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Factors associated with household-level experiences of COVID-19-related hardships in Ethiopia: a quantitative analysis of hardships and the related socio-demographic factors.

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Abstract

Factors associated with household-level experiences of COVID-19-related hardships in Ethiopia: a quantitative analysis of hardships and the related socio-demographic factors.

By Melat Weldeselasie

Objectives
The objectives of this project are to identify the COVID-19-related hardships experienced by households in Ethiopia through the quantitative analysis of survey data, to estimate an additive hardship index for households, and identify the sociodemographic factors associated with household vulnerability to experiencing identified hardships.

Methods
The Harmonized COVID-19 Impact Ethiopia Survey assessed the impact of the COVID-19 pandemic and related mitigation efforts on livelihoods, food availability, and health care needs of children under five years of age. A simple random sample of 880 total households from Kersa and Harar regions were surveyed and included in the analytic sample of households. Descriptive statistics of key variables of interest were carried out to understand the experiences of hardship among households. An additive index was created using identified hardship index variables and this index was used in regression models to identify associated sociodemographic factors.

Results
The most experienced COVID-related hardships among households in Kersa and Harar, Ethiopia were job loss, food insecurity, and input inflation. In the total sample population of households, 44.7% of sampled households experienced job loss, 18.9% experienced input inflation, and 15.7% experienced food insecurity. 20% of rural households experienced food insecurity and 64.2% experienced job loss compared to 12.7% of urban households reporting experiences of food insecurity and 33.1% experiencing job loss. The average number of hardships experienced was 3. Residence, head of household education/literacy level and occupation were the factors associated with vulnerability of household-level experiences of COVID-related hardship.

Discussion
While sociodemographic factors such as household residence, head of household occupation and literacy levels may be starting points for understanding household vulnerability to experiences of hardship, nuanced quantitative assessment and qualitative undertakings of temporally grounded data are necessary to better understand contexts and target resources to better reach the most vulnerable populations within the local context.

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TABLE OF CONTENTS

I. INTRODUCTION 1

Introduction and rationale 1
Problem statement 4
Purpose statement 4
Objectives 5
Significance statement 6
Definition of terms 7

II. LITERATURE REVIEW 8

COVID-19 in context 8
Africa 8
Ethiopia 10
Vulnerability and resilience 14
Impact of COVID-19 on maternal and Child health 16
Conceptual Framework 19
Visual framework 21

III. DATA AND METHODS 22

Study background 22
Context CHAMPS 22
Study Population and Data source 23
Variables 25
Data preparation 27
Software 27
Sample creation 27
Data filtering and variable selection 27
Data cleaning and coding 29
Analysis 30
Descriptive Analysis 30
Hardship Index Construction 30
Regression Analysis 30

IV. RESULTS 31

Descriptive Findings 31
Analytic Findings 34

V. DISCUSSION 36

Limitations 38
Future Research 39

VII. APPENDIX 43

Tables and Figures 43
Analysis Codebook 52

Introduction

Introduction and Rationale

Adults and children with underlying and immunocompromising conditions, including chronic diseases such as diabetes and undernutrition, are at higher risk of serious illness and death from COVID-19. But the detrimental effects of the pandemic extend beyond these devastating individual-level direct health risks. The indirect effects of COVID-19 and associated population-level infection control methods on the most vulnerable populations include heightened barriers to accessing care, interrupted health programming, household food insecurity, and loss of household income. These indirect effects, in return, exacerbate the direct effects by acting as risk factors for conditions like undernutrition that then put people at greater risk for serious illness in the context of a pandemic (Roberton et al., 2020).

The novel coronavirus (2019-nCoV) was declared to be a public health emergency of international concern by the WHO on January 30th of 2020, but the first cases of COVID-19 in Africa weren't reported until February 14th, 2020. Since then, the trajectory of the COVID-19 pandemic in Africa has been slower in comparison to other parts of the world with fewer severe cases and deaths reported due to various potential influencing factors such as younger population demographics, differences in climate, early implementation of public health measures, timely and unified leadership, and limited testing ability. While there has been a significant effort to scale up testing on the continent through initiatives like PACT, the Partnership to Accelerate COVID-19 Testing, launched by the Africa CDC, testing remained a major challenge limiting the ability to understand the extent of the COVID-19 pandemic in Africa (Maeda & Nkengasong, 2021).

Like the trajectory observed across the continent, Ethiopia has had a steady trajectory of COVID-19 cases with minimal notable impact on health systems and changes in patterns of morbidity and mortality. The potential factors contributing to Ethiopia's low COVID-19 case counts include early implementation of public health interventions, low testing capacity, reliance on self-reporting, insufficient disclosure and contact tracing, and high rural to urban population ratio (Wondimagegn et al., 2020). Ethiopia also has a young country profile with 40% of the population under age 15 and only around 8% of the population over the age of 55 (Shigute, Mebratie, Alemu, & Bedi, 2020). This is thought to be beneficial in comparison to the epidemiological profiles of countries experiencing a higher trajectory of severe cases and deaths.

In recognition of the potential effects that a pandemic might have on Ethiopia's already weak health systems and vulnerable economy, Ethiopia took a "cautious" country-level response to the SARS-CoV-2 pandemic. Initial measures were adopted on March 16th of 2020 and refined on March 20th at the time of the first 5 confirmed cases in the country. With 38% of children aged 5 and under stunted, and undernourishment experienced by 22% of reproductive-age women (Ages 15-49), the high prevalence of undernutrition in Ethiopia is an added complicating factor warranting a cautious and calculated pandemic response approach. There was a greater push for more preventative measures, like the lock-down style measure of infection control implemented in other areas, including isolation of international travelers, mandatory quarantines, mass disinfection of critical urban locations, overcrowding limits, and creative dissemination of WHO-recommended practices. Population density was also a factor of consideration in the pandemic response in Ethiopia, because while most of the country has a lower population

density, urban centers such as Addis Ababa contain about 6,516 inhabitants per km2 (Shigute et al., 2020).

In addition to these lock-down style measures, Ethiopia's health extension workers were integrated into community engagement task forces to function at the lowest administrative levels and health facilities, increasing awareness at the individual level. The requirements of the country's social protection programs were also modified to minimize social contact as a measure of disease control. Further efforts were made to strengthen the health systems and the health workforce by bringing back retirees and organizing students into the workforce to support existing health professionals, as well as country-level partnerships and international collaboration to aid in technical support and provision of necessary supplies.

While strict lockdown requirements were outlined and recommended, enforcement did not take effect at the same level due in some part to the large informal sector and the need for day-to-day income generation in Ethiopia. The continuation of economic activities at a lower level is noted to be a deliberate decision to reduce the level of vulnerability that would have resulted from strict enforcement of the outlined disease control measures. Nonetheless, the economic impact of COVID-19 and related responses were felt. Loss of household income due in part to low agricultural productivity and gaps in food import/export systems have affected local food markets and small businesses (Roberton et al., 2020).

The complex multisectoral impacts of COVID-19 and its related population-level mitigation efforts are being further investigated and better understood as the pandemic progresses. Beyond

the direct individual and population-level health consequences of COVID-19, there have been social and economic effects that have disrupted the core systems of societies, communities, and households; consequently, influencing household food security, financial stability and autonomy, care-seeking behavior, and access to health care and health resources. People with lower incomes, those with disabilities and chronic conditions, people residing in rural areas, and women and children are among the most vulnerable to these impacts of COVID-19. Understanding context-specific household-level experiences of these effects and data-driven decision-making is going to be critical for effective and sustainable programming and maintenance of the public's health.

Problem Statement

Those already vulnerable to social discrimination and lost in the gaps of social and emergency relief programs are the same people most vulnerable to the impacts of COVID-19 and disease control methods. The disruption in the health and financial systems of the societies had detrimental effects on vulnerable populations that rely on the continuation of these systems, especially in a country like Ethiopia where malnutrition and stunting are critical problems and maternal and infant mortality is still high. To maintain progress in the areas of food security, economic stability, and maternal and child health gains during emergency situations, a better understanding of local experiences is necessary for better targeting of relief programs and system improvements. There is limited knowledge on household-level experiences of COVID-19-related hardships and the factors that relate to household vulnerability in Ethiopia.

Purpose Statement

The purpose of this study is to a) identify the COVID-19-related hardships experienced by households in Ethiopia, and b) explore the sociodemographic factors that relate to household vulnerability to experiencing these hardships. This is important because of the complex multisectoral impacts of COVID-19 and the related infection control methods on households' ability to maintain health and wellbeing. Understanding these impacts on households' ability to access health care, maintain economic autonomy, and sustain food security in tandem with the factors of vulnerability is critical to the targeting of emergency relief programs, improvement of context-specific infection control methods, and establishment of sustainable collaborations with social support programs and agencies.

Objectives

The objectives of this project are:

1. To outline the COVID-19-related hardships experienced by households in Kersa and Harar, Ethiopia
2. To estimate a COVID-19-related hardship index for households in Kersa and Harar, Ethiopia based on identified household-level COVID-19 hardship indicators.
3. To identify the sociodemographic factors that are positively associated with household vulnerability to experiencing the specified COVID-related hardships in the population.

COVID-related hardships are defined, for the context of this project, as experiences of food insecurity, job loss, business closure or disruption, disruptions in farming activities, disruption of livestock activities, disruption of fishing activities, increased price of farming or business inputs, decreased price of farming or business outputs, increased price of major food items

consumed, and illness, injury, or death of any household members that took place during the COVID-19 pandemic period, notably from March of 2020 to August/September 2021 at the time of data collection. Food insecurity for the context of the project is simply defined as not having enough food to eat at the household level. Discussion of COVID-19 disease control or mitigation efforts refers to community or state level actions recommended, taken, or enforced to control the spread of the virus. These efforts include advise to stay at home and avoid gatherings, restrictions on in country and international travel, school and university closures, curfew/lockdown enforcements, and closure of non-essential businesses as well as establishment of isolation centers, disinfection of public places, and other mitigation efforts.

Significance Statement

Previous infectious disease outbreaks and pandemics, both on the African continent and across the world, have pointed out the disproportionate risks of disease exposure and the effects of disease control efforts on different subsections of the population. Often, the most vulnerable populations experience the heaviest burden when it comes to disease outbreaks and are subjected to discrimination and limited resources in seeking care and support. While it is known that lower-income populations, those with disabilities and chronic conditions, people residing in rural areas, and women and children tend to be among the most vulnerable, there is limited knowledge on household-level experiences of COVID-19-related hardship and the sociodemographic factors that relate to household vulnerability in Ethiopia. This knowledge is critical to guide emergency response for maximum impact. This project aims to understand household-level experiences of COVID-19-related hardships and the sociodemographic factors related to experiencing these hardships in Kersa and Harar, Ethiopia. The findings of this study will help expand knowledge

on the household-level impacts of COVID-19 infection control methods and improve the movement towards accurately targeted emergency relief programs to reach and support the most vulnerable populations.

Definition of Terms

Direct effects of COVID-19: Illness, disability, or death resulting from COVID-19 infection.

Indirect effects of COVID-19: Job loss, business/activity interruption, limited transportation, limited access to food etc.

COVID-related hardship: Adverse events and challenges experienced during and as a result of the pandemic, from March of 2020 to time of data of data collection in August/September of 2021, directly through COVID-19 infection or indirectly through the socioeconomic impacts of pandemic mitigation efforts: limited transportation, reduced economic activity, limited import/export, program and service interruptions or closure etc. The time period was specifically outlined in the questions of the survey administered to respondents, therefore all hardship experienced was contextualized within the COVID-19 pandemic period.

Vulnerability: "Susceptibility to harm" beyond one's ability to protect oneself due to the interaction of risk factors, and availability of and access to support and resources contextualized within the local social, cultural, political, and economic systems in place (Allotey, Verghis, Alvarez-Castillo, & Reidpath, 2012).

Resilience: One's ability to withstand, adapt, and recover from a disaster or public health emergency.

Factors (of vulnerability/of resilience): The socio-demographic characteristics, such as household income, literacy, or type of residence, and/or aspects of the built environment such as

the public infrastructure, public health resources, healthcare systems, and access to these systems and resources that allow for the detriment (vulnerability), or improvement(resilience) of one's physical, behavioral, and social wellbeing in preparation for, as a response to, or in recovery from a disaster or public health event (National Association of County and City Health Officials, 2022).

HoH: Head of household

Literature Review

COVID-19 in context

Africa

Declaration

The novel coronavirus(2019-nCoV) was declared a public health emergency of international concern by WHO Director-General Dr. Tedros Adhanom Ghebreyesus on January 30th of 2020(Makoni, 2020). Following this announcement, the Africa Centers for Disease Control and Prevention (Africa CDC), led by director Dr. John Nkengasong, organized the Africa Task Force for Novel Coronavirus on February 3rd of 2020 to work with WHO in managing the region's surveillance (screening at points of entry, infection prevention and control in health-care facilities), clinical management of severe cases, laboratory diagnosis, risk communication and community engagement needs (Makoni, 2020).

Trajectory Defining Factors

Several key factors have defined the trajectory of the COVID-19 pandemic in Africa. Factors include limited testing: which consequently restricts public health measures taken; a younger

majority population: resulting in fewer severe cases and deaths; differences in climates: possibly affecting transmission; early implementation of public health measures, and timely and unified leadership: resulting in a comparatively calm public response. The pattern of testing and case reporting has occurred in a nonlinear pattern. The first cases of COVID-19 in Africa were reported on February 14th, 2020, and by following April of 2020 an estimated 330,419 SARS-CoV-2 tests have been conducted amounting to only 0.03 of the continent's population. In response, the Africa CDC launched the Partnership to Accelerate COVID-19 Testing (PACT) in April of 2020 to expand testing capacity and as a result testing was scaled up from approximately 600,000 tests per month in April of 2020 to 3.5 million per month in November of 2020. Despite the impressive scaling up of testing in a short amount of time on the continent, testing remained a challenge and capacity varied over time limiting understanding of the full extent of SARS-CoV-2 infection in Africa (Maeda & Nkengasong, 2021).

Timely coordination and collective leadership are critical aspects of the Africa COVID-19 response that have resulted in less sever patterns across the continent. A mere 8 days following the reporting of the first SARS-CoV-2 cases reported in Egypt, an emergency meeting of all health ministers was convened by Africa CDC at the African Union Commission in Addis Ababa, Ethiopia where a joint continental strategy outlining three goals of limiting transmission, limiting deaths, and limiting social and economic harms and impacts on other endemic diseases was established and endorsed by the Bureau of the Heads of State and Governments of the African Union. In addition, plans for the coordination, cooperation, collaboration, and communication efforts across Africa were set to be implemented by the Africa Taskforce on Coronavirus (AFTCOR). This well-organized system was able to provide a clear course of action

when COVID-19 cases began to rise on both the side of capacity expansion and human resource training to support country needs. The African Medical Supply Platform was a key aspect of the organization that streamlined access to response materials (Maeda & Nkengasong, 2021).

Ethiopia

Ethiopia was identified by the World Health Organization (WHO) as one of thirteen countries in Africa noted to be of top priority for COVID-19 preparedness due to its connectivity to the rest of the continent (Wondimagegn et al., 2020). Ethiopia is the second most populous country in Africa with disproportionately limited number and capacity of health facilities and health professionals to adapt and meet the pandemic-related increased health needs of the population that may result. Pre-pandemic, 81.3% of the population is multidimensionally poor with very low access to basic services, with 22% of the population extremely poor and unable to satisfy basic needs, 19% facing food shortages, and only 62% having access to safe drinking water (EEA/EEPRI, 2020). On average, rural residing households in Ethiopia have 1.8 rooms and 6.2 family members and urban residing households have 2.5 rooms and 5 family members, suggesting that traditional isolation measures may not be feasible (EEA/EEPRI, 2020). Evidence on household size and housing conditions in Ethiopia support the prioritization of methods that limit the spread of the pandemic as a more relevant and highly feasible method of infection control rather than isolating after disease has already spread. Measures to limit mass transport, gatherings, business closures, flight bans, school closures and work -at-home alternative are more feasible for the Ethiopian context but still impractical for a majority of the Ethiopian population (EEA/EEPRI, 2020).

Despite initial alerts for a potentially catastrophic outbreak, the trajectory of COVID-19 cases in Ethiopia has been steady with minimal notable impact on health systems and changes in patterns of morbidity and mortality. There is a plethora of potential contributing factors to Ethiopia's low COVID-19 case counts including reliance on self or institutional reporting, insufficient disclosure and contact tracing, low testing capacity, cross-immunity with other viruses, age distribution, and various environmental factors(Wondimagegn et al., 2020). Ratio of tests performed for each confirmed case early in the pandemic (July 2020: 31 tests per confirmed test) support the overall low prevalence of COVID-19 cases at the time. The high rural to urban population ratio, young median age, high average temperatures, and high altitude are noted to be possible factors affecting low transmission of COVID-19 in Ethiopia (Wondimagegn et al., 2020). Early implementation of public health interventions such as mandatory quarantining, closing of borders, schools, and limited mass gathering along with early health education campaigns is also attributed to the slow progression of the pandemic in Ethiopia (Wondimagegn et al., 2020).

Country Response

Ethiopia took a "cautious" country-level response to the SARS-CoV-2 pandemic in part due to fear of its effects on already weak health systems and a vulnerable. The recognition of the weaknesses in the health systems and the inability to support a large-scale patient surge was an aspect of the push for more preventative measures. Ethiopia implemented similar lock-down style measures of infection control early through isolation of international travelers; quarantines; dissemination of WHO recommended practices, mass disinfection of critical urban locations, and overcrowding limits. Initial measures were adopted on March 16th of 2020 and refined on March

20th at the time of the first 5 confirmed cases in the country (Shigute, Mebratie, Alemu, & Bedi, 2020).

Ethiopia's 42,000 health extension workers were also integrated into risk communication and community engagement task forces. These task forces work at the lowest administrative units and health facilities to facilitate awareness and sensitizations at the individual level around the topic of village agricultural and social practices. The country's social protection program, the Productive Safety Net Program (PSNP), was reoriented to modify traditional community level contributions to individual based contributions to minimize social contact as a measure of infection control. Preparations were made by organizing students and calling retirees back into the workforce to support existing health professionals. Country partners and international help were solicited to strengthen the country's health systems through advisory from medical experts and support in the provision of medical supplies (Shigute et al., 2020).

Trajectory Defining Factors

Falling in line with the trend described for the Africa region, Ethiopia has also had low reported case numbers and experiences of limited resources and utilization of testing services and accurate reporting. Given the high-risk nature of health facilities, there has been a significant decline in the use of health services at public hospitals leading to decreased number of patients and a reciprocated absenteeism among health professionals. There are some potential difference makers identified. Ethiopia has a young country profile with 40% of the population under age 15 and only around 8% of the population over the age of 55. This is thought to be beneficial in comparison to the epidemiological profile in other parts of the world in countries without young

country profiles and the trajectory of the virus observed. With 38% of children aged 5 and under stunted and undernourishment experienced by 22% of reproductive-age women (Ages 15-49), the high prevalence of undernutrition in Ethiopia is a potential complicating factor. Population density is also a factor of consideration in the trajectory of the pandemic in Ethiopia and the methods implemented for infection control in different parts of the country. While most of the country has a lower population density, urban centers such as Addis Ababa contain about 6,516 inhabitants per km^2 (Shigute et al., 2020).

Economic Impacts

Much of the economic impact of the virus has resulted from government, organization, and individual-level efforts to control spread(Chen et al., 2021). Infection control methods have included partial or full business closures and interruptions leading to reduced economic activity and lost wages, particularly in the informal sector affecting household income, as well as reduced individual activity that has affected the demand side of the economy (EEA/EEPRI, 2020). Globally, nations with lower economic status are more vulnerable to not only higher rates of illness but the resulting effects of economic and social welfare hardships, which in turn lowers productivity and increases cost of health care exacerbating already existing cycles of poverty and disease. The feasibility of the commonly utilized preventative methods against the spread of COVID-19 are largely dependent on the country context and particularly on the level of development and welfare accessible Poverty, access to basic services and facilities, and social structure and demography are important factors influencing experiences of individual and household vulnerability to the direct and indirect effects of the pandemic (EEA/EEPRI, 2020).

While strict lockdown requirements were outlined and recommended, enforcement did not take effect at the same level due in some part to the large informal sector and need for day-to-day income generation in Ethiopia (Shigute et al., 2020). The continuation of economic activities at a lower level is noted to be a deliberate decision to reduce the level of vulnerability that would result from strict enforcement of strict infection control measures (Shigute et al., 2020). The service industry and internationally oriented sectors such as tourism, airline travel, and horticultural exports, with majority female employees, experienced significant drops.

Vulnerability and Resilience

Social vulnerability is "the combined effect of social, cultural, economic, political, and institutional processes that shape socioeconomic differentials in the experience of and recovery from hazards" (Spielman et al., 2020). While the hazard, COVID-19, has been a common one across the globe, the social, economic, and political systems and contexts of individual nations and more specific communities is critical to the understanding of vulnerability. Those already burdened by societal shortcomings and excluded from necessary resources and services are most affected by hazards. Lack of access to services and resources, results in unmet needs that then manifest in unequal exposure to the hazard or risk resulting in worse outcomes with limited ability to overcome or recover. Differential vulnerability needs targeted and context specific interventions to surpass and reach equitable solutions (Juntunen, 2005).

Factors of Vulnerability

Vulnerability extends beyond available infrastructure and aspects of the physical environment to include socioeconomic factors that affect community resilience. Factors of vulnerability can be

categorized into domains of socioeconomic status: which may include factors of income/wealth, poverty, employment, education/literacy levels; Household characteristics: with factors like age(child or elder), parenting and/or caretaking status, disability; Minority status and language: including factors such as race, ethnicity, language proficiency; and finally Housing and transportation (which can also be thought of as indicating wealth and access): with factors like housing structure, vehicle access, crowding (Flanagan, Gregory, Hallisey, Heitgerd, & Lewis, 2011). The domains can be helpful in the context of identifying or assessing vulnerability in disasters or public health emergencies. Those with physical or mental disabilities, impoverished people, children, and the elderly, as well as those with language or communication barriers are more likely to experience adverse outcomes in the event of a disaster and are also less likely to recover (Juntunen, 2005).

Geographic designations can also be important factors to consider as there can be demographic differences between rural/ urban designations or regions as it relates to access and availability of resources and other resiliency factors. Populations identified to be at a greater risk of vulnerability and requiring special attention in Ethiopia additional to previously noted factors include pregnant women, the unemployed, those in the informal sector, those with limited access to services and resources including media outreach, those with underlying medical conditions, and those receiving emergency food aid (EEA/EEPRI, 2020). Among the activities noted to be vulnerable to economic shocks as a result of the pandemic is agriculture (perishable growers and dairy products in particular) trading and commodity exchange, as well as tourism and hospitality.

Factors of Resilience

Factors of resilience are the community or household assets that are protective from adverse effects of hazards and risks and support recovery aftereffects. Factors can include wealth/ income, proximity to healthcare facilities or health resources, access to safety net programs: insurance, loans, access to information, and adaptable work environments that allow for continued activity and income (EEA/EEPRI, 2020).

Impact of COVID-19 on Maternal and Child Health (MCH)

At the beginning of the COVID-19 pandemic in 2019, the key sectors noted to be at increased risk of collapse and have a significant effect of maternal and child health were food systems, incomes, social protection, health care services for women and children, and services and access to clean water and sanitation (Akseer, Kandru, Keats, & Bhutta, 2020). Focus and support is needed for the most marginalized households in rural populations and urban slums. It is advised that deploying community health workers and strengthening community-led sanitation programs can work in supporting women and communities. Data-driven decision making is going to be critical for context specific programs. As COVID-19 continues, we also know that both adults and children with underlying conditions, particularly noncommunicable diseases, such as diabetes and hypertension as well as undernutrition, and overweight/obesity are at higher risk for serious illness and death from COVID-19 (Akseer et al., 2020).

COVID-19 responses such as isolation and movement restrictions have had a negative impact on the nutritional status of women and children. This is due to a combination of factors including limited financial resources, heightened barriers to food access, and other related factors. Recent modelling exercises accounting for a diverse set of potential COVID-19 impacts estimate that the

prevalence of wasting could increase by 10-50% with an excess of 40,000-2,000,000 child deaths (Roberton et al., 2020). These projections are potentiated to be underestimates as the potential effects of COVID-19 on maternal nutrition, micronutrition deficiencies, intrauterine growth, and downstream impacts on health programs may also impact stunting and growth (Roberton et al., 2020). The effects on linear growth in children and stunting could have substantial effects beyond short-term effects of undernutrition.

Risk factors for undernutrition in the time of COVID-19 include food insecurity and poor-quality diets resulting in part by loss of household income exposing vulnerable families to food shortages and escalated prices exacerbated by low agricultural productivity and gaps in food import/export systems affecting local food markets and small business; reduced income and limited financial resources; limited care and restricted health services; interrupted education for children and adults; and unhealthy household environments (Roberton et al., 2020). Other indirect effect of the pandemic include delayed antenatal care (ANC) to every 3 months instead of every month, and delayed postpartum visits to 3 months after delivery which are likely to have significant maternal and neonatal health implications (Menendez, Gonzalez, Donnay, & Leke, 2020).

Direct effects of COVID-19 on maternal and child health including the greater risk of severe disease for pregnant women and adverse pregnancy outcomes such as preterm births due to COVID-19 (Kingsley, Vijay, Kumaresan, & Sathiakumar, 2021). Indirect effects of COVID-19 on maternal and child health include increased barriers to accessing essential health services (Kingsley et al., 2021). Both direct and indirect effects are likely exacerbating maternal and

neonatal morbidity and mortality especially for vulnerable populations across the world but even more so in low and middle-income communities. Resilient maternal health services are paramount to continued child and population health. Multi-sectoral investments and programmatic priorities are necessary in providing high-quality and continuous care that systematically incorporates digital health care solutions accessible to all parts of the population (Kingsley et al., 2021). While this project will not assess factors related to pregnant women, it will include an aspect of child health, child unmet medical need, as an indicator variable of hardship.

Maternal and Child Health Care Seeking Behavior during COVID-19

Perceived risk of COVID-19 among adults, ages 18 and above, in Harar Ethiopia was assessed to be low with willingness to seek health care at only 35.6% (Eyeberu et al., 2021). The WHO's Pulse Survey on Continuity of Essential Health Services During the COVID-19 found that 90% of the 105 countries surveyed across the five regions between March and June of 2020 reported disruptions in health services (Osendarp et al., 2021). Greater than 70% of surveyed countries experienced disruptions in routine immunizations and more than 50% reported disruptions in antenatal care, management of malnutrition, and sick child services in 2020 (Osendarp et al., 2021). Similar findings were reported by UNICEF in January of 2021 with an overall 30% reduction in coverage of essential nutrition programs including micronutrient supplementation and nutrition promotion programs in lower- and middle-income countries (LMICs) as well as programs for the treatment of severe wasting in children (Osendarp et al., 2021). There are also reports of avoiding medical care seeking during the pandemic due to fear of exposure to the virus

or due to movement restrictions enforced as part of infection control methods (Osendarp et al., 2021).

Conceptual Framework

This project aims to understand household-level experiences of COVID-19-related hardships by populations in Kersa and Harar, Ethiopia. Additionally, it aims to identify the sociodemographic factors that relate to experiences of these hardships within the local context. The research project utilizes the Harmonized COVID-19 Impact – CHAMPS DSS Ethiopia survey data linked with the most recent DSS head of household (HoH) demographics to estimate a COVID-19- related hardship index for households in Kersa and Harar, Ethiopia. The domains of hardship that will be assessed for are 1. Income disruption: defined as job loss, business closure, or business/activity interruption; 2. Food insufficiency: defined as insecurity or limited access to food and lack of affordability; and 3. Health care accessibility: defined as disruptions in necessary health care services or lack of access to necessary care for children.

The same survey data is then used to assess for sociodemographic factors that are associated with the level of household vulnerability to the identified hardships. These factors include head of household age, education status/literacy level, sex, and occupation, as well as household size, number of children in the household, number of elderly people (adults 65 years and over) in the household, and type of residence. Head of household marital status and insurance status, while potentially important factors of vulnerability, were not accessible and therefore are not part of the analysis. It is hypothesized that rural residence, higher household size, unemployment, low

levels of education, and high number of children and elderly in the household would be positively associated with experiences of COVID-related hardships.

The findings of this study will help expand knowledge on the direct and indirect effects of COVID-19 and related infection control methods at the household-level. This can aid in the movement towards accurately targeted emergency relief programs to reach and support the most vulnerable populations during public health emergencies. This will contribute to the context-specific understanding of effects of COVID-19 on households in Ethiopia and add to the knowledge base in integrating experiences of LMICs and particularly African experiences of the pandemic into the literature. These improvements will ultimately work together to contribute to the big picture goal of improving, or at the very least maintaining, maternal and child health gains during emergency situations by increasing understanding of household vulnerabilities to associated hardships and supporting those most vulnerable to experiencing emergency related hardships.

Figure 1 below visualizes the contextual framework by simply outlining the relationship of interest that we are exploring with this project. It is known and has been observed that COVID-19 and associated pandemic mitigation efforts have contributed to direct and indirect effects on populations including related economic and social hardship at the household level (Center on Budget and Policy Priorities, 2022). This project explores the nuance in this relationship between COVID-19 and associated mitigation efforts and COVID-19-related hardship within the context of Kersa and Harar, Ethiopia by first identifying the types of COVID-19-related hardships experienced by households in Ethiopia and then diving deeper to assess what sociodemographic

factors are associated with household experiences of varying levels of COVID-19-related hardships. The experience of COVID-19 related hardships has a downstream effect on adverse maternal and child health outcomes due to income limitations that may limit care seeking behaviors, interrupted essential health services or limited health workforce and resources, and even associated fear that may exacerbate already existing maternal and child health disparities in Ethiopia.

Visual Framework

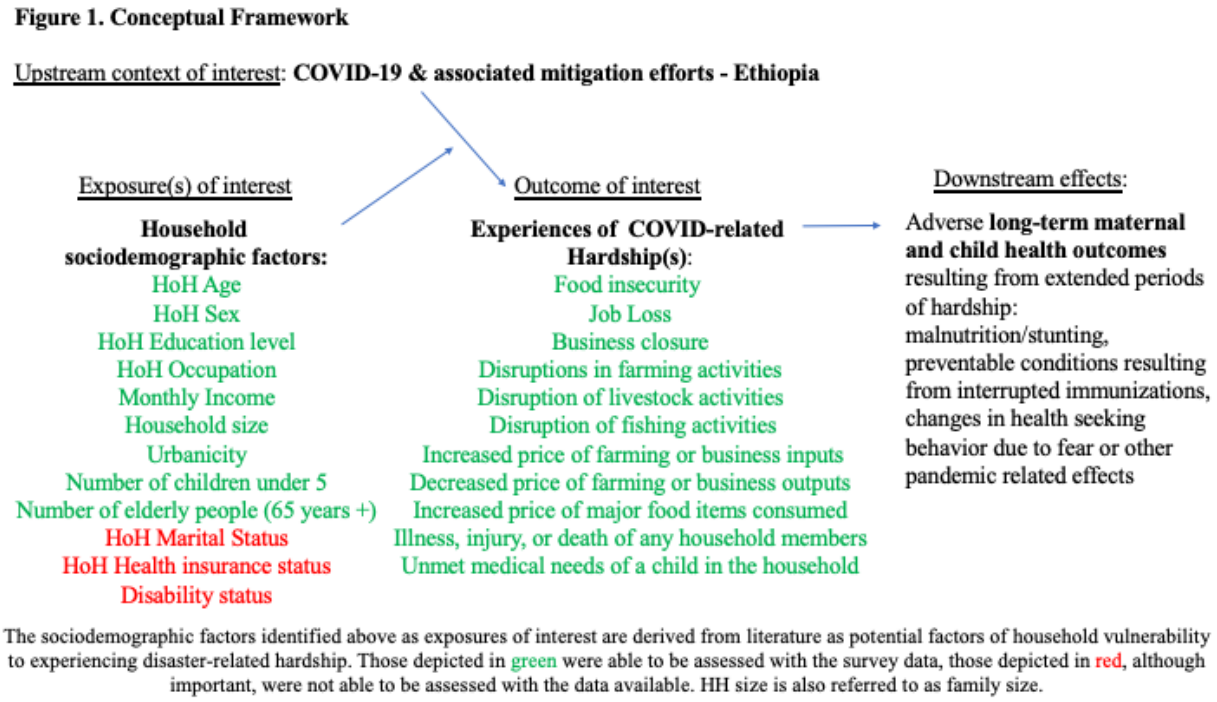


Figure 1. Conceptual Framework

COVID-19 disease control or mitigation efforts refers to community or state level actions recommended, taken, or enforced to control the spread of the virus. These efforts include advise to stay at home and avoid gatherings, restrictions on in country and international travel, school and university closures, and curfew/lockdown enforcements. COVID-related hardship(s) refers

to household level experiences of the listed hardships during the period of the COVID-19 pandemic: notably March 2020 through the time of data collection: August/September 2021.

Data and Methods

Study Background

Context CHAMPS

The Child Health and Mortality Prevention Surveillance (CHAMPS) network was established to collect longitudinal mortality data in network sites to better understand and track preventable causes of childhood deaths (stillbirth and under5 mortality rates) (Salzberg et al., 2019). The CHAMPS project works to prevent child deaths by utilizing reliable demographic surveillance systems, such as the HDSSs, in tandem with diagnostic and laboratory methods, to generate health and demographic data that can inform actionable policy. The project is currently made up of a network of 7 different sites including Ethiopia, Sierra Leone, and Bangladesh (Cunningham et al., 2019).

Demographic surveillance systems (DSSs) are used to monitor population-level health over time within **well-defined geographic areas**, also known as demographic surveillance areas (DSAs). A health and demographic surveillance system (HDSS) is one that combines disease surveillance information such as disease outbreaks, pregnancies, and health-seeking behaviors, whether hospital-based (passive) or community-based (active), with demographic surveillance which monitors information such as births, deaths, migrations, socioeconomic standings, and health conditions. The CHAMPS network of HDSSs collaborate with the common goal of collecting and using high-quality data to characterize and prevent child mortality but are independent

research groups with methods, priorities, and challenges that are rooted in the communities and countries within which they exist (Cunningham et al., 2019).

Study Population and Data Source

There are currently two CHAMPS associated HDSSs in Ethiopia. The first was established in 2007 in the rural site location of Kersa followed by an urban location in Harar established in 2012. Kersa covers an area of 353 km^2 including 24 kebeles (subdistricts) and a population of 131,431 (2017/2018) while Harar covers an area of 25.4 km^2 including 12 kebeles and a population of 60,044 (2017/2018). Data collection takes place twice annually and covers information on immunization of children, family planning, and morbidity (Cunningham et al., 2019). The data collected form these sites is not nationally representative of Ethiopia but is representative of the population within the geographic designations of Kersa and Harar, Ethiopia.

The Harmonized COVID-19 Impact Survey module was integrated into the existing Ethiopia HDSS data collection process as an interim session of data collection in between regular biannual sessions to provide timely context-specific data. As a COVID-19 module, the survey was conducted in the hopes of assessing the impact of the pandemic and related mitigation efforts on livelihoods, food availability, and health care needs of children under five years of age. Data collection took place between August-September of 2021 and the source population included all households in Kersa and Harar, most recently reported to be 25,653 households in Kersa DSS and 14,768 households in Harar HDSS as of last HDSS data collection cycle in 2020.

All households enumerated within the Kersa or Harar HDSS were included in the selection process. A simple random selection of 440 HDSS households were selected for participation from each of the two CHAMPS associated HDSS sites in Kersa and Harar for a total of 880 total households surveyed. Sample size was specified to detect prevalence changes in accessing care in each HDSS with a priori specifications of 50% of the population experiencing changes, 95% CI, precision of 0.05, and non-response adjustment of 10%. Data collection took place in the form of in-person interviews using tablet-based implementation of the survey with head of households and/or spouses of each household. Interviews were conducted by HDSS enumerators already working in the specified HDSSs. Since the Harmonized COVID-19 Impact survey was not conducted exclusively with heads of households, the survey data were linked with the most recent DSS head of household demographic information (2020) for the Impact survey surveyed households to be able to assess for household level sociodemographic factors associated with reported experiences of COVID-related hardships. DSS merged data includes head of household age, sex, occupation, and education, as well as number children under 5 years of age, and number of elderly adults (adults over 65 years) in the household. Type of residence, household size, and household average monthly income were retained from the Impact Survey, along with all of the hardship indicator variables.

Study Approval

This study is not research with “human subjects”, nor is it a “clinical investigation” as defined in the federal regulations. Therefore, no IRB review was required due to the nature of the research as determined by Emory IRB Determination Form and supported by the memorandum provided in the appendix.

Variables

Primary Outcome Variable

Experience of COVID-19 related hardship(s), identified through an index-based analysis of self-reported experiences of COVID-19-related difficulties during the pandemic, is the primary outcome variable of interest. Self-reported experiences were indicated as a response to the survey led interviews conducted in person and recorded electronically. This subsection of the survey was introduced as "Now, I would like to ask you about events that may have affected your household since mid-March." And followed by the question of "Has your household been affected by any of these events since mid-March?" with an option for the interviewers to read aloud and select all options that apply. The options for events experienced include job loss, non-farm business closure, farm disruption, livestock disruption, fishing disruption, farm/business input inflation, farm/business output deflation, increased food prices, and illness or death and were coded as individual Yes (1) / No (0) experiences. Experiences of food insecurity and experiences of unmet child medical need during the same time period were also included as additional indicators of hardship. Food insecurity was assessed through question "Since the beginning of the COVID lockdown, has it happened that your household did not have enough food to eat?" and unmet child medical need was assessed through the question "Since mid-March, was there a time you needed medical care or clinic visit for a baby or child but could not do so?". Both additional hardship indicator variables were coded in a similar Yes (1)/No (0) manner. The additive hardship index ranges from 0, no hardship experienced, to 11, all previously listed hardships experienced.

Informed by existing literature, the objectives of the overall study, and the construction of the survey instrument, COVID-19 related hardship was defined to be adverse events and challenges experienced from March of 2020 to August/September 2022 directly through COVID-19 infection or indirectly through the socioeconomic impacts of pandemic mitigation efforts (limited transportation, reduced economic activity, limited import/export, program and service interruptions or closure etc.). COVID-19 related hardship was conceptually categorized into three domains for the purposes of this project: 1. Income disruption, 2. Food insufficiency, and 3. Child health care accessibility and defined in Table A below.

Table A. Definition of COVID-19 related Hardship

	Hardship domains	**Associated events**
1	Income disruption	Job loss, business closure, or business/agricultural interruption
2	Food insufficiency	Insecurity or limited access to food and lack of affordability
3	Child health care inaccessibility	Disruptions in necessary health care services or lack of access to necessary care

Theoretical classifications of hardship domains and corresponding survey aspects.

Covariates

A range of sociodemographic variables were used in the assessment of factors associated with households' reported experiences of COVID-19 related hardships as outlined above. Age of head of household was included as a continuous variable ranging from 14-105 years. Sex of head of household was included as a dichotomous level variable coded Female = 0, Male = 1. Occupation of head of household was included as a categorical level variable coded as Unemployed = 0, Farmer = 1, Employed Farmer = 2, Merchant = 3, Private employee = 4, Petty trader = 5, Housewife = 6, Student = 7, Retired = 8, Government employee = 9, NGO worker = 10, Daily laborer = 11, and Other = 12. Education level of head of household was included as an

ordinal variable with Neither read nor write = 0, Read only = 1, Literate = 2, and Can read and write = 3. General household information was also included. Number of family members, also referred to as family number or household size, was included as a continuous level variable ranging from 1-15. Number of children under 5 years of age was included as a continuous level variable ranging from 0-3. Number of elderly adults, age 65+, was included as a continuous level variable ranging from 0-2. Household average monthly income was included as a continuous variable ranging from 150-150,000. Residence/urbanicity was included as a dichotomous level variable coded Rural = 0, Urban = 1. All included variables were self-identified during interviews.

Data Preparation

Software

All analyses were conducted using RStudio Version 1.4.1717. All visualizations were created using ggplot2.

Sample Creation

The study sample included all 880 respondents. No age specific inclusion/exclusion criteria were enforced as anticipated due to confirmation that those under 18 were also correctly identified as heads of households. There are 9 observations/households missing education level and occupation status. We have decided to keep these missing data as missing and not remove them because of the low number of missing values and as to not lose variability in the data.

Data Filtering and Variable Selection

The analytic sample includes all 880 sampled households. The selected variables of interest were grouped into two categories: 9 sociodemographic variables plus an additional Age category variable, and 11 COVID-related hardship indicator variables. Age category is an added variable that was not identified on the original survey but was extrapolated from the HoH age continuous variable on the survey for the purposes of descriptive understandings of the sample population. The 11 COVID-related hardship indicator variables were experiences of food insecurity, job loss, non-farm business closure, farm disruption, livestock disruption, fishing disruption, farm/business input inflation, farm/business output deflation, increased food prices, illness or death, and unmet child medical need all defined within the time limits of the COVID-19 pandemic, March 2020 through data collection in August/September of 2022 and coded as Yes (1)/ No (0).

We have chosen to exclude COVID-related hardship question response in the categories of ‘other problems’, ‘not affected’, ‘don’t know’, ‘refused’, and ‘other’. This is because the question assessing experiences of hardship is worded as “Has your household been affected by any of these events since mid-March?” with an option for the interviewers to read aloud and select all options that apply. Because respondents had a chance to respond yes or no to experiencing each event, those who did not experience any of the outlined hardship experiences would have said no to each and therefore it would have been encompassed in the specified event data and would have been redundant to have the not affected, don’t know, and refused options. The removal of these options did not have an effect on the overall sample. The specification of other events or problems is outside the scope of analysis for this project but could be a potential supplementary qualitative addition. Given that the parent study and project, CHAMPS, works to

decrease child mortality, we are also including child unmet medical need during the pandemic as a hardship indicator as well as food insecurity which can have detrimental short and long-term effects on the development of children and pregnant women in households.

Data Cleaning and Coding

Data cleaning and recoding was conducted after selection of variable of interests and can be seen in the included Rmd file in the appendix. Data cleaning included the reconciliation of 1 experience of food insecurity observation coded as CHOOOO2 instead of the original CH00002, these were assumed to be the same designation of no and coded as 0. Frequency and univariate analyses were conducted to assess respective numerical and categorical variables of interest. There are 9 observations/households missing education level and occupation status in the data. We have decided to keep these as missing and not remove the households/observations from the sample because of the low number of missing values and as to not lose variability in the data.

Hardship Index was an additive index variable, considered as a continuous variable for regression analysis, of all hardship indicator variables (11) mentioned previously and ranges from 0-11 with 0 indicating households that were not affected by COVID-related hardships as outlined in the study and those with 11 indicating households that experienced a high level of COVID-related hardships on a summative index. An additional categorial Hardship Experience variable was created indicating household experience of hardship (Yes (1) / No (0) based on the additive index of 0 indicating no hardship experienced and 1 or more indicating experience of COVID-related hardship at the household level. Analysis codebook and full R Markdown documents have been included in the appendix for reference.

Analysis

Descriptive Analysis

Univariate descriptive statistics of key variables of interest in the study sample of households in Ethiopia were carried out to understand the experiences of the total study sample. Bivariate descriptive statistics, study sample by type of residence, of experiences of key hardship indicators such as job loss and child unmet medical need were also carried out. Findings of descriptive analysis are provided in Table 1 below.

Hardship Index Construction: Additive Index

An additive COVID-19 related hardship index was created using the 11 COVID-related hardship indicator variables: experiences of food insecurity, job loss, non-farm business closure, farm disruption, livestock disruption, fishing disruption, farm/business input inflation, farm/business output deflation, increased food prices, illness or death, and unmet child medical. All variables are coded Yes:1 /No: 0, and therefore are on the same scale, no further scaling was done. Cronbach's alpha test was conducted to assess internal consistency of the additive index, under the assumption that the indictor variables utilized measure the same underlying construct of household COVID-related hardship.

Regression Analysis: Hardship and Associated Sociodemographic Factors

To investigate the household sociodemographic factors associated with experiences of hardship, a series of models were run. Linear regression models were run to investigate bivariate associations of the outcome of interest: household experiences of hardship, as indicated by the

additive COVID-related hardship index created, and the various socio-demographic variables including head of household age, age category, sex, occupation, and education level, as well as number of children under 5 and number of elderly adults in the household, household size/family number, average household income, and residence. Coefficients were analyzed to identify association of the sociodemographic factors with household level experiences of hardship. Multiple R-squared and adjusted R-squared values were assessed to identify the strength of the bivariate and multivariate models respectively and p-values were assessed to identify statistical significance.

A multiple linear regression model was constructed incorporating the outcome of interest: household-level experiences of hardship as indexed by the additive HardshipIndex variable, and the 9 sociodemographic variables of interest previously identified to be of importance in assessing household-level vulnerability to hardship. While the bivariate associations investigated give us an idea of how the individual factors may relate to household experiences of hardship, the full model helps us assess what sociodemographic factors are associated with household-level experiences of hardship when all other covariates are accounted for, as they would exist in real life. The 9 sociodemographic variables included are head of household (HoH) age, sex, education/literacy level, occupation, household average monthly income, household size, residence, number of children under 5 years of age, and number of elderly adults over age 65.

Results

Descriptive Findings

Household experiences of COVID-related hardships among the total study population is represented in *figure 2* and shows that the most reported COVID-related hardship experienced by sampled households was job loss, followed by input inflation, and food insecurity. It is visible in *figure 3* that job loss was the highest reported COVID-related hardship experienced by households in both rural and urban areas. Conversely while output inflation was the second most reported hardship in urban households, the second most reported hardship in rural households was food insecurity. As can be seen in *table 1* with the Hardship Index, the mean number of hardships experienced by households was 3, with minimum 0 and maximum of 10 hardships. A considerable majority of sample households have reported experiencing multiple COVID-related hardships, as seen in *figure 4*. As can be seen in *Table 1* and *figure 4,* 11.8% of households reported not having experienced any of the COVID-related hardships as outlined in the study, and over 2/3 households experienced 2 or more COVID-related hardships. No households reported having experienced all 11 outlined hardships.

Univariate and Bivariate Analyses

Table 1 and *table 2* present the univariate summary statistics of the total sample population and urbanicity designations respectively. In assessing the sociodemographic characteristics of the total population shown in *table 1*, the average age of heads of households was 51 years and over 50 percent of households are headed by those between 35 and 54 years of age. It is important to notice that age of the total study population ranges from 14 to 105 years. While it was initially anticipated that the study population would be restricted to households headed by those age 18 and over due to concerns of sampling error, it was confirmed that those younger than 18 were also heads of households within the local context. Over 65% of sampled households are headed

by male heads of households, around 41% of heads of households can neither read nor write and over 36% are farmers. The average household has approximately 5 household members.

In exploring the sociodemographic characteristics of the urbanicity designations in *table 2*, it is clear that head of household sex is quite different between rural and urban households. In the urban households, head of household sex is closer in proportion with 58% male heads of households and 42% female heads of household while head of household sex in rural households in majority male with 78%. As may be expected, there is a higher literacy level among urban households with only a little over 18% of heads of households noting they can neither read nor write compared to almost 80% reporting the same in rural households. Only 15.2% of urban heads of households were farmers while 72.8% of HoHs in rural households noted farmer as their occupation.

Tables 1 and 2 also contain important information on households' experiences of hardship in the total population and in urbanicity designations respectively. In the total population, as shown in *table 1*, 44.7% of households experienced job loss, followed by 18.9% of households reporting experiences of input inflation, and 15.7% of households experiencing food insecurity. Only 0.1% of the total study population reported experiences of farm disruption and only 0.2% reported experiencing child unmet medical need. In *table 2*, I found that no rural households experienced farm disruptions or child unmet medical need but 20% of rural households experienced food insecurity and 64.2% experienced job loss. A higher proportion compared to urban households, with 12.7% of urban households reporting experiences of food insecurity and 33.1% experiencing job loss.

Analytic Findings

Hardship Index Creation: Additive index

Upon descriptive assessments of the sample population and identification of the COVID-related hardship indicator variables, I were able to construct a COVID-related hardship index for households in Ethiopia. A simple additive index was created by considering the 11 identified hardship indicator variables: food insecurity, job loss, non-farm business closure, farm disruption, livestock disruption, fishing disruption, farm/business input inflation, farm/business output deflation, increased food prices, illness or death, and unmet child medical need and taking a sum of 0/1 values indicative of no/yes to experiencing the events. The Hardship index ranges from 0 to 11 and I found that the median number of hardships experienced was 3, mean was 3.055, and maximum number of hardships experienced by sampled households was 10. A Cronbach's alpha test was ran to estimate the reliability of the indexing variables and found the alpha to be 0.739, within the 'acceptable' range of internal consistency. This tells us that the 11 hardship indicator variables used in the construction of the Hardship index are acceptably related to each other as a group and that there may also be additional indicators that may not have been included. There is room for improvement.

Bivariate Regression

A series of bivariate linear regression models were run with the dependent variable: Hardship Index, and the independent variables; household sociodemographic variables: HoH age, age category, HoH sex, HoH occupation, HoH education level, number of family members, number of children under 5, number of elderly (65 years +), average household monthly income, and

residence to investigate individual-level associations between household sociodemographic factors and experiences of COVID-related hardship. Linear regression assumptions were considered and in doing so I found that the continuous variables were not normally distributed, and head of household age is moderately correlated to the number of elderly adults present in the household with a spearman correlation coefficient of 0.67.

In initial assessment of bivariate associations between the outcome of interest and individual sociodemographic factors shown in *table 3*, it was found that head of household age and number of elderly adults in the household were not independently statistically significantly associated with household-level experiences of COVID-related hardships. On the other hand, household average monthly income, household size, number of children in the household, residence, head of household sex, occupation, and education/literacy level were all independently statistically significantly associated with household experiences of COVID-related hardship.

Full Model of Household Sociodemographic Factors and Hardship

Following assessments of bivariate regression models, a multiple linear regression model, Full Model, was constructed incorporating the outcome of interest: household-level experiences of hardship as indexed by the additive HardshipIndex variable, and the 9 sociodemographic variables identified to be of importance in assessing household-level vulnerability to hardship in the literature review process. The sociodemographic factors included in the model were residence, head of household age, sex, occupation, education/literacy level, household size, number of children under 5 in the household, number of elderly adults in the household, and household average monthly income. Model results including the coefficients mentioned hereafter

are provided in *table 4*. When considering all outlined important sociodemographic factors, residence, education/literacy level, and occupation are still important factors associated with higher vulnerability of experiencing household-level COVID-related hardships. A change from rural to urban residence is predicted to have a -2.49 difference in the level of household vulnerability to experiencing outlined COVID-related hardships when all other factors are considered. Urban residing households have a (-2.49 unit) lower vulnerability of experiencing hardships compared to urban residing households. Households with head of households that are employed in other unspecified fields are at (1.15 unit) lower vulnerability to experiencing household-level COVID-related hardships than households with unemployed heads. This points out that further qualitative investigation of nuanced responses might be necessary in assessing unspecified fields of occupation. Interestingly, households with heads that can read only are at (1.04 unit) higher vulnerability to experiencing hardships than those households with heads that can neither read nor write, and the households with heads that can both read and write are at (1.58 unit) lower vulnerability of experiencing COVID-related hardships than those with heads that can neither read nor write.

Discussion

The Harmonized COVID-19 Impact Survey's integration into the existing Ethiopia HDSS data collection process was a timely and targeted effort to understand context-specific COVID-19 related impacts on the local population. The survey aimed to assess the impact of the pandemic and related mitigation efforts on livelihoods, food availability, and health care needs of children under five years of age. This study is a preliminary data analysis effort utilizing the survey data integrated with necessary household head demographic variables from DSS to assess household

level impacts of the pandemic through identification of COVID-related hardships experienced by households and subsequent determination of sociodemographic factors associated with household level experiences of specified hardships. In accordance with the outlined objectives of this study, I was able to identify the COVID-19-related hardships experienced by households, estimate a COVID-19-related hardship index for households in Ethiopia based on identified experiences of COVID-19 hardships, and finally investigate and identify the sociodemographic factors that are associated with household vulnerability to experiencing the identified hardships.

I found that the most reported hardships experienced by households were job loss, input inflation, and food insecurity. Rural households reported experiencing food insecurity second to job loss while urban households reported experiencing input inflation second to job loss. Despite anticipated effects of pandemic mitigation efforts leading to business closures and farming and activity disruptions, household reports of experiences of business closures and activity disruptions were low. Assessing the dependency on local agricultural production for food and identifying barriers to access is necessary to further understand the leading reasons for the prevalence of food insecurity. There is also further follow-up that can be done to better understand the reasoning for job loss in the context of minimal business disruption and closure.

In the construction of an additive HardshipIndex variable, I found that the mean number of hardships experienced by households in the Kersa and Harar regions of Ethiopia was 3, with a minimum 0 and maximum of 10 hardships reported to have been experienced. 11.8% of households reported not having experienced any of the COVID-related hardships as outlined in the study and over 2/3 households experienced 2 or more COVID-related hardships. No

households reported having experienced all 11 outlined hardships. In assessing the associations between the literature identified sociodemographic factors and household-level experiences of COVID-related hardship, it was found that residence, head of household occupation, and head of household education/literacy level were important sociodemographic factors associated with vulnerability of hardship experienced by households. Among the most vulnerable households to experiences of COVID-related hardships in the Kersa and Harar regions were rural residing households with heads of households that can neither read nor write and those that can read only, and heads of households that were unemployed. As can be quite easily ascertained, simply residing in a rural or urban residence is not a cause or risk factor for hardship, which is not what was assessed in the study but ascertained associations can point to further investigations needed into the contextual factors that may align with residence type. These contextual factors may include access to information, and health and financial resources, access to social support systems, and access to education and job opportunities, as well as access to transportation or necessary basic infrastructure.

Study Limitations and Implications

The cross-sectional design of the study limits the ability to make any causal inferences or assess change in situations beyond assessing the state of COVID-19-related hardship experiences of the study population at the time of data collection. Temporally specific data is necessary to assess changes in baseline experiences of hardship compared to the status of household level hardship experiences during the pandemic to assess change and factors of change. It is important to understand that the DSS and Impact Survey data used is not nationally representative of Ethiopia but is representative of the geographic regions from which it originated, Kersa and Harar,

Ethiopia. There may also be potential for recall bias due to the nature of the survey design of the study and study participants being asked about time-bound COVID-related experiences that have spanned a particular stretch of time before survey administration and are also ongoing with frequent changes in associated conditions (Wang & Cheng, 2020). There may have been other essential sociodemographic characteristics such as head of household marital status and head of household health insurance status that were not accessible in the data to investigate associations with household experiences of hardship. There is also concern for endogeneity. There is a chance that other hardship indicator variables were missed whose inclusion may have made for a stronger Hardship Index with higher internal consistency that may be better able to represent household experiences of hardship and assess for associated factors. Further investigations of intercorrelation of independent variable should be pursued with future research.

Future Research

Building on the findings of this study, further nuanced analyses of the identified primary hardships experienced by households can be done to assess for risk factors. Explorations of the characteristics of the specifically identified hardship experiences of job loss and food insecurity can be essential in identifying which job sectors may be more volatile than other in times of public health emergencies. Association between type of occupation and job loss during the period of COVID-19 can aid in this identification. Understanding the factors affecting food insecurity, within the context of low reports of disruptions and business closures especially in rural areas where higher proportions of food insecurity were reported can provide critical knowledge. This could lead to a deeper analysis of potential environmental or infrastructural access barriers such as limited transportation to and from food access points or disruptions in the

import/export systems that may have impacted food access at the household level. Within in the context of Ethiopia, it may also be critical to assess any relationships that may exist between conflict related barriers or changes in economic activity as well as climate change related consequences or disruptions and food insecurity and job loss. Qualitative analysis of the built environment such as the state of public infrastructure, availability of goods and services, as well as support systems will provide important information and lessons on the vulnerability or resilience factors of local communities furthering knowledge in this area.

References

Abeyasekera, S. (2005). Multivariate methods for index construction. *Household Surveys in Developing and Transition Countries: Design, Implementation and Analysis*.

Akseer, N., Kandru, G., Keats, E. C., & Bhutta, Z. A. (2020). COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. *Am J Clin Nutr, 112*(2), 251-256. doi:10.1093/ajcn/nqaa171

Allotey, P., Verghis, S., Alvarez-Castillo, F., & Reidpath, D. D. (2012). Vulnerability, equity and universal coverage--a concept note. *BMC Public Health, 12 Suppl 1*, S2. doi:10.1186/1471-2458-12-S1-S2

Chen, J., Vullikanti, A., Santos, J., Venkatramanan, S., Hoops, S., Mortveit, H., . . . Marathe, A. (2021). Epidemiological and economic impact of COVID-19 in the US. *Sci Rep, 11*(1), 20451. doi:10.1038/s41598-021-99712-z

Cunningham, S. A., Shaikh, N. I., Nhacolo, A., Raghunathan, P. L., Kotloff, K., Naser, A. M., . . . Breiman, R. F. (2019). Health and Demographic Surveillance Systems Within the Child Health and Mortality Prevention Surveillance Network. *Clin Infect Dis, 69*(Suppl 4), S274-S279. doi:10.1093/cid/ciz609

Eyeberu, A., Mengistu, D. A., Negash, B., Alemu, A., Abate, D., Raru, T. B., . . . Dessie, Y. (2021). Community risk perception and health-seeking behavior in the era of COVID-19 among adult residents of Harari regional state, eastern Ethiopia. *SAGE Open Med, 9*, 20503121211036132. doi:10.1177/20503121211036132

Flanagan, B. E., Gregory, E. W., Hallisey, E. J., Heitgerd, J. L., & Lewis, B. (2011). A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management, 8*(1). doi:Artn 3
10.2202/1547-7355.1792

Kingsley, J. P., Vijay, P. K., Kumaresan, J., & Sathiakumar, N. (2021). The Changing Aspects of Motherhood in Face of the COVID-19 Pandemic in Low- and Middle-Income Countries. *Matern Child Health J, 25*(1), 15-21. doi:10.1007/s10995-020-03044-9

Maeda, J. M., & Nkengasong, J. N. (2021). The puzzle of the COVID-19 pandemic in Africa. *Science, 371*(6524), 27-28. doi:10.1126/science.abf8832

Makoni, M. (2020). Africa prepares for coronavirus. *Lancet, 395*(10223), 483-483. Retrieved from <Go to ISI>://WOS:000514576900015

Menendez, C., Gonzalez, R., Donnay, F., & Leke, R. G. F. (2020). Avoiding indirect effects of COVID-19 on maternal and child health. *Lancet Global Health, 8*(7), E863-E864. doi:10.1016/S2214-109x(20)30239-4

Osendarp, S., Akuoku, J. K., Black, R. E., Headey, D., Ruel, M., Scott, N., . . . Heidkamp, R. (2021). The COVID-19 crisis will exacerbate maternal and child undernutrition and child mortality in low- and middle-income countries. *Nature Food, 2*(7), 476-484. doi:10.1038/s43016-021-00319-4

Roberton, T., Carter, E. D., Chou, V. B., Stegmuller, A. R., Jackson, B. D., Tam, Y., . . . Walker, N. (2020). Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. *Lancet Global Health, 8*(7), E901-E908. doi:10.1016/S2214-109x(20)30229-1

Salzberg, N. T., Sivalogan, K., Bassat, Q., Taylor, A. W., Adedini, S., El Arifeen, S., . . . Mortality Prevention Surveillance Methods, C. (2019). Mortality Surveillance Methods to

Identify and Characterize Deaths in Child Health and Mortality Prevention Surveillance Network Sites. *Clin Infect Dis, 69*(Suppl 4), S262-S273. doi:10.1093/cid/ciz599

Shigute, Z., Mebratie, A. D., Alemu, G., & Bedi, A. (2020). Containing the spread of COVID-19 in Ethiopia. *J Glob Health, 10*(1), 010369. doi:10.7189/jogh.10.010369

Spielman, S. E., Tuccillo, J., Folch, D. C., Schweikert, A., Davies, R., Wood, N., & Tate, E. (2020). Evaluating social vulnerability indicators: criteria and their application to the Social Vulnerability Index. *Natural Hazards, 100*(1), 417-436. doi:10.1007/s11069-019-03820-z

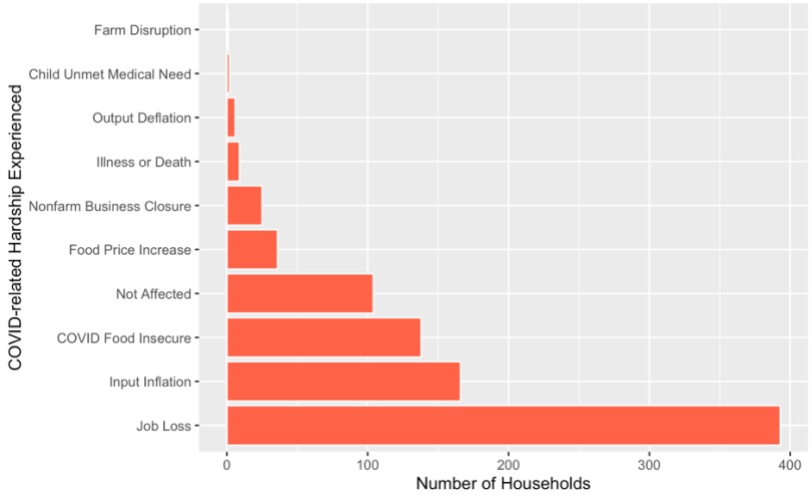
Wang, X., & Cheng, Z. (2020). Cross-Sectional Studies: Strengths, Weaknesses, and Recommendations. *Chest, 158*(1S), S65-S71. doi:10.1016/j.chest.2020.03.012

Wondimagegn, D., Petros, A., Asrat, Y., Aklilu, T., Estifanos, A. S., Addissie, A., . . . Yifter, H. (2020). COVID-19 in Ethiopia: A contextual approach to explaining its slow growth. *J Glob Health, 10*(2), 020369. doi:10.7189/jogh.10.020369

Appendix

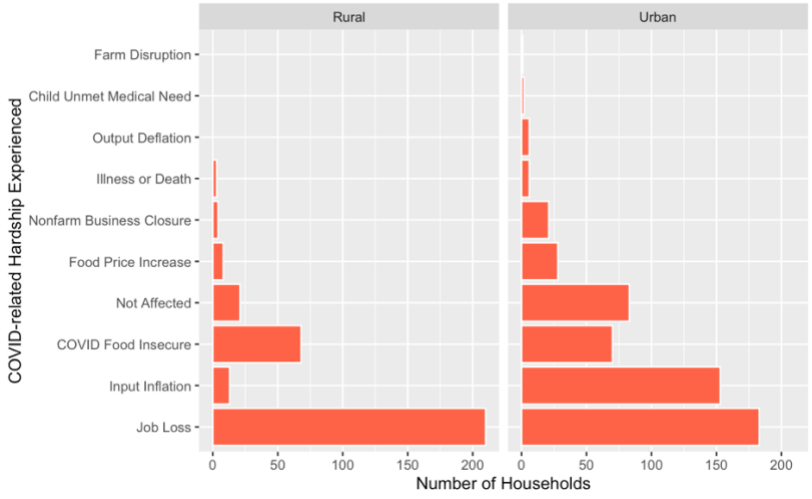
1. Tables and Figures

Figure 2. Reported COVID-related Hardships Experienced by Households



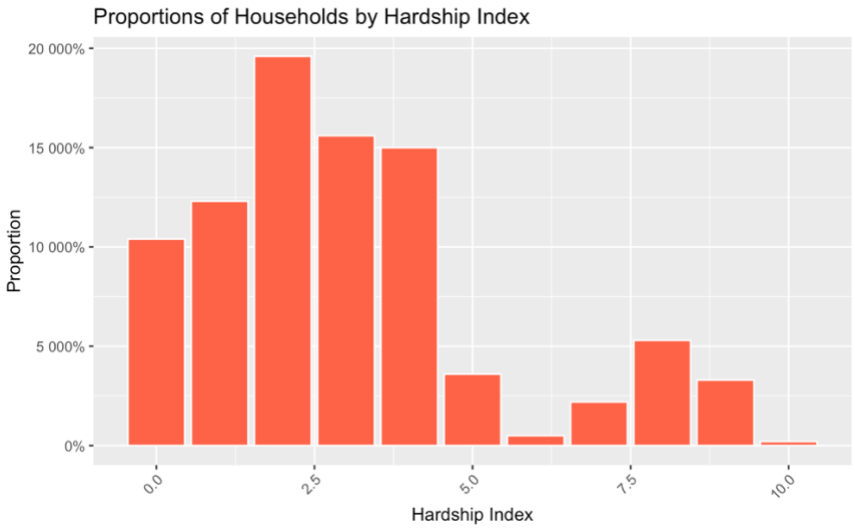
Experiences of COVID-related hardships reported by total sample of households in Kersa and Harar, Ethiopia. N=880.

Figure 3. Reported COVID-related Hardships Experience by Households by Residence



Experiences of COVID-related hardships reported by sample of households in Kersa and Harar, Ethiopia by type of residence. N=880, N_{rural}=327, N_{urban}=553. Rural and urban designations were predetermined based on the nature of the HDSS and household site.

Figure 4. Proportion of Households Experiencing Levels of Hardship



Proportion of households reporting to have experienced hardships on the additive hardship index. Index ranges from 0, not affected by any of the COVID-related hardships outlined in the study, to 11, having experienced all 11 hardships as outline.

Table 1. Summary statistics of Analytic Sample and Variables of Interest

Table 1. Descriptive Statistics

Variable	N	Mean / %	SD	Min	Median	Max
Residence	**880**					
... Rural	327	37.2%				
... Urban	553	62.8%				
HoH Age	880	51.006	14.425	14.623	48.704	104.704
HoH AgeCategory	**880**					
... 14-24 y/o	7	0.8%				
... 25-34 y/o	92	10.5%				
... 35-44 y/o	224	25.5%				
... 45-54 y/o	243	27.6%				
... 55-64 y/o	166	18.9%				

... 65-105 y/o	148	16.8%				
HoH Sex	**880**					
... Female	303	34.4%				
... Male	577	65.6%				
HoH Education Level	**871**					
... Literate	474	54.4%				
... Read only	15	1.7%				
... Can read and write	21	2.4%				
... Neither read nor write	361	41.4%				
HoH Occupation	**871**					
... Farmer	319	36.6%				
... Employed farmer	1	0.1%				
... Merchant	45	5.2%				
... Private employee	22	2.5%				
... Petty trader	30	3.4%				
... Housewife	81	9.3%				
... Student	59	6.8%				
... Unemployed	34	3.9%				
... Retired	53	6.1%				
... Government employee	133	15.3%				
... NGO worker	6	0.7%				
... Daily Laborer	67	7.7%				
... Other	21	2.4%				
Family Number	880	4.955	2.381	1	5	15
Children Under 5	880	0.482	0.748	0	0	3
Elderly	880	0.318	0.563	0	0	2
HH Average Monthly Income	880	3496.859	5821.415	150	2950	150000
COVID Food Insecure	**880**					
... No	742	84.3%				
... Yes	138	15.7%				
Job Loss	**880**					
... No	392	44.5%				
... Yes	488	55.5%				
Nonfarm Business Closure	**880**					
... No	614	69.8%				
... Yes	266	30.2%				
Farm Disruption	**880**					
... No	762	86.6%				
... Yes	118	13.4%				
Livestock Disruption	**880**					
... No	648	73.6%				
... Yes	232	26.4%				
Fishing Disruption	**880**					
... No	769	87.4%				
... Yes	111	12.6%				
Input Inflation	**880**					

... No	442	50.2%				
... Yes	438	49.8%				
Output Deflation	**880**					
... No	635	72.2%				
... Yes	245	27.8%				
Food Price Increase	**880**					
... No	356	40.5%				
... Yes	524	59.5%				
Illness or Death	**880**					
... No	788	89.5%				
... Yes	92	10.5%				
Child Unmet Medical Need	**880**					
... No	844	95.9%				
... Yes	36	4.1%				
Hardship	**880**					
... Child Unmet Medical Need	2	0.2%				
... COVID Food Insecure	138	15.7%				
... Farm Disruption	1	0.1%				
... Food Price Increase	36	4.1%				
... Illness or Death	9	1%				
... Input Inflation	166	18.9%				
... Job Loss	393	44.7%				
... Nonfarm Business Closure	25	2.8%				
... Not Affected	104	11.8%				
... Output Deflation	6	0.7%				
HardshipIndex	880	3.055	2.367	0	3	10
HardshipExperience	**880**					
…No	104	11.8%				
…Yes	776	88.2%				

HoH: Head of Household
HH: Household

Table 2. Summary statistics of Analytic Sample and Variables of Interest by Urbanicity

Table 2. Urbanicity Descriptive Statistics

Variable	N	Mean / %	SD	Min	Median	Max	N	Mean / %	SD	Min	Median	Max
	Rural						Urban					
HoH Age	327	51.96	14.125	14.623	50.705	93.834	553	50.442	14.583	22.705	47.704	104.704
HoH AgeCategory	**327**						**553**					
... 14-24 y/o	6	1.8%					1	0.2%				
... 25-34 y/o	26	8%					66	11.9%				
... 35-44 y/o	84	25.7%					140	25.3%				
... 45-54 y/o	91	27.8%					152	27.5%				
... 55-64 y/o	65	19.9%					101	18.3%				
... 65-105 y/o	55	16.8%					93	16.8%				

HoH Sex	327						553					
... Female	73	22.3%					230	41.6%				
... Male	254	77.7%					323	58.4%				
HoH Education Level	324						547					
... Literate	40	12.3%					434	79.3%				
... Read only	12	3.7%					3	0.5%				
... Can read and write	13	4%					8	1.5%				
... Neither read nor write	259	79.9%					102	18.6%				
HoH Occupation	324						547					
... Farmer	236	72.8%					83	15.2%				
... Employed farmer	0	0%					1	0.2%				
... Merchant	0	0%					45	8.2%				
... Private employee	0	0%					22	4%				
... Petty trader	0	0%					30	5.5%				
... Housewife	45	13.9%					36	6.6%				
... Student	17	5.2%					42	7.7%				
... Unemployed	9	2.8%					25	4.6%				
... Retired	5	1.5%					48	8.8%				
... Government employee	2	0.6%					131	23.9%				
... NGO worker	0	0%					6	1.1%				
... Daily Laborer	0	0%					67	12.2%				
... Other	10	3.1%					11	2%				
Family Number	327	6.266	2.19	1	6	15	553	4.179	2.139	1	4	14
Children Under 5	327	0.676	0.85	0	0	3	553	0.367	0.655	0	0	3
Elderly	327	0.321	0.568	0	0	2	553	0.316	0.561	0	0	2
HH Monthly Income	327	2103.976	1146.761	250	1800	10000	553	4320.499	7166.503	150	3000	150000
COVID Food Insecure	**327**						**553**					
... No	259	79.2%					483	87.3%				
... Yes	68	20.8%					70	12.7%				
Job Loss	**327**						**553**					
... No	67	20.5%					325	58.8%				
... Yes	260	79.5%					228	41.2%				
Nonfarm Business Closure	**327**						**553**					
... No	113	34.6%					501	90.6%				

... Yes	214	65.4%					52	9.4%				
Farm Disruption	**327**						**553**					
... No	215	65.7%					547	98.9%				
... Yes	112	34.3%					6	1.1%				
Livestock Disruption	**327**						**553**					
... No	106	32.4%					542	98%				
... Yes	221	67.6%					11	2%				
Fishing Disruption	**327**						**553**					
... No	219	67%					550	99.5%				
... Yes	108	33%					3	0.5%				
Input Inflation	**327**						**553**					
... No	181	55.4%					261	47.2%				
... Yes	146	44.6%					292	52.8%				
Output Deflation	**327**						**553**					
... No	115	35.2%					520	94%				
... Yes	212	64.8%					33	6%				
Food Price Increase	**327**						**553**					
... No	158	48.3%					198	35.8%				
... Yes	169	51.7%					355	64.2%				
Illness or Death	**327**						**553**					
... No	288	88.1%					500	90.4%				
... Yes	39	11.9%					53	9.6%				
Child Unmet Medical Need	**327**						**553**					
... No	304	93%					540	97.6%				
... Yes	23	7%					13	2.4%				
Hardship	**327**						**553**					
... Child Unmet Medical Need	0	0%					2	0.4%				
... COVID Food Insecure	68	20.8%					70	12.7%				
... Farm Disruption	0	0%					1	0.2%				
... Food Price Increase	8	2.4%					28	5.1%				
... Illness or Death	3	0.9%					6	1.1%				
... Input Inflation	13	4%					153	27.7%				
... Job Loss	210	64.2%					183	33.1%				
... Nonfarm Business Closure	4	1.2%					21	3.8%				

... Not Affected	21	6.4%					83	15%				
... Output Deflation	0	0%					6	1.1%				

HoH: Head of Household
HH: Household

Table 3. Bivariate Regression Series: Independent sociodemographic factors associated with household-level experiences of COVID-related hardship

Outcome:	HardshipIndex		
Sociodemographic Factor	**Intercept**	**Coefficient**	**P-Value**
Head of Household Age	2.79	0.005	0.344
Household Size	1.635	0.287	2.20E-16 *
Household Average Monthly Income	3.193	-3.90E-05	4.00E-03*
Number of Children under 5	2.94	0.244	0.022*
Number of Elderly Adults	3.04	0.031	0.8254
Residence: Rural | Urban	4.81	-2.79	2.20E-16*
Head of Household Sex: Female | Male	2.71	0.52	0.0019*
HoH Occupation: Unemployed |	3.29		2.20E-16*
| Farmer		0.784	
| Employed Farmer		-3.294	
| Merchant		-1.294	
| Private Employee		-1.249	
| Petty Trader		-1.327	
| Housewife		0.644	
| Student		-0.853	
| Retired		-1.124	
| Government Employee		-1.429	
| NGO Worker		-1.294	
| Daily Laborer		-1.011	
| Other		-0.437	
HoH Education/Literacy Level | Neither Read Nor Write	4.144		2.20E-16*
| Read Only		1.256	
| Literate		-1.961	
| Can Read and Write		-1.954	

Reference group | Index group
HoH: Head of household
*** statistically significant, alpha = 0.05**

Table 4. Regression Model: Sociodemographic factors associated with household-level experiences of COVID-related hardship

Outcome Variable	HardshipIndex
	Full Model
(Intercept)	5.23 ***
	[4.50, 5.96]
Residence	-2.49 ***
	[-2.92, -2.07]
Head of Household Age	-0.04
	[-0.23, 0.15]
Head of Household Sex	0.12
	[-0.23, 0.48]
Head of Household Occupation	
Farmer	-0.53
	[-1.25, 0.19]
Employed Farmer	-2.47
	[-6.32, 1.38]
Merchant	-0.54
	[-1.41, 0.33]
Private Employee	-0.53
	[-1.58, 0.52]
Petty Trader	-0.71
	[-1.66, 0.25]
Housewife	-0.12
	[-0.92, 0.68]
Student	-0.80
	[-1.64, 0.03]
Retired	-0.70
	[-1.56, 0.16]
Government Employee	-0.74
	[-1.49, 0.02]
NGO Worker	-0.53
	[-2.21, 1.16]
Daily Laborer	-0.33
	[-1.14, 0.48]
Other	-1.15 *
	[-2.22, -0.09]
Head of Household Education/Literacy Level	
Read Only	1.04 *
	[0.04, 2.04]
Literate	-0.24
	[-0.63, 0.15]
Can Read and Write	-1.58 ***
	[-2.44, -0.71]
Household Size	0.12
	[-0.03, 0.27]
Number of Children under 5 Years of Age	-0.11
	[-0.25, 0.03]
Number of Elderly Adults (age 65+)	0.02
	[-0.16, 0.21]

Household Average Monthly Income	0.04 [-0.10, 0.17]
N	871
R^2	0.35
Adjusted R^2	0.3372

All continuous predictors are mean-centered and scaled by 1 standard deviation. *** p < 0.001; ** p < 0.01; * p < 0.05. Full Model contains all sociodemographic factors identified to be important to household vulnerability through the literature review process.

2. Analysis Codebook

ANALYSIS CODEBOOK

	Variable Name | Recoded name	Variable Description	Variable values	Variable Value description
1	HoH Age	Age (in years)		
2	| Age Category	Age category	0	14-24 years
			1	25-34 years
			2	35-44 years
			3	45-54 years
			4	55-64 years
			5	65-105 years
3	dss_s2 | Residence	Urbanicity	1	Urban
			0	Rural
4	HoH Sex	Sex	1	Male
			0	Female
6	dss_s7 | Family Number	Number of Family Members		
7	HoH Education Level	Education level	0	Neither read nor write
			1	Read only
			2	Literate
			3	Can read and write
8	HoH Occupation	Occupation	0	Unemployed
			1	Farmer
			2	Employed Farmer
			3	Merchant
			4	Private employee
			5	Petty trader
			6	Housewife
			7	Student
			8	Retired
			9	Government employee

			10	NGO worker
			11	Daily Laborer
			12	Other
9	dss_s11 | HH Monthly Income	Household monthly income		
10	Children Under 5 (Linked)	Number of children under 5		
11	Elderly (Linked)	Number of adults over 65 years		
12	dss_p2a | COVID Food Insecure	Food Insecurity-During Covid Lockdown-	0	No
			1	Yes
13	dss_m1_01 | Job Loss	Covid-19-related: Job Loss	0	No
			1	Yes
14	dss_m1_02 | Nonfarm Business Closure	Covid-19-related: Nonfarm business closure	0	No
			1	Yes
15	dss_m1_03 | Farm Disruption	Covid-19-related: Disruption of farming	0	No
			1	Yes
16	dss_m1_04 | Livestock Disruption	Covid-19-related: Disruption of livestock activities	0	No
			1	Yes
17	dss_m1_05 | Fishing Disruption	Covid-19-related: Disruption of fishing activities	0	No
			1	Yes
18	dss_m1_06 | Input Inflation	Covid-19-related: Increased price of farming or business inputs	0	No
			1	Yes
19	dss_m1_07 | Output Deflation	Covid-19-related: Decreased price of farming or business outputs	0	No
			1	Yes
20	dss_m1_08 | Food Price Increase	Covid-19-related: Increased price of major food items consumed	0	No
			1	Yes

21	dss_m1_09 | Illness OR Death	Covid-19-related: Illness, injury, or death of any household member	0	No
			1	Yes
22	dss_q3 | Child Unmet Medical Need	Child Unmet Medical Need	0	No
			1	Yes