SE	β	SE	β	SE
Female-headed family	0.007	0.006	-0.066***	0.011	-0.008	0.007	-0.0002	0.011	-0.004	0.006
Observations	72684		72684		72684		72684		72684	

	Television		Landline telephone		Computer /laptop/tablet		Internet access at home		Secondary education	
	β	SE	β	SE	β	SE	β	SE	β	SE
Female-headed family	-0.128***	0.031	0.011	0.008	-0.021*	0.010	0.039***	0.006	-0.033***	0.003
Rural residence indicator	Yes		Yes		Yes		Yes		Yes	
Age fixed effects	Yes		Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes		Yes	
Observations	2366		2366		2366		72684		72684	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. β = marginal effect. SE = standard error.

Table 9: Relationship between being a female-headed family and the probability of having selected characteristics before the COVID-19 pandemic in Ethiopia

	Radio		Television		Gas stove		Electric stove		Refrigerator	
	β	SE	β	SE	β	SE	β	SE	β	SE
Female-headed family	-0.080***	0.009	-0.080***	0.009	-0.010***	0.003	-0.036***	0.008	-0.075***	0.008
Observations	17563		17563		17563		17563		17563	

	Married		Divorced/ separated/widowed		Literate		Ever attended school		Health Insurance coverage	
	β	SE	β	SE	β	SE	β	SE	β	SE
Female-headed family	-0.413***	0.011	0.489***	0.011	-0.142***	0.010	-0.123***	0.010	-0.017*	0.008
Rural residence indicator	Yes		Yes		Yes		Yes		Yes	
Age fixed effects	Yes		Yes		Yes		Yes		Yes	
Region fixed effects	Yes		Yes		Yes		Yes		Yes	
Observations	16969		16969		16964		16964		16965	

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. β = marginal effect. SE = standard error.

6. Discussion and policy implications

For governments to formulate policies, and channel appropriate resources to mitigate the impact of pandemics, there is need for reliable and timely evidence on the circumstances of individuals and households during pandemics. We have used data from high frequency phone survey of households in Ethiopia, conducted by the World Bank—a survey that builds on the national longitudinal Ethiopia Socioeconomic Survey (ESS) that the Central Statistical Agency (CSA) carried out in 2019 in partnership with the World Bank to explore wealth-related inequity in access to health services during the first wave of the COVID-19 pandemic. We have found that the onset of the pandemic is associated with worse food insecurity outcomes, reduced incomes, and exacerbated inequities in access to health services and other necessities, especially among female-headed families in both Kenya and Ethiopia. Our results are consistent with emerging literature in low-income countries (see, for example, (Kansiime et al., 2021; Tabe-Ojong, Gebrekidan, Nshakira-Rukundo, Börner, & Heckelei, 2022)).

Furthermore, we demonstrate that individuals who are in more vulnerable positions within the household, that is those with children and those classified as being of low socioeconomic status before the COVID-19 pandemic were more likely to experience worse food insecurity outcomes, lost incomes, reduced consumption, and had difficulty with accessing health care and other necessities during the pandemic. While policies for containing the pandemic such as lockdowns and curfews are crucial for public health and safety of the population at large, they do come with other undesirable consequences on food insecurity, incomes, consumption, and access to necessities or essentials. In countries like Kenya and Ethiopia, where a larger fraction of women are in precarious employment arrangements, losing incomes and wage employment is inevitable and with far-reaching implications (Calder, Boost, Busiello, & Fox, 2021; Copley et al., 2020; Ebuenyi, Gitonga, Tele, & Syurina, 2022; Sisay et al., 2021). The effects of these lockdown policies can impact women both directly and indirectly (Bau et al., 2022). In Ethiopia, the finding that female-headed families had greater difficulty with access to necessities is mostly explained by the fact that a large majority of the people had lost their incomes because of the pandemic. Also, as many people resorted to panic buying and stockpiling, commodity price increases were inevitable. Since most female-headed families are from lower socioeconomic status positions, the chances of not affording the prevailing prices in the market were likely to be higher, hence experiencing greater difficulties. Also, some people noted that

shops or supermarkets had ran out of stock, some reported local market closures while others cited limited mobility due to government restrictions to go outside with some noting a lack of transportation. All these factors contributed to access woes among people with much greater difficulties experienced among female-headed families. In Kenya, amongst the top reasons given by people for not being able to go for their regular check-ups as frequently as they would have needed was the fact that they feared being infected with COVID-19, some feared long waiting lines while a few others cited that their doctor was either not available or was too busy due to a high demand. Amongst the top reasons given by respondents in Kenya regarding why most people had difficulty with access to essentials during the pandemic was the fact that many had experienced a decrease in income or simply that they had no money. Other Kenyan respondents noted that they could not afford transportation while others cited an increase in the prices of basic staple commodities such as maize with some indicating a decrease in commodity supply including market closures following government mandated lock-down measures. While these measures affected everyone, female-headed families felt the greater burden, owing to their pre-existing lower socioeconomic status which increased their vulnerability to the pandemic.

We also found that the level of inequities in access to health services and other essentials appeared to be greater for female-headed families when compared to male-headed families in both countries. The reasons for such greater inequities are also explained by the presence of pre-existing inequalities in several dimensions as alluded to earlier with female-headed families being in lower socioeconomic status positions. The observed inequities in access to health services and other necessities in both countries are a mere reflection of the pre-existing inequities in several socioeconomic characteristics in the pre-pandemic period.

Our results have several important implications for public policy in both countries. First, as much of the difficulties in access to health services and necessities could be attributed to the government mandated measures such as the lockdowns, curfews and stay-at-home directives as noted by respondents in both countries, it would be important for governments to keep in mind the fact that while measures such as curfews and lockdowns could help lower the spread of the virus, they come at a premium of lost livelihoods. Thus, government should find an optimal mix of such policies to maximize protection from the virus itself while at the same time minimize the negative impacts on livelihoods with a deliberate focus on female-headed families who are more likely to be amongst the most vulnerable.

Second, there is need for governments to be better prepared for future pandemics through having a clear understanding of salient pre-existing inequalities in the socioeconomic status dimensions as these will translate into increased or decreased vulnerability. In line with this finding is the need for governments in both countries to prioritize policies that promote eradication of poverty or that promote the improvement of the socioeconomic circumstances of people. One way this could be operationalized is through increased government spending on programmes targeted at eradicating poverty or those aimed at increasing growth and development of

communities. As a large majority of the population in both countries resides in rural areas, this would entail a focus on promoting economic development of rural areas or promoting empowerment of women living in rural communities who might be more vulnerable during pandemics.

Lastly, given that we have documented greater vulnerability among female-headed families in both countries, there is need for governments to design pandemic response policies that deliberately target female-headed families or women. To improve social protection and reduce vulnerability of female-headed families, governments must purposefully construct fiscal policy initiatives with a clear gender lens to promote equality. This could entail setting aside targeted aid programmes to assist female-headed families especially in terms of access to necessities during pandemics. As the pandemic appears ongoing, with low-income countries still having significant inequalities in access and roll-out of vaccines, a clear understanding of the implications of the pandemic on livelihoods and access to health services and necessities is important information for public policy planners.

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