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COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment



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ABSTRACT

This study assessed implications of the Coronavirus Disease 19 (COVID-19) pandemic on household income and food security in two East African countries – Kenya and Uganda, using online survey data from 442 respondents. Results show that more than two-thirds of the respondents experienced income shocks due to the COVID-19 crisis. Food security and dietary quality worsened, as measured by the food insecurity experience scale and the frequency of consumption of nutritionally-rich foods. The proportion of food insecure respondents increased by 38% and 44% in Kenya and Uganda respectively, and in both countries, the regular consumption of fruits decreased by about 30% during the COVID-19 pandemic, compared to a normal period (before the pandemic). Results from probit regressions show that the income-poor households and those dependent on labour income were more vulnerable to income shock, and had poorer food consumption during the COVID-19 pandemic compared to other respondent categories. As such, they were more likely to employ food-based coping strategies compared to those pursuing alternative livelihoods, who generally relied on savings. Farmers were less likely to experience worsened food security compared to other respondent categories who depended to a great extent on market sources for food. In both countries, participation in national social security schemes was less likely to mitigate respondents' income shock during the COVID-19 period. Conversely, membership in savings and loan groups was correlated with less likelihood of suffering income shocks and reduction in food consumption. The results suggest that ongoing and future government responses should focus on structural changes in social security by developing responsive packages to cushion members pushed into poverty by such pandemics while building strong financial institutions to support the recovery of businesses in the medium term, and ensuring the resilience of food supply chains particularly those making available nutrient-dense foods.

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1. Introduction

The provision of food has always been a challenge facing mankind. Globally, around 820 million people face hunger daily and more than two billion people lack vital micronutrients, affecting their health and life expectancy (FAO, IFAD, UNICEF, WFP, & WHO, 2019). The root causes of food insecurity are complex and multidimensional. They are linked to a range of closely related factors, such as poverty, low access to basic social services, and inadequacy of some public policies (Abdullah et al., 2019; Sriram &

Tarasuk, 2016). In East Africa, the poverty situation is made worse by other concurrent crises, such as the desert locust (*Schistocerca gregaria*) invasions since December 2019, in addition to weather-related shocks in Kenya, and the refugee influx and weather extremes in Uganda (FSIN, 2020). WorldBank (2020b) reports that the 2016/2017 drought in Uganda stalled the pace of poverty reduction, increasing the poverty rate by 1.7 percentage points from 2013 to 21.4% in 2016, and multi-dimensional poverty incidence was estimated at 60% in the same year. In Kenya, the proportion of people living below the poverty line was estimated at 36% in 2015/16, reaching 70% in rural areas. Approximately 1.3 million people in Kenya were facing worse levels of acute food insecurity, and in need of assistance in late 2019 (USAID, 2020).

This bleak global and regional food insecurity picture will be compounded by the unfolding effects of the Coronavirus Disease

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19 (COVID-19) pandemic. First reported in Hubei province of China in December 2019 (Singhal, 2020), the virus rapidly spread throughout the world, and the World Health Organisation (WHO) declared it a global pandemic in March 2020 (Cucinotta & Vanelli, 2020). The disease has since become an unprecedented public health crisis that has led to economic and social crises. In East Africa region, the first case of COVID-19 was reported in Kenya on March 13th, 2020, and the disease has since continued to spread in the region with new infections reported every day. Consistent with World Health Organisation (WHO) guidelines and the global practice, East Africa governments instituted various restrictions to contain the spread of the disease within their boundaries. The measures included; movement restrictions, border closures, social distancing, quarantine, and closure of non-essential services. The movement restrictions enforced in Uganda were stricter than in Kenya though, akin to a total lockdown situation. Internal travel was banned throughout Uganda, with citizens only allowed to leave their homes in emergencies (Steverding & Margini, 2020).

Suffice to say, the enforcement of these stringent measures has inadvertently disrupted peoples' way of life with significant ramifications on food security and the economy. This is particularly true in East Africa, a region already struggling with widespread poverty, hunger, and malnutrition due to multiple shocks. Reports show that the region will face disruptions in three ways; the loss of income for especially people working in the informal sector who often survive on daily hand-to-mouth wages, reduction in income from remittances, and the disruption of food systems (Demekle & Kariuki, 2020; ILO, 2020; UN-Habitat & WFP, 2020), thereby creating strong tensions and food security risks. Other reported factors considered to amplify the situation in East Africa include; a large share of informal workers with no opportunity to work from home, less diversified income streams, and weak health systems. Besides, the weak or non-existent state welfare systems in Africa (Bailey & Turner, 2002) to shield households against loss of income will spell dire consequences to households on access to food, adversely affecting their nutritional status.

McKibbin and Fernando (2020) opine that infectious diseases of a pandemic nature can affect households, governments, and businesses through among other ways, increased business costs, increased public health care expenditure, and changes in labour supply due to mortality and morbidity. COVID-19 related restrictions have obstructed all stages of the food supply chain, including production, distribution, processing, and consumption (Siche, 2020; Torero, 2020), and damage of perishable agricultural commodities such as meat and vegetables (Nicola et al., 2020). In contexts where shocks lead to food gluts or shortages, food prices are bound to increase, with prices of the most nutritious foods likely to experience the highest spike. UN-Habitat & WFP (2020) report food price increases of 8 to 10% in the region between April 2019 and April 2020, following the start of the COVID-19 pandemic. Fresh produce such as vegetables, meat, and fish recorded the highest increases, driven mainly by shortages related to disruptions in the supply chain.

While various studies have examined potential impacts of the pandemic on global and national economic indicators such as global poverty, government expenditures, GDP growth, budget deficits, employment, etc (ILO, 2020; Nicola et al., 2020; Sumner, Hoy, & Ortiz-Juarez, 2020; UN-Habitat & WFP, 2020; WorldBank, 2020a), there is limited information on how the pandemic, and associated lockdown policies, is affecting individuals at the household level. Economic effects of such a pandemic disproportionately impact members of the society, depending on their socio-economic status, livelihood strategies, access to markets, etc, thus it is important to understand the household level impacts and support mechanisms that can be enhanced to ensure income smoothing. Ceballos, Kannan, and Kramer (2020) and Harris, Depenbusch,

Pal, Nair, and Ramasamy (2020) studied the impacts of COVID-19 and related restrictions on smallholders in India and reported a large degree of heterogeneity in the impacts of COVID-19 responses on agricultural activity, income, and food security. We add to the growing body of literature on the COVID-19 pandemic by examining its implications for household income and food security, covering two East African countries – Kenya and Uganda. The following specific questions were addressed: 1) What government policy responses have been put in place to alleviate the effects of the pandemic on households? 2) To what extent has COVID-19 affected income-generating activities of households and what coping measures have they implemented? 3) What is the effect of COVID-19 on household food security and dietary quality? and 4) What factors determine whether a respondent's source of income and food and nutrition outcomes have worsened during the COVID-19 pandemic? Results are based on a rapid assessment and provide empirical analysis that complements existing knowledge to guide policy discussions on food security implications and coping measures during the early days of the COVID-19 pandemic and inform decision-making on preserving the livelihoods of households most at risk due to the pandemic.

The results show that while both Kenya and Uganda instated restrictions, those in Uganda were more stringent, a situation close to total lockdown. More than two-thirds of the respondents across both countries reported experiencing income shocks due to the COVID-19 crisis. The proportion of food insecure respondents increased by 38% and 44% in Kenya and Uganda respectively. Food security outcomes declined mostly for income-poor households, and those dependent on labour income. As such, they were more likely to employ food-based coping strategies and have poorer food consumption. The rest of the paper is structured as follows. Section two provides a brief background on the COVID-19 pandemic in the two study countries and policy response to alleviate the effects of the pandemic. The data sources and estimation methods are presented in section three. Descriptive and empirical results are presented and discussed in section four, and section five concludes the paper.

2. COVID-19 in Kenya and Uganda and policy response

The first case of COVID-19 within the East Africa region was reported in Kenya on March 13th, 2020, and the disease has since continued to spread in the region with new infections reported every day. Consistent with WHO guidelines and the global practice, East Africa governments instituted various restrictions to contain the spread of the disease within their boundaries. These measures comprised country-wide partial lockdowns and curfews to restrict the movement of people, suspension of international passenger flights, a ban on public gatherings, closure of all learning institutions, hotels, restaurants, and places of worship. In Uganda, internal travel was also banned throughout the country, with citizens only allowed to leave their homes in emergencies (Steverding & Margini, 2020). While COVID-19 cases were concentrated in cities; Kampala (Uganda), Nairobi and Mombasa (Kenya), and Busia, the shared border between Kenya and Uganda, the instated restrictions applied countrywide, with implications on all segments of the society.

To cushion their citizens against the adverse economic effects of the pandemic, the governments of Kenya and Uganda announced various policy guidelines and financial stimulus packages. The Government of Kenya (GoK) announced a 100% tax relief for individuals earning a gross monthly income of KES 24,000 (~USD 230) or less, reduction of the income tax rate (Pay As You Earn - PAYE) from 30% to 25%, reduction of resident income tax (Corporation Tax) from 30% to 25%, reduction of the turnover tax rate from

3% to 1% for all small and medium enterprises (SMEs), and suspension of Credit Reference Bureau (CRB) listing for loan defaulters. Further, the GoK announced the reduction of the value-added tax (VAT) rate from 16% to 14% and an appropriation of KES10 Billion (~USD 95million) to the elderly, orphans, and other vulnerable members of the society (GoK, 2020). In May 2020, the GOK further announced a post-COVID-19 economic stimulus package of 53.7 billion shillings (\$503 million) to support businesses that have been hit by the pandemic. The package is aimed at providing credit guarantees, loans to small businesses, and help prop up tourist facilities. The Bank of Uganda (BoU), in its Monetary Policy Statement of April 06, 2020, referred to credit relief measures to mitigate the adverse effects of the COVID-19 pandemic, ensuring financial sector stability, and facilitating the financial intermediation process during this pandemic period. Among the raft of measures introduced in Uganda include repayment holidays, debt relief of up to 12 months, and reduction of the central bank lending rate from 9% to 8% (BoU, 2020). The government of Uganda also announced that they would provide food relief to vulnerable workers, particularly those whose daily activities would be affected by the lockdown, in a way of extending social protection to vulnerable sections of the population.

While these measures will to some extent mitigate the economic impacts of COVID-19 on the citizens of these two countries, they are in no way a panacea. The economies in the study countries are largely informal; in Uganda, the informal sector provides 81% and 90% of employment opportunities in urban and rural areas respectively (UBOS, 2018), while in Kenya the informal sector is estimated to account for 83.6% of total employment providing most urban informal settlement dwellers with daily wages (UEWEA, 2020). Miller et al. (2020) and Ozili (2020) suggest that social assistance programmes like direct cash and in-kind transfers to households and waiver of utility fees could have yielded more favourable outcomes to such households, in particular, the wage earners whose earning has been affected by restrictions. Besides, the relief measures came into effect when people had already lost their sources of income, and social protection measures were hardly implemented due to logistical challenges, hence amounting to minimal relief.

3. Methods

3.1. Data

Data were collected using an online questionnaire launched via google forms. The questionnaire was sent to random respondents in Kenya and Uganda using social media (WhatsApp, Facebook, Telegram, and Twitter), and via email. The COVID-19-induced social distancing and lockdowns did not allow face-to-face interviews. The two countries have been affected by COVID-19 in varying degrees, and the containment measures put in place varied, with anticipated differences in effects on food and nutritional outcomes. The online questionnaire was open for 10 days from 18th to 27th April 2020 and focused on experiences since lockdown which was approximately five weeks for both countries as at the time the study was launched. The responses were obtained from 313 and 129 people in Kenya and Uganda respectively, making a total of 442 respondents. Respondents were requested to indicate their district, and results showed that responses were distributed in both urban and rural areas scattered throughout the two countries. Given that we used a rapid online survey approach to obtain the data, it should be stressed that the sample is not representative of the two countries, and there is a possible bias towards the highly educated persons with access to the internet and smartphones. Nonetheless, it provides useful information for understanding the

food security implications of the ongoing COVID-19 pandemic that is wreaking havoc worldwide.

3.2. Empirical methods

As previously mentioned, the main objectives of this study were to analyse how residents in Kenya and Uganda are coping with the COVID-19-induced economic disruptions and to gain insight into the implications for food and nutrition security. Food security was measured using the food insecurity experience scale (FIES) which was developed by the Food and Agriculture Organization (FAO). The FIES is an experience-based measure of the access pillar of food security, and it has been validated for cross-cultural use (Ballard, Kepple, & Cafiero, 2013). It is also among a set of globally agreed indicators for measuring progress towards the achievement of the Sustainable Development Goal 2 of ending hunger and achieving food security and improved nutrition. Using the individually-referenced version of the FIES survey module (FAO, 2016a), which consists of eight short questions with dichotomous (yes/no) responses, respondents were asked about their experiences of varying degrees of food insecurity before COVID-19 and during the COVID-19 period. The eight questions related to anxiety and uncertainty about food supply, compromise on food variety and quality, insufficient food intake, and experiencing hunger (FAO, 2016b).

Following FAO (2015), three food insecurity indicators were constructed based on the sum of the eight FIES items. First, a respondent is considered to be food insecure if the raw score is greater or equal to one and zero otherwise. Secondly, a raw FIES score of four or greater corresponds to moderate or severe food insecurity. The third is a severe food insecurity indicator that is equal to one if a respondent's raw FIES score is 7 or 8 and zero otherwise. Dietary quality implications of the COVID-19 crisis were explored by asking the respondents to indicate how often they consumed five different food groups in a one-month duration before the COVID-19 pandemic and during the COVID-19 period. The food groups include fruits, vegetables, fish and seafood, meat (goat, beef, mutton, etc), and poultry products. These food groups reflect micronutrient-rich foods and perishable food products whose accessibility and consumption are likely to be affected by the pandemic. For each of these food groups, the respondents chose among three consumption frequency options; rarely (once or twice a month), sometimes (3–10 times a month), and often (>10 times a month). For each food group and each of the two periods (i.e. before and during the COVID-19 crisis), frequent consumption variables that are equal to one if a respondent selected 'often (>10 times a month)' and zero otherwise, were computed.

Quantitative data were analysed using descriptive statistics and regression models. Descriptive statistics including frequencies, means, standard deviations, and *t*-test were used to highlight the socio-economic characteristics of the respondents and how the pandemic has affected their income-generating activities, and food and nutrition patterns, as well as the coping strategies, adopted. Probit regression model was used to estimate the factors determining whether a respondent's source of income has been affected by the COVID-19 crisis and whether food and nutrition outcomes have worsened during the pandemic. This can be expressed as:

$$y_i = \alpha_i + \vartheta A_i + \varphi I_i + \beta x_i + \varepsilon_i \quad (1)$$

where y_i is a binary outcome variable for respondent i . Three different probit regressions were estimated. First, y takes the value of 1 if a respondent's regular source of income has been affected by the COVID-19 pandemic and 0 otherwise. Second, y is equal to 1 if a respondent has experienced worsened food security (i.e., the difference between a respondent's raw FIES score during COVID-19 and normal periods is greater zero) and 0 otherwise. Finally, y takes

the value of 1 if a respondent has reduced the frequency of consumption of a specific food group due to COVID-19 and 0 otherwise. A and I are two main variables of interest, and they denote the main source of income and the monthly income of the respondent, respectively, while θ and ϕ are their respective parameters to be estimated. Thus, the study particularly focused on how different income-generating activities and income groups are affected by COVID-19-induced economic disruptions. x is a vector of other explanatory variables, including the gender, age category and level of education of the respondent, household size, and whether the respondent is the household head, as well as their membership in savings and social security groups. β is the associated vector of parameters to be estimated, and ϵ is the error term.

4. Results and discussion

4.1. Socio-economic characteristics of respondents

Table 1 presents the descriptive statistics for the socio-economic characteristics of the respondents, disaggregated by the two study countries. In both countries, about two-thirds of the respondents were male. Roughly, two-thirds and one-third of the respondents in Kenya and Uganda, respectively, were youth aged between 18 and 35 years. A large proportion of the respondents had a tertiary level of education. This is not surprising, given that the data were collected through online surveys, and therefore likely to be filled by educated persons who are more likely to have access to the internet, have a smartphone, belong to social media platforms, and understand the questions without assistance. Most of the respondents were household heads, presiding over households comprising about five or six members on average. Nearly two-thirds of the respondents from Uganda were members of savings and national social security groups. In Kenya, only a quarter of the respondents participated in national social security group schemes. Half of the respondents in Kenya were salary earners, compared to nearly three-quarters of those in Uganda. The other main sources of income included wages, farming, self-employment and transfer payments. Majority (63%) of the respondents in Kenya earned <500 USD per month, compared to 44% of the respondents in Uganda.

4.2. Effect of COVID-19 on income-generating activities and coping strategies

Respondents were asked whether the COVID-19 pandemic had affected their regular source of income. Their responses are sum-

marised in Fig. 1. Roughly 70% of the respondents asserted that the pandemic had affected their regular source of income, ranging from 66% in Uganda to 73% in Kenya. This is consistent with the widespread perceptions about the negative impacts of the COVID-19 crisis on jobs and incomes. Further, the respondents were asked how COVID-19 had affected their main source of income (Fig. 2). In both Kenya and Uganda, the most cited effect of the pandemic relates to a reduction or closure of business activities, as a result of restrictions. Similar effects of the pandemic on income sources were reported by respondents across the two countries, but with some noticeable differences (in terms of percentage of respondents). For instance, proportionally more of the respondents in Kenya than Uganda cited complete job loss and cessation of remittances as economic implications of the pandemic. Conversely, reduction or delay in payment (such as salaries, wages, or rental fees) were more common in Uganda compared to Kenya. The differences are likely due to differences in country-level responses to the pandemic; for instance, the Uganda government banned even internal travels, which can affect business activities and the ability of business owners to pay wages on time. This is also related to the UN-Habitat & WFP (2020) report which shows that small and medium businesses in Kampala, Uganda continued to lay off some workers, while approximately 84% reduced their workforce by more than half. In comparison, to Kenya, only 34% of shops closed and 54% of the respondents lost their sources of livelihood. These COVID-19 induced disruptions of income-earning activities have been observed in several other reports (ILO, 2020; Vos, Martin, & Laborde, 2020; WorldBank, 2020a).

To buttress the effects of the pandemic on income-generating activities, a self-employed respondent in Kenya remarked:

“Since the last 45 days of the outbreak of this deadly disease, so many people have travelled back to rural areas to hide. This has made my business weak because most of my customers went away, and the current situation now is nothing but survival. There is no movement after 7 pm, and this is reducing the business activity hence lowering income. Life is hard, generally”.

Two farmers in Kenya also opined that:

“I used to sell some vegetables to schools and now that schools are closed, I have a problem. There is a lack of market for the farm produce, and as a result, the produce is rotting at home”.

Similarly, some of the respondents in Uganda expressed that the COVID-19 induced lockdown was hindering their farming operations through statements such as;

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

	Kenya (n = 313)		Uganda (n = 129)	
	Mean	SD	Mean	SD
Gender of respondent (1 = male)	0.61	0.49	0.63	0.48
Age group (1 = adult; 0 = youth)	0.37	0.48	0.62	0.49
Education level of respondent (1 = tertiary)	0.85	0.36	0.97	0.17
Household size (#)	5.05	4.16	6.15	4.86
Respondent is household head (1 = yes)	0.65	0.48	0.71	0.45
Membership in savings group (1 = yes)	0.59	0.49	0.64	0.48
Membership in national social security group (1 = yes)	0.25	0.43	0.66	0.48
Main source of income: Farming	0.12	0.32	0.05	0.21
Salaried employment	0.50	0.50	0.73	0.45
Self-employment	0.18	0.39	0.13	0.34
Wage employment	0.13	0.34	0.08	0.29
Transfers/dependents	0.07	0.26	0.02	0.15
Monthly household income: <500 USD	0.63	0.48	0.44	0.50
500–2000 USD	0.28	0.45	0.44	0.50
>2000 USD	0.09	0.29	0.12	0.32

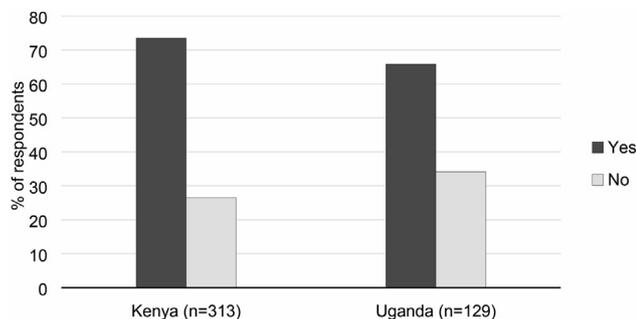


Fig. 1. Whether COVID-19 affected income-generating activities.

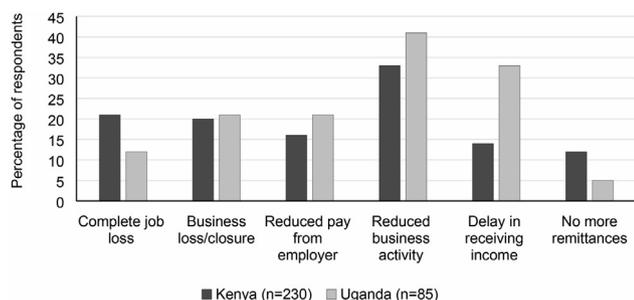


Fig. 2. Effects of COVID-19 on income-generating activities Note: Multiple responses were recorded.

“It has reduced my income from the poultry business due to challenges in getting feeds and customers”;
“It has affected routine supervision on our farm due to lack of allowable transport means”; and;
“It has affected access to quality agro-inputs”.

Besides income effects, the respondents mentioned other COVID-19-induced social challenges such as restricted movements, interrupted work schedules, mental health issues, and isolation. Restricted movements were also associated with feelings of fear, uncertainty, and stress due to failure to attend social gatherings. Salaried workers were more likely to report these social effects compared to other categories. Increased dependence was also reported which increased strain on household resources. In the absence of a structured social protection system, most stressed households depended on their relatives and friends. Respondents mentioned support to extended family in the form of providing food, remittance, buying masks, sanitizers, and medicines.

Table 2 presents probit estimation results on the factors that determine whether a respondent’s regular source of income has been affected by the COVID-19 pandemic. Results show that male respondents were 11% more likely than female respondents to report that their source of income has been affected by the COVID-19 crisis. This is partly because a significantly higher percentage of the male respondents were involved in multiple income-generating activities, and as such faced multiple COVID-19 induced income shocks. The finding agrees with Béland, Brodeur, and Wright (2020) who contend that the labour market impacts of COVID-19 are disproportionately greater for men than for women. Membership in savings groups such as savings and credit cooperative organisations (SACCOs), village savings and loan associations (VSLA), and co-save (welfare), was significantly correlated with an 8% reduction in the probability of the income of a respondent being affected by the COVID-19 pandemic. This reflects the ability to borrow money for consumption smoothing, thus coping better in periods of income shocks. The role of savings groups

Table 2
Factors determining whether COVID-19 crisis affected the regular source of income.

	Marginal effect	SE
Age category (1 = adult; 0 = youth)	0.009	0.043
Education level of respondent (1 = tertiary)	-0.101	0.083
Household size (#)	-0.001	0.004
Respondent is household head (1 = yes)	0.029	0.051
Gender of respondent (1 = male)	0.109**	0.045
Member of a savings group (1 = yes)	-0.080**	0.040
Member of a social security group (1 = yes)	0.022	0.041
Salaried employment (1 = yes) ^a	-0.329***	0.055
Self-employment (1 = yes) ^a	0.025	0.048
Wage employment (1 = yes) ^a	-0.164**	0.070
Transfers or dependents (1 = yes) ^a	-0.178*	0.097
Monthly income (500–2000 USD) ^b	-0.179***	0.046
Monthly income (>2000 USD) ^b	-0.351***	0.075
Country (1 = Uganda; 0 = Kenya)	0.011	0.042
Number of observations	442	

Note: ***, **, and * represent 1%, 5%, and 10% significance level, respectively.

^a Base category = Farming.

^b Base category = Monthly income (<500 USD).

and community-based microfinance groups’ effect on resilience to shocks, food security, and household business outcomes have been documented (Karlan, Savonitto, Thuysbaert, & Udry, 2017). Conversely, participation in national social security schemes showed no significant effect on the source of income during the COVID-19 crisis. This is likely because the current legal framework for national social security in the study countries only allows statutory access to the fund upon retirement, or in cases of disability or death. Husain, Sandström, Greb, and Agamile (2020) also report that a combination of working poverty and low social protection coverage exacerbates the negative welfare impacts of lockdowns. The need to expand social security coverage to those population groups who are not typically qualifying for cash transfers but are now pushed into poverty by the pandemic has been advocated (Bodewig, Gentilini, Usman, & Williams, 2020).

Looking at sources of income, results showed that compared to farmers, salary-earning workers were about 33% less likely to experience adverse effects on their source of income. Similarly, wage-earning workers and those who depend on transfer payments as their main source of income respectively had a 16% and 17% lower likelihood of reporting an impact of the COVID-19 crisis on their regular source of income, relative to farmers. On the other hand, the self-employed respondents were as likely as farmers to have their regular source of income affected by the pandemic. Taken together, the results suggest that although the COVID-19 pandemic is causing detrimental effects on all economic sectors, farmers are more likely than salary and wage earners to report suffering income shocks. Potential explanations include difficulties for farmers to go to farms, access inputs or transport their produce to markets due to COVID-19 induced lockdown. The social distancing restrictions also limit the number of market participants at a time and reduce operating hours for food markets. On the other hand, salary and wage earners, particularly the salaried workers, may work remotely, depending on the type of job. Moreover, compared to salary and wage-earning workers, the farmers in this sample earned relatively low incomes. Consequently, even a small shock to their income-earning activity could cause devastating effects.

The results also indicate that the income-earning activities of poor respondents were more likely to be affected by the pandemic. In particular, respondents whose monthly incomes range from USD500 to USD2000, and above USD2000 were 18% and 35% less likely to report that the COVID-19 crisis affected their regular sources of income respectively. Thus, there was a significant negative relationship between increasing income and the likelihood of facing COVID-19-induced income risks. This finding suggests that

the relatively higher-income respondents were more likely to offset income risks from the pandemic than poorer respondents. Finally, the country dummy variable was not statistically significant, indicating that the respondents in both countries had an equal likelihood of reporting negative effects of the COVID-19 shock on their income sources.

The measures taken by the respondents' households to cushion the adverse income effects of the COVID-19 crisis are shown in Fig. 3. In both Kenya and Uganda, the two most used coping strategies were changing dietary patterns and relying on savings. Households indicated a change in their dietary patterns in response to the COVID-19 outbreak by consuming less diverse diets, skipping meals, and reducing portions of food consumed. This points to the negative impacts of the pandemic on household food and nutrition security. With the COVID-19 crisis causing delays in payments of wages and salaries as well as job losses, savings become an important resource for smoothing household consumption. This also supports the earlier result (Table 2) that participating in savings groups was significantly associated with a reduction in the perceived effect of COVID-19 on income sources. However, this could potentially decimate the savings of households leading them further into poverty (Teachout & Zipfel, 2020). Other important coping mechanisms shown in Fig. 3 include obtaining credit or in-kind support from family and friends and selling of assets. Various studies have also found that households in Kenya and Uganda as well as other developing countries rely on similar coping strategies to buffer the effects of unexpected income shocks (Amendah, Buigut, & Mohamed, 2014; Mawejeje, 2019; Opiyo, Wasonga, Nyangito, Schilling, & Munang, 2015; Yilma et al., 2014).

Table 3 disaggregates the coping strategies by the main sources of income of the respondents. Proportionally more farmers coped with the COVID-19-induced income shocks by changing dietary patterns, which was also the most used coping strategy among the wage earners and those depending on transfer payments. The salary-earning workers and self-employed mostly relied on their savings to cope with the income shocks. We also see that distress sale of livestock and household durable assets, respectively, were more common among the respondents depending on farming and transfer payments as the main sources of income. Another noticeable result is that the salary workers relied less on assistance from relatives/friends, while those who depended on transfer payments were proportionally less likely to cope by obtaining credit.

4.3. Food security implications of the COVID-19 pandemic

Table 4 highlights the food insecurity situations of the respondents before and during the COVID-19 pandemic. The upper part of this table presents the results for the eight questions that constitute the FIES. It is obvious from the results that food insecurity has worsened during the period of the pandemic compared to a normal

period. For instance, during the COVID-19 period in Kenya, more than half of the respondents were worried about insufficient food, unable to eat healthy and nutritious food, ate reduced portions of food, and consumed limited food varieties. However, before the COVID-19 outbreak, only 30% of the respondents in Kenya experienced these food insecurity situations. Similarly, the number of respondents in Uganda who reduced the amount of food eaten, were unable to eat healthy and nutritious food, consumed less diverse diets, or were worried about not having enough food to eat increased significantly by about 30, 35, 45, and 50 percentage points, respectively, during the COVID-19 period relative to a normal period. A conspicuous difference between the results for the two countries relates to the FIES items on feeling hungry and not eating and going a whole day without eating. The share of respondents who experienced these two food insecurity situations was higher in Kenya than in Uganda and with statistically significant differences between COVID-19 and normal periods only in the case of Kenya. Kenya's food imports are estimated at 11% and fluctuations in regional markets, as has been brought about by the COVID-19 crisis, can contribute to food insecurity. For example, a spike in maize prices could leave many people in Kenya unable to purchase sufficient food.

The lower part of Table 4 shows the results for three food security measures that were constructed from the eight FIES items. Compared to a normal period, the findings reveal that the number of food-insecure households increased by 38 and 44 percent in Kenya and Uganda respectively. Likewise, compared to a normal period, severe levels of food insecurity have been exacerbated by 7 and 20 percentage points among the respondents in Uganda and Kenya, respectively. Overall, the evidence presented in Table 4 is indicative of a deteriorating food security situation among respondents who, before the COVID-19 outbreak, were food secure on average. This may be due to several COVID-19 induced disruptions, such as income shocks (Fig. 2) and thus limited disposable income to spend on food, as well as disruptions in food supply chains, resulting in possible food shortages and higher food prices (FAO, 2020; Reardon, Bellemare, & Zilberman, 2020). Additionally, having children at home due to the closure of schools is more likely to exacerbate food insecurity because for some students living in poverty, schools are not only a place for learning but also for eating healthily (Van Lancker & Parolin, 2020). Thus, such children lose the benefit of free school meals where such meals are provided (Douglas, Katikireddi, Taulbut, McKee, & McCartney, 2020). Indications of higher food prices coupled with increased consumption and high dependency levels will certainly lead to bigger socio-economic impacts, especially for the most vulnerable households.

Table 5 summarizes the probit regression results for the determinants of whether a respondent has experienced worsened food security during the COVID-period. The statistically significant variables related to the primary source of income, and the monthly income of the respondents. The results demonstrate that self-employed and wage earners respectively were 15% and 18% more likely than farmers to experience worsened food security during the COVID-19 pandemic relative to a normal period. A plausible explanation is that while the self-employed and wage earners might face difficulties in purchasing food due to higher food prices and reduced purchasing power, the farmers may be able to increase the consumption of self-produced food during the pandemic. Harris et al. (2020) also report that the ability to consume one's produce by farming households may be protective of diets when other routes to food access fail. The statistical insignificance of the salaried employment variable is possible because the sources of income of the salaried workers were less affected by the COVID-19 (as shown in Table 2). Consequently, salaried workers may bear the brunt of the COVID-19 induced disruptions to food systems better than wage earners and self-employed respon-

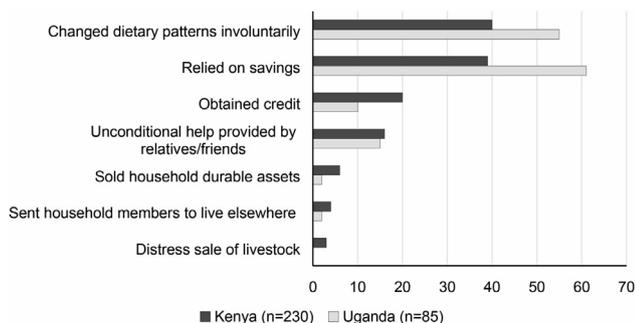


Fig. 3. Coping strategies to COVID-19-induced income shocks Note: Multiple responses were recorded.

Table 3
Coping strategies by the main source of income (%).

	Farming	Salaried employment	Self-employment	Wage employment	Transfers/dependents
Changed dietary patterns involuntarily	44.2	27.7	33.8	39.2	32.0
Relied on savings	39.5	30.9	40.5	29.4	12.0
Obtained credit	11.6	10.0	20.3	13.7	16.0
Unconditional help provided by relatives/friends	20.9	3.2	22.9	25.5	12.0
Sold household durable assets	4.7	2.0	5.4	0.0	8.0
Sent household members to live elsewhere	4.7	1.2	4.1	5.9	4.0
Distress sale of livestock	11.6	0.0	0.0	2.0	0.0
No. of observations	43	249	74	51	25

Note: Multiple responses were recorded.

Table 4
Food security situation before and during the COVID-19 period.

Food security indicator	Kenya (n = 313)		Uganda (n = 129)		Full sample (n = 442)	
	COVID-19 period	Normal period	COVID-19 period	Normal period	COVID-19 period	Normal period
1. Worried about not having enough food	0.74***	0.29	0.63***	0.14	0.71***	0.25
2. Unable to eat healthy/nutritious food	0.56***	0.23	0.51***	0.16	0.55***	0.21
3. Ate only few kinds of foods	0.72***	0.30	0.74***	0.29	0.72***	0.30
4. Skipped a meal	0.42***	0.19	0.27***	0.12	0.38***	0.17
5. Ate less amount of food	0.56***	0.24	0.48***	0.19	0.54***	0.23
6. Ran out of food	0.38***	0.18	0.16***	0.08	0.31***	0.15
7. Felt hungry but did not eat	0.37***	0.19	0.19	0.12	0.32***	0.17
8. Went without eating for a whole day	0.22***	0.14	0.09	0.08	0.19***	0.12
Food insecure	0.88***	0.50	0.87***	0.43	0.87***	0.48
Moderately or severely food insecure	0.55***	0.18	0.40***	0.10	0.50***	0.16
Severely food insecure	0.26***	0.06	0.09***	0.02	0.21***	0.05

Notes: *** denotes that the mean difference between COVID-19 and normal periods is significant at the 1% level.

Table 5
Determinants of the worsened food security situation.

	Marginal effect	SE
Age category (1 = adult; 0 = youth)	-0.012	0.050
Education level of respondent (1 = tertiary)	-0.057	0.075
Household size (#)	-0.007	0.005
Respondent is household head (1 = yes)	0.002	0.057
Gender of respondent (1 = male)	0.020	0.051
Member of a savings group (1 = yes)	-0.017	0.046
Member of national social security group (1 = yes)	-0.011	0.050
Salaried employment (1 = yes) ^a	0.085	0.086
Self-employment (1 = yes) ^a	0.147*	0.089
Wage employment (1 = yes) ^a	0.181*	0.096
Transfers or dependents (1 = yes) ^a	-0.053	0.128
Monthly income (500–2000 USD) ^b	-0.194***	0.046
Monthly income (>2000 USD) ^b	-0.271***	0.065
Country (1 = Uganda; 0 = Kenya)	0.064	0.049
Number of observations	442	

Note: ***, **, and * represent 1%, 5%, and 10% significance level, respectively.

^a Base category = Farming.

^b Base category = Monthly income (<500 USD).

dents. There was a significantly negative correlation between increasing income and worsening food security, implying that the income-poor respondents were more likely to suffer from the COVID-19 pandemic in terms of food insecurity, which is expected. Similar to this study, [Arndt et al. \(2020\)](#) report that lockdown policies will jeopardize the food security of low-income households dependent on labour income.

4.4. Dietary quality implications of the COVID-19 pandemic

In this section, the effect of the COVID-19 pandemic on dietary quality is examined by focusing on the consumption of five nutrient-rich food groups. [Fig. 4](#) compares frequent consumption (>10 times per month) of these food groups before and during the COVID-19 crisis among respondents across the two study

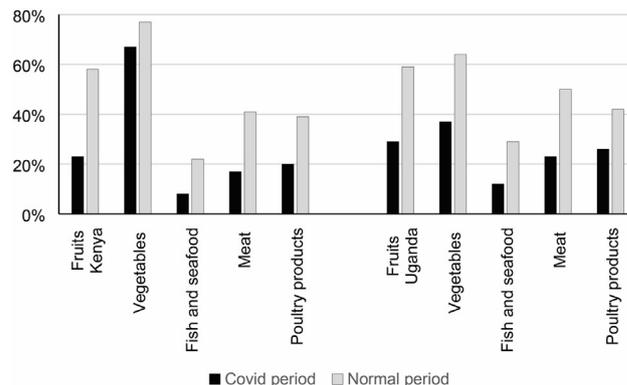


Fig. 4. Percentage of respondents who consumed the food groups before and during the COVID-19 period.

countries. There is a large difference in how often the respondents consumed these food groups before and during the pandemic. For example, about 60% of the respondents in both countries indicated that they normally consume fruits at least 10 times a month. However, <30% of the respondents did so during the COVID-19 period. There was a high frequency in the consumption of vegetables in Kenya even during the COVID-19 period. The diets of the majority of Kenyans are largely composed of maize meal, often consumed together with vegetables. Other studies have shown high consumption of fresh produce, second to staples in Kenya, and for the low-income households, vegetables are the meal of choice, a necessity ([Ayieko, Tschirley, & Mathenge, 2011](#)). This provides a relevant explanation concerning the observed high consumption of vegetables by respondents in Kenya even during the COVID-19 crisis. Results further show that in both countries, <30% of the respondents consumed fish and seafood often even before the COVID-19 outbreak. Overall, [Fig. 4](#) suggests that except for vegeta-

bles in Kenya, the number of respondents who regularly consumed each of the five food groups reduced by about 50 percentage points during the pandemic. This may be due to low affordability or lack of market access because of restrictions. Reductions in diet quality as a result of other food system shocks (Darnton-Hill & Cogill, 2010) and COVID-19 (Harris et al., 2020) have been reported, with households tending to protect staple food consumption over the consumption of more expensive but more nutrient-dense foods. This is a cause for concern, given that some of these food groups are important sources of micronutrients needed for good health, and estimates suggesting that over two billion people worldwide already suffer from micronutrient deficiency (von Grebmer et al., 2014).

Table 6 shows the factors that determine whether a respondent reduced the frequency of consumption of the five food groups due to COVID-19. The probit regression results show that household size exerted significant positive effects on the consumption of fruits and fish, implying that larger households were more likely to reduce the consumption of these two food groups during the COVID-19 crisis. This is intuitive because the satisfaction of food needs in the wake of income shocks and disruptions of food supply chains will be more challenging for households with more members. The results also indicate that membership in savings groups significantly decreased the likelihood that a respondent will reduce the consumption of vegetables, and meat and poultry products during the COVID-19 period by 5% and 9%, respectively.

Consistent with the above result on the negative relationship between increasing income and worsening food security situation, results show that income-poor respondents were more likely to report a reduction in the frequency of consumption of diverse food groups in the wake of the COVID-19 outbreak. For instance, the respondents that earn more than USD2000 per month had an 11%, 31%, and 42% higher probability of not reducing the regular consumption (>10 times per month) of vegetables, fruits, and fish

and seafood, respectively than their counterparts that earn less than USD500 per month. This further confirms that the poor in this sample were especially vulnerable to food and nutrition insecurity during the COVID-19 pandemic. Lastly, the country dummy variable is not statistically significant, except in the case of vegetables. Specifically, the respondents in Uganda were 17% more likely than those in Kenya to reduce the frequency of consumption of vegetables in a time of COVID-19.

5. Conclusions

This study assessed the implications of COVID-19 on household incomes and food security in two East African countries – Kenya and Uganda. The two countries instituted similar containment measures, with more restrictions in Uganda compared to Kenya. Results show evidence of worsening food security and dietary quality of respondents in the two countries during the COVID-19 period compared to before. This is attributed to the loss or reduction in income, reduced access to markets due to travel restrictions, and low purchasing power. Farmers were more likely to report reduced income during the crisis compared to salary or wage earners. Farmers rely on markets, and restrictions directly affect their incomes, unlike salaried workers who may improvise mechanisms of working remotely.

Across the study countries, the number of food-insecure respondents increased by 38% and 44% in Kenya and Uganda respectively. The stricter measures put in place by the Ugandan government compared to Kenya and considering that more respondents in Uganda than Kenya belonged to the lower-income category, explain the worsening food security situation in Uganda compared to Kenya. The situation in Kenya was however worsened by disruptions in regional markets, given the high ratio of food imports to domestic production. Food security outcomes were

Table 6
Determinants of reduced consumption of diverse food groups.

	Fruits	Vegetables	Fish	Meat	Poultry
Age category (1 = adult; 0 = youth)	-0.037 (0.052)	-0.011 (0.034)	-0.031 (0.051)	0.072 (0.048)	0.065 (0.051)
Education level of respondent (1 = tertiary)	-0.004 (0.068)	-0.069 (0.042)	0.022 (0.067)	-0.081 (0.061)	-0.038 (0.067)
Household size (#)	0.009** (0.005)	0.003 (0.002)	0.011** (0.005)	0.003 (0.004)	0.006 (0.005)
Respondent is household head (1 = yes)	-0.023 (0.060)	0.052 (0.038)	-0.022 (0.058)	-0.075 (0.054)	0.049 (0.058)
Gender of respondent (1 = male)	0.053 (0.054)	-0.058* (0.034)	0.048 (0.053)	0.028 (0.049)	-0.037 (0.052)
Member of a savings group (1 = yes)	-0.009 (0.046)	-0.051* (0.029)	0.008 (0.045)	-0.092** (0.041)	-0.086* (0.044)
Member of national social security group (1 = yes)	-0.031 (0.055)	-0.016 (0.036)	-0.035 (0.053)	0.028 (0.051)	0.015 (0.053)
Salaried employment (1 = yes) ^a	-0.081 (0.083)	-0.037 (0.060)	-0.051 (0.081)	-0.029 (0.073)	0.004 (0.078)
Self-employment (1 = yes) ^a	-0.010 (0.088)	-0.016 (0.061)	-0.005 (0.086)	0.080 (0.079)	0.069 (0.083)
Wage employment (1 = yes) ^a	-0.028 (0.096)	-0.055 (0.064)	-0.047 (0.092)	0.090 (0.088)	-0.044 (0.087)
Transfers or dependents (1 = yes) ^a	-0.019 (0.114)	-0.087 (0.065)	-0.060 (0.108)	0.052 (0.105)	-0.040 (0.103)
Monthly income (500–2000 USD) ^b	-0.139*** (0.054)	-0.059 (0.049)	-0.234*** (0.068)	-0.142*** (0.050)	-0.199*** (0.051)
Monthly income (>2000 USD) ^b	-0.305*** (0.060)	-0.105* (0.054)	-0.416*** (0.074)	-0.273*** (0.051)	-0.302*** (0.057)
Country (1 = Uganda; 0 = Kenya)	0.033 (0.053)	0.172*** (0.034)	0.055 (0.052)	-0.018 (0.050)	0.037 (0.051)
Number of observations	442	442	442	442	442

Note: ***, **, and * represent 1%, 5%, and 10% significance level, respectively.

^a Base category = Farming.

^b Base category = Monthly income (<500 USD).

found to be worse among the income-poor and those dependent on labour income, as they are less likely to have adequate savings for food purchase amidst increased food prices. As such, they were more likely to employ food-based coping strategies and have poorer food consumption compared to those pursuing alternative livelihoods. Farmers were more likely to have adequate food compared to other respondent categories who depended to a great extent on market sources for food.

Participation in national social security schemes was less likely to mitigate respondents' income shock and food insecurity situation, while participation in savings groups was correlated with less likelihood of suffering income shocks and reduction in food consumption. This implies that having the opportunity to borrow from saving groups or access own savings could help stabilize consumption in the face of COVID-19 or other disruptions. Social networks played a role in supporting family and friends to cope with the situation, except this exerted additional pressure on household consumption due to increased expenses and food consumption. In such situations, formal social protection measures are needed to smooth incomes and restore livelihoods.

Study results suggest the following strategies to aid in stabilizing incomes, access to food, and livelihood recovery after a pandemic such as COVID-19: First, the government needs to implement structural changes in social security schemes that consider packages that are responsive to members' needs during such crises, as an immediate fall-back position. Secondly, promoting and harnessing the savings and borrowing capacity, especially for low-income earners and rural households would provide opportunities for borrowing and restoring businesses and livelihoods after a crisis. Lastly, mechanisms to ensure the survival of food supply chains, particularly those making available nutrient-dense food are key.

Finally, it should be mentioned that the data used in this study was based on a rapid online survey, as COVID-19-induced social distancing and lockdowns did not allow face-to-face interviews. This limited the amount of information collected and the generalisability of our findings. However, the data provided useful information for exploring some of the immediate implications of the COVID-19 crisis, which future research involving representative and longitudinal samples or alternative survey methods can build upon and extend.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.worlddev.2020.105199>.

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