

Are Effects of COVID-19 Understated? Gender-Based Implications on Income, Coping Strategies and Time Allocation in Ethiopia

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ABSTRACT

This study investigates impacts of COVID-19 on household income, coping strategies, and time allocation challenges using gender-differentiated approach. Data from two rounds of phone surveys conducted in Ethiopia were used. The findings reveal significant impacts of COVID-19 and its containment measures on the income of both male-headed (50 percent) and female-headed households (44 percent). In response to income decline, majority of male (70 percent) and female (64 percent) respondents resorted to saving as a coping strategy. This outcome underscores the prevalent gender disparity in financial inclusion within Ethiopia. A comparative analysis of time allocation for reproductive and domestic activities before and during the pandemic indicates that women allocated more hours than men to these tasks. It is, therefore, crucial to acknowledge and assign value to women's contributions, given their predominant role in reproductive and domestic activities. These activities are essential components of daily life within households and contribute significantly to the overall economy.

Keywords: Gender, COVID-19, Income, Coping strategies, Time allocation.

INTRODUCTION

The first Coronavirus case was reported in Ethiopia on March 13, 2020 and since this time, the Government of Ethiopia undertook various restrictions to contain the spread of the virus. Some of these measures include suspension/closure of schools, sporting events, public gatherings; a regulation for anyone entering into Ethiopia to undergo a mandatory government supervised-quarantine for 14 days, and declaration of a five-month long State of Emergency (SoE) starting on April 8, 2020. These restrictions and lock down measures have implications on income and could lead to substantial economic costs especially for the poor segments of the population. In addition to its impact on education, health, and other public services, the COVID-19 pandemic has resulted in unprecedented shocks to households' income and food security. The pandemic has reduced economic activities and mobility, increased higher transaction costs, and lowered trading activities which disrupted resource allocations within countries and across sectors,

increased inefficiency in the economy, and reduced total productivity growth (see Bartik et al. 2020; Apedo-Amah et al. 2020).

The COVID-19 pandemic preventive mechanisms such as strong containment measures, including lockdowns, stay-at-home orders, and restricted mobility caused various economic and socioeconomic consequences (Ge et al., 2022). These consequences include significant loss of income (Ragasa and Lambrecht, 2020), disruption of agricultural activities such as farming and access to farm inputs and markets (Arndt et al. 2020) that have exacerbated food insecurity and related nutrition deficiencies (Naja and Hamadeh, 2020). In addition, reductions in incomes and restrictions in access to food markets may lead to a decline in the diversity of diet and shifts from high-quality but more expensive items to cheaper substitutes (Abay et al. 2020). Like the rest of the world, many African countries experience some form of food insecurity, particularly among poor households and remote or rural communities. For example, Chiwona-Karltun et al. (2021) found that concern about the local spread of COVID-19 and the economic impact of the virus increases the probability of food insecurity in Sub-Saharan African countries. Govender et al. (2021) state that in Eastern and Southern Africa (ESA) countries affected by the COVID-19 pandemic, public health measures designed to control the spread of the virus have reduced economic activities and severely deteriorated the livelihood of people. Many people in ESA are employed informally, have low-paid contract positions, or receive hourly wages. The containment measures of the pandemic, such as the sudden closure of formal and informal businesses, have caused a significant reduction in income for many people, with household food and health security being threatened. Moreover, the pandemic resulted in a significantly higher proportion of job loss i.e., about 8 percent of respondents lost their jobs at the beginning of the outbreak, where job losses were higher in urban (20 percent) than in rural areas (3 percent) and higher for women (13 percent) than for men (6 percent) (Wieser et al. 2020).

Studies show that the continued rise in the spread of COVID-19 poses various challenges to food supply chains (Minten et al., 2020; Morton, 2020; Richards and Rickard, 2020) and raises concerns about household food security (Harris et al. 2020). As a response to this, food stockpiling may be frequently observed where consumers buy substantial amounts of food products to avoid possible future shortages or increased food prices. Food stockpiling could also be due to movement restrictions and consumers' concern about minimizing movements (from home to markets). Hence, it will be critical to understanding consumer food stockpiling behavior in the face of the current COVID-19 pandemic in developing countries.

The very few snapshot surveys conducted in Ethiopia over the past few months indicated that when the news of travel restrictions emerged, people have started stockpiling food, sometimes more than what they need (Omer and Hassen 2020). Wieser et al. (2020) reported that most households were able to buy enough of the food items they needed such as teff, wheat, maize, and edible oil. Of those who could not buy enough food, affordability (because of higher prices) was the biggest challenge (Wieser et al. 2020). Other studies argue that stockpiling food items is more pronounced at macro level in view of tackling the pressure borne by the pandemic. Currently, the biggest and most popular one is the Emergency Food Security Reserve (EFSR), which stockpiles 410'000mt (mainly wheat, maize and sorghum). It has storage sites located in seven different food insecurity-prone areas (Häberli 2013). The main objective of the EFSR is price stabilization and emergency assistance to the most vulnerable population in Ethiopia. However, to our knowledge, no studies systematically analyzed the impact of the COVID-19

pandemic on the extent and trends of food stockpiling and variations across women-headed and male-headed households in Ethiopia.

The COVID-19 pandemic has disproportionately affected women-headed households in various ways. For example, the UN Women's report reveals that the COVID-19 shock and measures to prevent its spread are driving a disproportionate increase in women's unemployment (compared to men's) and decreasing their overall working time. Hence, this study aims to take a rather focused dimension on micro-implications of COVID-19 by examining the impact of the pandemic on the income of various segments of the population (namely salaried workers, daily wage, and self-employed), mainly through a gender lens. This helps to provide a broader perspective on how the pandemic has affected the livelihood of males and females precisely and provides targeted policy recommendations.

The COVID-19 pandemic caused disparities between males and females in the total allocation of paid (productive) and unpaid work (person care and house works). For example, Bahn et al. (2020) argue that the COVID-19 pandemic reveals how the usual functioning of the labor market combines with gender roles to require more work from women than from men. They also state that the pandemic increased the burden of women by increasing the need for home-based caring, mainly caused by the closing of schools and childcare facilities, and also a surge in the number of sick people who need closer attention and help.

Consistent with this argument, using a survey of Australian men and women conducted during a state-imposed lockdown in May 2020, Craig and Churchill (2021) examine the effect of the COVID-19 pandemic on paid work, domestic work, and caring responsibilities. They find that the domestic burden has increased for both male and female respondents. While females shouldered most of the unpaid workloads, males' childcare time increased in relative terms. This indicates that the pandemic has narrowed gender gaps in average terms. However, the relative gap between males and females in housework remained after the pandemic. In the same vein, Fodor et al. (2021), using survey data in Hungary, examine the effect of the COVID-19 pandemic on the gendered division of childcare duties. The authors find that the pandemic has significantly increased the gender gap (in absolute terms) in terms of the allocation of working hours for childcare activities.

To attenuate the negative effects of the COVID-19 pandemic (e.g., reduction in income), individuals may use various coping strategies. Some of these strategies include using own savings; borrowing; selling productive assets and reducing non-food and food expenditures, which may have implications for food security. Hence, this paper aims to identify the most common coping strategies employed disaggregated by income sources and gender. This analysis can help policymakers and Governments better tailor, implement interventions and policy responses, and monitor their effects.

Therefore, our paper attempts to fill this gap in the literature by undertaking the following tasks. First, it identifies the most commonly used coping strategies against income decline induced by the COVID-19 pandemic. Second, it identifies factors determining consumers' food stockpiling behavior due to the COVID-19 pandemic. In addition, our dataset allows us to examine differences in time allocation on productive and care work and housework roles

before and during the COVID-19 pandemic among women-headed and men-headed households.

The remainder of the paper is organized as follows. Section 2 discusses a review of the related literature. Section 3 describes the data. Section 4 outlines the empirical methodology. Section 5 provides results and discussion. Finally, Section 6 concludes.

MATERIALS AND METHODS

Data

This research uses two primary data sources. One is a rapid assessment survey conducted in Ethiopia in April 2020 by Frontieri Consult, Ethiopia, in collaboration with Humboldt University of Berlin, Germany. The second is a follow-up survey conducted in October 2021 by taking a sub-sample of respondents from the first survey round. The first-round survey was implemented with a mobile-phone data collection approach and cross-sectional design targeting citizens of age 18 and above in nine regional states and two city administrations in Ethiopia (Figure 1). Sampling for this survey aimed to construct an urban biased representative sample that could help to draw inferences vis-à-vis understanding the income implications of COVID-19, various coping strategies employed, and consumer food stockpiling behavior. Stratified random sampling was used where the regional states/city administrations constituted our strata. A sample size of 1,050 respondents was estimated for the eligible population based on a 3 percent sampling margin of error at a 95 percent confidence level.

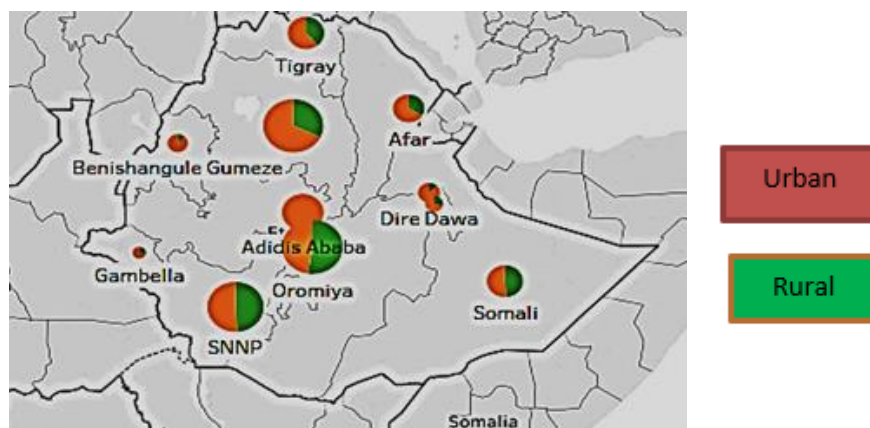


Figure 1: Distribution of respondents across regions in Ethiopia

Following standard procedure, sampling frames for a mobile-phone survey could be from three sources. These include sampling from existing nationally representative surveys with mobile-phone numbers of respondents, sampling from a list of valid phone numbers from telecommunication, and using random digit dialing (Himelein et al. 2020). Out of these three alternatives, the most viable and immediately accessible option for the rapid assessment was the one where a sample of respondents was drawn from an already conducted nationally representative survey at Frontieri with registered mobile-phone numbers of respondents. Sixteen enumerators were trained to conduct the mobile phone-based survey and interviewed 1,037 respondents from April 9-25, 2020, where one interview took an average of 25 minutes. Verbal consent was obtained from all participants before administering the questionnaire.

The research team conducted a follow-up telephone survey in October 2021 on a subset of sampled respondents from the April 2020 first round of survey. This is possible since the survey has stored the telephone numbers of the interviewees from round one in April 2020. In the second-round telephone survey, 453 interviews were conducted in primarily from urban and semi-urban areas. Hence, the descriptive and panel analysis results can represent urban and semi-urban segments of the population of Ethiopia.

Empirical Methods

We used descriptive statistics (means, percentage of frequencies, and standard deviations) to assess the income implications of COVID-19 on various income groups. In addition, we explored respondents' respective coping strategies and food stockpiling behavior using descriptive analysis disaggregated by gender. Finally, we used a panel regression model to estimate the factors determining whether a respondent's income has been affected by the COVID-19 pandemic and whether respondents' have stockpiled food since they heard about the pandemic and respective movement restrictions and disruptions.

The essential advantage of using panel data is that it deals with time-invariant unobserved heterogeneity. For this, standard econometric methodology suggests using efficient panel data estimators, such as fixed and random effect estimators (Wooldridge 2002). Fixed effect estimators' control for unobserved time-invariant characteristics of households and account for within-household variations across time. Likewise, the random effects model takes care of both within and between household variations. Therefore, we undertook the Hausman test to identify the use of fixed effect or random effect estimators for result interpretation. The panel equation to be estimated can be expressed as:

$$Y_{it} = \emptyset G_i + \partial I_{it} + \beta X_{it} + \alpha_i + \varepsilon_{it}$$

Where Y_{it} is a binary outcome variable for respondent i at time t . We estimated two separate panel regressions. For identifying the determinants of reduced income, Y_{it} takes the value of 1 if a respondents' income has reduced due to the COVID-19 pandemic and 0 otherwise. For identifying the determinants of food stockpiling, Y_{it} takes the value of 1 if respondents have stockpiled food items since they heard about COVID-19 and 0 otherwise. The two main variables of interest are G and I , which denote the respondent's gender and occupation category, respectively. $\emptyset$ and ∂ are the respective estimated parameters respondent's gender and occupation category. In a way, this study pays particular attention to how gender and various occupation categories determine the likelihood of income reduction imposed by COVID-19.

Our paper also assesses how gender and different income-generating categories influence food-stockpiling behavior. X_{it} is a vector of demographic and other explanatory variables, including education, household size and other characteristics of respondent i at time t . β is the associated vector of estimated parameters. α_i denotes unobserved respondent specific effects assumed to be fixed over time and vary across respondents and ε_{it} is the error term. tt denotes the two-time frames of phone-based data collection namely first-round survey conducted in April 2020 and second-round survey conducted in October 2021. We used a balanced panel sample size of 441 respondents for the regression analysis. We also present regression results for women-

headed and men-headed households separately to disentangle significant determinants of income reduction due to COVID-19 and food stockpiling behavior during the pandemic.

RESULTS AND DISCUSSION

Descriptive Results

We focus on a gender-disaggregated indicators for the descriptive analysis by taking the average value of various relevant variables across the two survey rounds, namely in 2020 and 2021. Specifically, the pooled data from the two surveys gives us 894 observations, out of which 520 are men-headed and 374 are women-headed respondents who reside in urban and semi-urban areas of Ethiopia. Table 1 shows no significant difference in the mean age of male and female respondents. Most male and female respondents are adults aged above 30 years. Roughly 60 percent of the respondents are male, while 40 percent are female. Table 1 also shows that most male respondents were married (84 percent) compared to female respondents (62 percent). The literacy rate is lower among female respondents than male respondents, about 14 percent of female and 6 percent male respondents had no education. Similarly, the completion of primary and secondary levels of education among female respondents is lower, where 60 percent and 52 percent of male and female respondents had attended primary and secondary education. However, there exists an insignificant difference in the attainment of tertiary education among male and female respondents (i.e., 34 percent of them had attended tertiary education).

Table 1: Summary statistics of the socio-economic characteristics of the respondents

	Mean		
	Male	Female	Difference
Age group (years)			
18-24	21.82	21.37	0.44 (0.28)
25-34	29.41	28.50	0.91 (0.00)
35-50	40.35	40.55	-0.21(0.69)
51-64	56.12	57.32	-1.20(0.05)
>64	69.87	69.99	-0.02 (0.99)
Household size (#)	5.08	4.73	0.35 (0.01)
Marital status (1 = married; 0 = otherwise)	0.84	0.62	0.21 (0.00)
Education of respondent:			
0 = respondent has no education	0.06	0.14	-0.08 (0.00)
1 = respondent has completed primary and secondary education	0.60	0.52	0.08 (0.08)
2 = respondent has completed tertiary education	0.34	0.34	0.00 (0.99)
Main source of income:			
0 = Farming	0.06	0.01	0.06 (0.00)
1 = Self-employment	0.32	0.23	0.09 (0.04)
2 = Daily wage employment	0.13	0.08	0.05 (0.09)
3 = Salaried employment	0.37	0.38	-0.01 (0.81)
4 = Other sources of income*	0.13	0.31	-0.18 (0.00)
Respondent feels that he/she is at risk of COVID-19 virus (1 = yes; 0 = no)	0.37	0.30	0.07 (0.03)
Respondent expects virus transmission grows alarmingly** (1 = yes; 0 = no)	0.27	0.17	0.11 (0.00)

Respondent holds an opinion on food price increase due to COVID-19 (1 = yes; 0 = no)	0.73	0.70	0.03 (0.33)
Respondents who have benefited from any government support (such as food aid, finance, loan redemption) related to the COVID-19/Coronavirus pandemic	0.02	0.02	-0.01 (0.62)
Respondents who have received any assistance from any institution (the government, international organizations, and religious bodies) in the form of cash or kind	0.02	0.06	-0.05 (0.00)
Reported income reduction due to COVID-19 (1 = yes; 0 = no)	0.50	0.44	0.06 (0.08)
Stock-piled food items since the news about COVID-19 (1=yes; 0 = no)	0.26	0.25	0.01 (0.68)
Number of observations	520	374	

Notes: We checked the significance of the mean differences across male and female respondents using t-test. The p-values for the t-test of are provided in parenthesis. *Other sources of income include housewife/househusband, not working/unemployed, student, and community/religious worker.

Concerning income sources, Table 1 shows that a smaller proportion of both male (6 percent) and female (1 percent) respondents were engaged in farming activities to generate income. The main reason for this evidence is that we surveyed urban and semi-urban areas of Ethiopia where a few individuals were involved in agricultural activities. This result is consistent with Yalew (2020), who states that urban agriculture contributes 0.5 percent to the overall crop production in Ethiopia. Furthermore, Table 1 demonstrates that more than one-third of male and female respondents were engaged in salaried employment. On the other hand, compared to female respondents (23 percent), a higher proportion of male respondents (32 percent) were engaged in self-employment. Likewise, while 13 percent of male respondents were involved in daily wage employment, 8 percent of female respondents were engaged in the same economic activities. Female respondents had a lower perception of being at risk (30 percent) due to the COVID-19 pandemic than male respondents (37 percent). This evidence could have a strong association with lower expectations among female respondents (17 percent) that the coronavirus transmits alarmingly than male respondents (27 percent).

Although the Ethiopian government implemented numerous policy measures to support individuals to reduce the negative consequences of the COVID-19 pandemic, the support measures have yet to reach a majority of citizens. Table 1 presents that only 2 percent of male and female respondents have benefited from government support (such as food aid, finance, and loan redemption) related to the COVID-19 pandemic. However, the results should be taken with caution, since our sample is urban and semi-urban biased, and the government support could have reached rural areas not captured in our sample. Nevertheless, our results show that even for urban and semi-urban areas, support to male and female respondents (in any form) was reported by only 2 percent of respondents. Our results also indicate that this minimal support should have also considered the pandemic's more distinct effect on women-headed households. Studies showed that female food insecurity was reported to have increased twice as compared with their male counterparts (Negesse et al. 2020). Hence, at the macro level, the severity of food insecurity among female-headed households in Ethiopia was more pronounced than the general national estimate of food insecurity. This evidence suggests that the government of Ethiopia needs to outlook how economic and health-related shocks, such as the COVID-19 pandemic, affect women's involvement in every aspect of activity and their level of household food security.

Significant proportion of male respondents (50 percent) were severely affected by income reduction induced by the COVID-19 pandemic compared to female respondents (44 percent). This evidence could have a strong association with the fact that a higher proportion of male respondents (13 percent) were engaged in daily wage employment compared to female respondents (8 percent). This workforce segment is particularly vulnerable to economic shocks, such as the labor market and health shocks, including the COVID-19 pandemic. Hence, for households engaging in daily wage employment, COVID-19 and its containment measures, such as lockdowns, movement restrictions, and other mitigation measures, have significantly affected their employment opportunities and income levels. In addition, the higher loss of income among the male respondents (compared to female respondents) could be attributed to the existing evidence in the Ethiopian labor markets. Specifically, according to the World Bank development indicators in 2019, the male labor force comprises a higher proportion (53.4 percent) of the total labor force than the female labor force. Thus, this evidence indicates that the burden of losing jobs and income due to the COVID-19 pandemic could be relatively higher in the male labor force than in its counterpart.

For those respondents that reported an income reduction due to the COVID-19 pandemic, a follow-up question was posed where respondents were requested regarding the coping strategies used in response to income shock. Table 2 presents the list of coping strategies (disaggregated by primary sources of income and gender of respondents) taken by the respondents to cope-up with the adverse impact of the COVID-19 pandemic on their income. Both male and female respondents reported saving as the most commonly used coping strategy against income decline. However, a higher proportion of male respondents using savings as the most important coping strategy. Specifically, about 70 percent of male and 64 percent of female respondents reported using their savings to compensate for the income reduction. This result could have strong association with the existing gender disparity in terms of financial inclusion in Ethiopia. For example, in Ethiopia, males are 16.6 percent more likely to have formal savings and 8.4 percent more likely to use savings for emergency funding compared to females (see Hundie and Tulu, 2021).

Table 2 further demonstrates that there is insignificant variation in male and female respondents who engaged in farming activities using various coping strategies. Regarding self-employment, in particular, 28 percent and 41 percent, respectively, male and female respondents used borrowings from family and friends to cope with the income reduction induced by the COVID-19 pandemic. Furthermore, about 50 percent of male respondents involved in daily wage employment had higher opportunities of accessing formal credit than their female counterparts (38 percent). Similarly, about 54 percent of male respondents who engaged in daily wage employment used borrowing from family and friends compared to 46 percent of their female counterparts. This result shows that access to both formal and informal credit for those engaged in daily wage employment is consistently lower for female respondents.

It is important to note from Table 2 that a larger proportion of both male and female respondents used borrowing from family and friends than from using credit from formal institutions. This could be the case that while the number of banks is increasing, the majority of Ethiopians, mainly the very poor and those engaged in micro and small businesses do not

have access to formal credit. Value of assets and collateral are one the main factors affecting households' likelihood of being credit constrained in Ethiopia (see Kedir, 2003).

Reduction in food expenditure is reported as a coping strategy by about 29 percent of male and 35 percent of female respondents. Reduction in food expenditure has clear implications for food security, and our data set shows that this coping strategy is reported more often by female than male respondents. Similarly, reduction in non-food expenditure more often by female respondents (38 percent) as compared to male respondents (29 percent). However, there appears to be insignificant variation among male and female respondents in stockpiling food since the news release about the COVID-19 pandemic. About one-fourth of male and female respondents have stockpiled food items.

Table 2: Coping strategies by income-generating activities (percent)

	All respondents*		Farming		Self-employed		Daily wage earners		Salaried employed		Others	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Formal credit	0.20	0.21	0.25	0.00	0.14	0.31	0.50	0.38	0.10	0.00	0.11	0.12
Borrowed from family and friends	0.31	0.32	0.00	0.00	0.28	0.41	0.54	0.46	0.05	0.20	0.11	0.06
Used saving	0.70	0.64	1.00	0.00	0.71	0.81	0.81	0.46	0.55	0.50	0.44	0.75
Received <i>Equb</i>	0.11	0.12	0.00	0.00	0.05	0.00	0.34	0.00	0.05	0.00	0.00	0.00
Reduced food expenditure	0.29	0.35	0.00	1.00	0.13	0.03	0.04	0.08	0.20	0.20	0.33	0.13
Reduced non-food expenditure	0.29	0.38	0.00	0.00	0.09	0.00	0.08	0.15	0.05	0.10	0.22	0.00
Did Nothing	0.09	0.11	0.00	0.00	0.11	0.09	0.04	0.08	0.20	0.10	0.00	0.19
N	520	374	16	1	81	42	32	14	94	70	33	58

*The sample size is considering only those respondents who reported an income decline.

Our data also enables us to assess the amount of time allocated to paid work (productive work), care work (e.g., childcare and caring for the sick), and housework (e.g., house cleaning and cooking) by men and women in the period of before COVID-19 and during COVID-19 pandemic. Table 3 shows that the COVID-19 pandemic has increased the difference between hours spent on productive activities per day among male and female respondents. Furthermore, the result shows that the pandemic has widened the difference (in absolute terms) in hours spent on care work and housework activities among male and female respondents. This evidence is consistent with Del Boca et al. (2020) findings, which show that most of the additional housework and childcare associated with COVID-19 falls on women.

While female respondents spent about six hours on productive activities per day before the COVID-19 pandemic, male respondents spent more than 8 hours on average on productive activities. During the pandemic, this gap widened because females' average hours spent on productive activities has reduced to 4.7. In contrast, males' average hours spent on productive activities reduced from 8 to 7.4 hours. The difference-in-difference of hours spent on productive activities between males and females before and during the COVID-19 pandemic shows an absolute value of 0.25. This evidence supports the argument that the pandemic has increased the pre-existing difference between hours spent on productive activities per day among male and female respondents.

Table 3: Differences in time allocation on productive and Person care and housework roles before and during the COVID-19 pandemic

Statement	Before COVID- 19			During COVID- 19		
	Male	Female	Difference	Male	Female	Difference
Hours spent on productive (paid) activities per day	8.38	6.01	2.37 (0.00)	7.36	4.75	2.62 (0.00)
Hours spent on person care activities (e.g., child care and caring for the sick) per day	1.63	3.79	-2.53 (0.00)	1.80	4.42	-2.62 (0.00)
Hours spent on housework activities (e.g., house cleaning and cooking) per day	1.03	3.18	-2.15 (0.00)	1.11	3.46	-2.34 (0.00)
Do you have paid domestic/house help	0.17	0.18	-0.01 (0.00)	0.14	0.12	0.02 (0.00)
Number of observations	520	374		520	374	

Examining the difference in hours spent on care work (e.g., child care and caring for the sick) and domestic activities (e.g., house cleaning and cooking), we find that women's time spent on these activities increased much more during the pandemic as compared to men. The number of hours spent on care work for men increased only from 1.63 before the pandemic to 1.8 during the pandemic; for women, the reported increase is from 3.8 to 4.4 hours per day. We also observe a similar trend in the average number of hours spent on domestic work. Concerning the availability of paid domestic/house help, we do not find significant differences between male and female respondents. However, male and female respondents reported a decline in the use of paid domestic/house help during the pandemic as compared to before the pandemic. This may be due to the increased number of hours women spend in housework and care work.

Empirical Results

Table 4 shows panel estimation results on the factors determining whether a respondent's regular sources of income have been affected by the COVID-19 pandemic. Again, we ran the panel estimation for the entire sample of a balanced panel (column 1), only for male respondents (column 2), and for only female respondents (column 3). Our findings reveal that the age of respondents plays a significant role in that aged respondents are less likely to report an income reduction due to the pandemic. This is especially significant for the entire sample and male respondents. This may have potentially correlated with the fact that a higher proportion of aged male respondents were engaged in various income-generating activities and hence can compensate for income shocks through diversified income sources.

Table 4: Factors determining whether COVID-19 pandemic affected income: Panel probit estimation

	(1): All sample	(2): Male respondents	(3) : Female respondents
VARIABLES	Income reduced due to pandemic	Income reduced due to pandemic	Income reduced due to pandemic
Age of respondent	-0.0153*** (0.00441)	-0.0149** (0.00631)	-0.0108 (0.00738)
Household size	-0.00233 (0.0270)	-0.000988 (0.0345)	0.00926 (0.0482)
Married respondent	0.1000 (0.138)	-0.193 (0.222)	0.260 (0.198)
Respondent stayed at	-0.0881	0.0762	-0.151

home due to Pandemic	(0.122)	(0.166)	(0.198)
Respondent feels at risk of virus	-0.131	-0.266*	0.0922
	(0.123)	(0.160)	(0.210)
Completed elementary and Secondary education ^a	0.238	0.323	0.328
	(0.198)	(0.296)	(0.310)
Completed tertiary education ^a	0.0480	0.253	-0.0434
	(0.227)	(0.329)	(0.362)
Self-employment (1=yes)^b	1.348***	1.588***	0.776
	(0.244)	(0.313)	(0.499)
Daily wage employment (1=yes)^b	1.425***	1.713***	0.749
	(0.279)	(0.370)	(0.531)
Salaried employment (1=yes)^b	-0.400	-0.199	-0.976*
	(0.246)	(0.302)	(0.528)
Other income sources ^{b *}	0.117	0.0114	-0.207
	(0.237)	(0.328)	(0.490)
Observations	849	507	342
Number of Household ID	453	271	192

Note: The dependent variable is respondents reporting income decline due to COVID-19 (1=income declined due to COVID-19; = 0 otherwise). The values in parentheses are standard deviation. *** p<0.01, ** p<0.05, * p<0.

^a Base category is no education; ^b Base category is farming. *Other sources of income include housewife/househusband, not working/unemployed, student, and community/religious worker.

The other set of variables of interest is the respondents' job sector. The findings show that those respondents involved in self-employment and daily wage employment are more likely than those engaged in farming to report that their regular sources of income have been affected by the COVID-19 crisis. These results reveal that the COVID-19 pandemic primarily influenced daily wage earners and self-employed. It is expected that the containment measures, such as lockdowns and movement restrictions due to COVID-19, have potentially affected sectors (such as construction works which were scaled down or even come to a halt) that hire a more significant number of daily wage earners. This is likely because daily wage earners, self-employed workers, temporary, on-call, or part-time contracts, and informal economy workers are highly exposed to income losses prompted by the pandemic (e.g., ILO, 2020).

In contrast, engagements in salaried employment showed no significant effect on the effect of income during the COVID-19 crisis. Our results for the female sample respondents show a significant (at 15percent) and negative relationship between the report of income reduction and salaried employment. Women engaged in salary employment are less likely to report income reduction significant at the 15 percent level.

Table 5 presents the results of panel probit estimation that identified factors of consumers' food stockpiling due to the COVID-19 pandemic. We ran the panel estimation for the entire sample

of a balanced panel (column 1), only for male respondents (column 2) and for only female respondents (column 3). The results reveal that aged respondents were less likely to stockpile food items during the COVID-19 pandemic. Furthermore, respondents' opinion about food price increment due to the COVID-19 pandemic is positively and significantly related to food stockpiling. This result is consistent for all three separate regressions (all samples, men-only and female-only respondents), showing that if respondents have the opinion that COVID-19 results in food price increases, they are more likely to stockpile food items. Likewise, respondents' expectation that the coronavirus transmits alarmingly and their opinion that COVID-19 results in a shortage of food supply increase the likelihood of food stockpiling, although at a marginally significant level.

Our estimation result shows that education is not found to have a significant relation to food stockpiling. Although not statistically significant in the sample of male respondents, we find a positive relationship between education and food stockpiling. However, this relation does not hold for the full sample or the sample of women respondents. In addition, we find a significant negative association with food stockpiling. Specifically, those engaged in self-employed, daily wage employment, and salaried employees are less likely to stockpile food items due to COVID-19.

Table 5: Factors of consumers' food stockpiling due to COVID-19 pandemic: Panel probit estimation

	(1): All sample	(2): Male respondents	(3): Female respondents
	Stockpiling	Stockpiling	Stockpiling
Age of respondent	-0.0140***	-0.00881	-0.0154**
	(0.00449)	(0.00761)	(0.00623)
Household size	-0.00222	0.0521	-0.0265
	(0.0271)	(0.0484)	(0.0333)
Married respondent	-0.0113	-0.255	0.281
	(0.139)	(0.193)	(0.217)
Respondent feels at risk of virus	-0.0849	-0.359*	0.0617
	(0.119)	(0.218)	(0.141)
COVID-19 Impact perception : shortage in food supply	0.192	0.220	0.181
	(0.118)	(0.204)	(0.144)
Opinion on food price increase due to COVID-19 (1=yes)	0.340***	0.376*	0.357**
	(0.129)	(0.215)	(0.162)
Respondent expects virus transmission grows alarmingly (1=yes)	0.102	0.207	0.0359
	(0.134)	(0.245)	(0.156)
Completed elementary and secondary Education^a	-0.0813	0.212	-0.278
	(0.198)	(0.315)	(0.276)
Completed tertiary education^a	-0.0237	0.308	-0.251
	(0.227)	(0.366)	(0.307)
Self-employment (1=yes) ^b	-0.558**	-1.092**	-0.434
	(0.240)	(0.557)	(0.278)

Daily wage employment (1=yes)^b	-0.483*	-1.369**	-0.205
	(0.262)	(0.598)	(0.300)
Salaried employment (1=yes)^b	-0.491*	-1.207**	-0.277
	(0.251)	(0.571)	(0.294)
Other income sources^b	-0.320	-0.866	-0.298
	(0.238)	(0.541)	(0.313)
Observations	847	340	505
Number of Household_ID	452	192	270

Note: The Dependent variable is respondents' food stockpiling behavior due to COVID-19 (1 = a respondent has stockpiled food due to COVID-19; 0 = otherwise). The values in parentheses are standard deviation. *** p<0.01, ** p<0.05, * p<0. ^a Base category is no education ^b Base category is farming *Other sources of income include housewife/househusband, not working/unemployed, student, and community/religious worker.

SUMMARY AND CONCLUSION

This paper addresses research questions that aim to add to the growing body of literature on the gender implications of the COVID-19 pandemic. Using a gender-differentiated approach in Ethiopia, our paper primarily examines the heterogeneous impacts of COVID-19 on households' income, coping strategies, and consumers' food stockpiling behavior. We use two rounds of telephone-based surveys administered in urban areas covering diverse regions in Ethiopia. The first-round survey was conducted in April 2020, and the second round was in October 2021. A total of 452 observations are used as a balanced panel for estimation. We use descriptive and regression analysis using a gender-disaggregated lens.

The major findings show that a larger proportion of male respondents (50 percent) were severely affected by income reduction induced by the COVID-19 pandemic compared to female respondents (44 percent). Although the Ethiopian government implemented numerous policy measures to support individuals to reduce the negative consequences of the COVID-19 pandemic, the support measures have yet to reach a majority of citizens. Our findings show that only 2 percent of male and 2 percent of female respondents have benefited from government support (such as food aid, finance, and loan redemption) related to the COVID-19/Coronavirus pandemic. This calls for a concerted effort to reach the target group in terms of designing social support programs, especially in times of global shocks such as COVID-19.

Regarding coping strategies, we find that both male and female respondents used to save as the most common coping strategy against income decline. However, more female respondents (35 percent) reported a reduction in food expenditure as a coping strategy than male respondents (29 percent). Reduction in food expenditure has clear implications for food security, and our data set shows that this coping strategy is reported more often by female than male respondents. Similarly, reduction in non-food expenditure as a coping strategy more often by female respondents (38 percent) as compared to male respondents (29 percent). This shows evidence of a clear difference in the choice of coping strategies between men and women in response to the COVID-19 pandemic.

Our data also provides supporting evidence that the COVID-19 pandemic has increased the pre-existing difference between hours spent on productive activities per day among male and female respondents. This is shown by the difference-in-difference of hours spent on productive activities between males and females before and during COVID-19 pandemic resulting in an

absolute value of 0.25. Likewise, our result shows that the pandemic has widened the difference (in absolute terms) in hours spent on care work and housework activities among male and female respondents. This implies that the pandemic has resulted in additional more housework and childcare for women than for men.

Finally, we find that those involved in self-employment and daily wage employment need particular focus while designing interventions as they are more likely affected by the COVID-19 crisis. In particular, our research provides evidence that females engaged in daily wage employment have lower access to both formal and informal credit. This implies that these population segments need special attention/intervention since their access to coping strategies is limited to smooth their consumption against income reduction in the face of the pandemic. Furthermore, although there appears to be no significant variation among male and female respondents in stockpiling food, determinants of food stockpiling, such as respondent's opinions about food price increment due to the COVID-19 pandemic, is found to a significant factor to consider for policy makers concerned with food stockpiling. Finally, given that the pandemic has disrupted global food chains, it has become increasingly evident that interventions that improve local food chains are essential to ensure food availability in local markets and minimize opinion shifts about food prices among consumers.

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