



Contents lists available at ScienceDirect

World Development

journal homepage: www.elsevier.com/locate/worlddev

Research Notes

The short-term economic effects of COVID-19 on low-income households in rural Kenya: An analysis using weekly financial household data



Wendy Janssens^a, Menno Pradhan^b, Richard de Groot^{c,*}, Estelle Sidze^d,
Hermann Pythagore Pierre Donfouet^e, Amanuel Abajobir^d

^a Vrije Universiteit, Amsterdam Institute for Global Health and Development and Tinbergen Institute, Netherlands

^b Vrije Universiteit, University of Amsterdam, Amsterdam Institute for Global Health and Development and Tinbergen Institute, Netherlands

^c Amsterdam Institute for Global Health and Development, Netherlands

^d African Population and Health Research Center, Kenya

^e African Population and Health Research Center (Kenya) and CREM, UMR CNRS 6211, University of Rennes 1, France

ARTICLE INFO

Article history:

Available online 25 November 2020

Keywords:

COVID-19 pandemic
Economic effects
Fixed-effects regressions
Risk-coping
East Africa
Kenya

ABSTRACT

This research assesses how low-income households in rural Kenya coped with the immediate economic consequences of the COVID-19 pandemic. It uses granular financial data from weekly household interviews covering six weeks before the first case was detected in Kenya to five weeks after during which various containment measures were implemented. Based on household-level fixed-effects regressions, our results suggest that income from work decreased with almost one-third and income from gifts and remittances reduced by more than one-third after the start of the pandemic. Nevertheless, household expenditures on food remained at pre-COVID levels. We do not find evidence that households coped with reduced income through increased borrowing, selling assets or withdrawing savings. Instead, they gave out less gifts and remittances themselves, lent less money to others and postponed loan repayments. Moreover, they significantly reduced expenditures on schooling and transportation, in line with the school closures and travel restrictions. Thus, despite their affected livelihoods, households managed to keep food expenditures at par, but this came at the cost of reduced informal risk-sharing and social support between households.

© 2020 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The COVID-19 pandemic not only affects livelihoods through increased risk of mortality, but also through containment measures (World Health Organization, 2020). While the initial focus was on the health effects of the pandemic, its socio-economic effects and accompanying policy responses are receiving increased attention, including in low-income countries.

The World Bank estimated that the COVID-19 crisis can push between 40 and 60 million people into extreme poverty, most of which in sub-Saharan Africa (Gerszon Mahler, Lakner, Castaneda Aguilar, & Wu, 2020). Another report found that under a scenario in which income and consumption contracts by 20 percent, between 420 and 580 million people would be pushed into poverty, reversing decades of decreasing poverty trends (Sumner,

Hoy, & Ortiz-Juarez, 2020). However, detailed insights in the immediate effects of the COVID-19 crisis at the household-level are lacking for most low- and middle-income countries. Most evidence is from developed countries. In the US, the lockdown policy reduced time spent outside the home (Gupta et al., 2020), contributed to a significant decline in employment (Montenovo, Jiang, Rojas, Schmutte, Simon, & Weinberg, 2020), and caused a large drop in job vacancy postings (Kahn, Lange, & Wiczer, 2020).

Our study quantifies the income and expenditure loss after the COVID-19 crisis at weekly intervals for a cohort of 328 low-income rural households in Western Kenya. Since December 2019, households were visited on a weekly basis to collect detailed information on each adult's financial transactions in the past week (including incomes, expenditures, loans, remittances and savings), allowing for an analysis of pre- and post COVID-19 trends, unlike studies that were initiated in response to the pandemic.

Our granular financial data enable us to assess how rural households were affected by the containment measures, how they responded and coped financially. Have incomes from business, employment and other sources declined? Were households forced

* Corresponding author.

E-mail addresses: w.janssens@vu.nl (W. Janssens), m.p.pradhan@vu.nl (M. Pradhan), r.degroot@aighd.org (R. de Groot), esidze@aphrc.org (E. Sidze), hdonfouet@aphrc.org (H.P.P. Donfouet), [abajobir@aphrc.org](mailto:aabajobir@aphrc.org) (A. Abajobir).

to withdraw savings or sell assets? Were households able to uphold their spending on food? These questions are of immediate concern to policymakers seeking a balance between protecting the health of the population by containing the spread of the virus and implementing policies to protect people's economic wellbeing.

A few recent studies examine the short-term effects of the COVID-19 pandemic in Kenya. One study conducted in Nairobi's five largest urban informal settlements found that 80 percent of their sample had experienced income loss, while also experiencing food price increases. Two-thirds had skipped a meal at least once or eaten less in the two weeks preceding the survey. Very few respondents had received any kind of support from the government or other sources (Population Council, 2020). However, this study did not collect detailed financial transaction records; instead, respondents retrospectively reported changes in income and expenditures. Another diaries study in Kenya, using qualitative phone interviews with respondents, found that 88 percent of the respondents experienced declines in income, with urban people hit hardest (Zollmann, Ng'weno, Gachoka, & Wanjala, 2020).

Based on household-level fixed-effects regressions, our findings show that household incomes decreased sharply by up to one-third in the five weeks after the first preventive measures were implemented. We particularly observe a drop in income from work, and a strong decrease in gifts and remittances received. Whereas most households managed to keep food expenditures stable, expenditures on education and transport decreased. We also find that households deposited less savings, but also withdrew less, suggesting that they were protecting whatever savings they still had. Informal risk-sharing between households declined as indicated by declining credit and loans, loan repayments, gifts, and Harambee contributions.

2. COVID-pandemic and response measures in Kenya

In Kenya, the first COVID-19 case was detected on 13 March, immediately followed by measures to contain the spread of the virus. On 15 March, schools were closed, and all workers were directed to work from home if possible. Subsequently, international flights were suspended, and bars and restaurants were closed. A nationwide curfew was installed on 27 March. In early April, travel restrictions were put in place in the most affected areas, including Nairobi, Mombasa, Kilifi and Kwala Counties (Were, 2020). As of May 31st, there were 1,888 confirmed cases and 63 deaths on a population of almost 50 million (Ministry of Health, 2020).

3. Data and methods

We use data from Financial and Health Diaries, collected for a study originally designed to measure the impact of a mobile phone-based health insurance scheme in Kakamega county through a cluster-Randomized Controlled Trial (RCT), and free access to public care in Kisumu county through a prospective longitudinal analysis. Both schemes were on-hold during our study period. The study population, drawn from low-income rural villages, consists of households with either a pregnant woman or a mother with children below four years old. First, 32 villages were randomly selected from the catchment areas of six health facilities. Next, in each village ten households were randomly sampled from lists with households fulfilling the study eligibility criteria.

Weekly data collection has been on-going since December 2019. The weekly interviews record all financial transactions (income from work/social schemes, expenditures, savings, gifts/remittances, loans) among others. Data are collected from all adults in the household, separately and in private. Diaries data collection was preceded by a household survey, collecting baseline demographic, socio-economic, and health information.

In March 2020, data collection changed from in-person to phone-based interviewing in response to the COVID-19 social distancing measures. The built-up rapport between respondents and enumerators ensured continuously high response rates.¹ We took various measures to ensure continued data quality. Fieldworkers received intensive training on phone interview techniques, including on privacy and ethics, and were encouraged to ensure the respondents' ability to answer freely by setting appropriate timing of calls or planning call-backs at respondents' convenience. Overall, 94 percent of households owned a phone; at the individual level, 88 (77) percent of male (female) respondents had their own cell number. Respondents without phones were reached through their preferred alternative contacts, including neighbors, community health workers, friends and relatives. Field team leaders were trained on remote data quality assurance and were supported with a protocol to provide psychosocial support to fieldworkers where needed.

We focus on the short-term effects of the COVID-19 outbreak. We note that these would be *indirect* effects, since as of 31 May, only 1 COVID-19 case and no deaths were recorded in our study areas (Ministry of Health, 2020). Nevertheless, cases could have been underestimated because the testing capacity was extremely limited. As pre-COVID-19 period, we take the weeks between February and mid-March 2020, when the first case was detected in Kenya and the first measures were taken.² Our post-COVID-19 period covers the five weeks between 17 March and 20 April.

Our data identify several sources of income, including income from work, gifts/remittances, loans/credits, and savings withdrawals. We break down income from work into sub-categories: income from business, formal employment, casual work, crop sales and livestock sales. For expenditures, we categorize spending into several subgroups, including food, education, and transportation. We also observe other money outflows, such as gifts given, money lent out, credit repayments, and savings deposits.

Our main objective is to determine how income and spending levels have changed since the start of the COVID-19 pandemic in Kenya. Our unit of observation is the household-interview week ($n = 2,995$; 328 households observed in 11 weeks)³, aggregating incomes and expenditures over all adult household members.⁴ We first present the weekly averages in graphical format. We then test

¹ Weekly response rates have slightly declined since the switch to phone interviews with 2 to 10 percent dependent on the week. We check for selective response by regressing all household demographic variables from Table 1 on dummies for post-COVID weeks to determine if average household composition changes after the COVID pandemic. Out of 145 estimates, we find 15 significant differences at the 10% level. We are therefore confident that selective household response is not driving our results. The post-COVID difference in weekly response rates between respondents with and without their own phone at baseline was relatively limited at 5 percent, although significant at the 10% level ($p = 0.073$).

² While our data allows us to go back further in time (to December 2019), there is a large peak in expenditures and income in the financial data during the first weeks of January due to the Christmas and New Year holidays, which would arbitrarily increase the averages over the pre-COVID-19 period, affecting our main results.

³ The potential number of household-weeks is 3,608 but we remove observations from our analysis in cases where none of the household members were interviewed during a particular week. Imputing these missing household-weeks with the pre- or post-COVID average further strengthens our results. Size and significance of our estimates increases, except for money withdrawn from savings.

⁴ In case one person in a household was not interviewed during a week, we conservatively impute his or her financial transactions in the household-level total with the average of the observed weeks. We test for robustness with two alternatives: 1) Imputing all missing values with the pre- or post-COVID average, instead of the average across all weeks. Compared to our main results, these estimates are larger and more often significant; 2) Reducing the sample to households with all respondents present for a particular week. The sample size in this case drops from 2,995 to 1,663. Compared to our main results, these estimates are qualitatively similar in size and significance, except for gifts/remittances received. Outliers, with a value higher than the 99th percentile during an interview week, are also replaced with the average over the other weeks. This has very little effect on our main findings. All results available on request.

for significant differences between the mean of the pre-COVID-19 period and weekly post-COVID-19 periods using household-level fixed effects regressions, clustering standard errors at the household level.

To investigate whether asset-rich households are better able to cope with the lockdown than others (Dercon, 2002), we assess heterogeneous effects by the possession of any savings, of more than the median amount of savings; livestock, cattle or land ownership; and availability of agricultural products in stock at baseline.

4. Results

Table 1 presents baseline household information. Households have on average five members with three members under 18 years. Household heads are relatively young (37 years on average) and 24 percent are female headed. Nearly all heads are married. The majority has received some basic education. The most common occupation of the head is casual labor (39 percent), operating an informal business (22 percent) or formal employment (18 percent). About 14 percent of heads were not earning income at baseline. Households had on average nearly Ksh 13,000 in savings, equivalent to about six weeks of pre-COVID household income from work (Ksh 2,036, see below). Households had on average about Ksh 3,900 loans outstanding and the amount of money lent to others was Ksh 1,875. About 20 percent of households had a loan at a formal institution (bank, microfinance institution) or a shop credit.⁵

To contextualize our study, Table 1 also provides estimates from Kakamega county, Kisumu county and Kenya. In comparison, our sample is younger, with more small children, fewer elders and younger heads, in line with our study eligibility criteria. Our sample is slightly better educated than households in Kakamega and Kisumu, more reliant on casual labor and less on farming, especially compared to Kakamega. Finally, our sampled households have lower amounts of loans outstanding, yet a higher share has a loan at a formal institution, compared to the county averages.

Fig. 1 shows a decreasing trend in total cash inflows and outflows since mid-March. Especially income from work (e.g. revenue from informal business, wage work), and received gifts and remittances went down (Fig. 2). Table 2 shows that weekly income significantly declined with up to Ksh 666 towards the end of April, compared to a pre-COVID-19 average of Ksh 2,036.

Gifts and remittances comprised 22 percent of household income before the pandemic hit (Column 2, Table 2). They decreased considerably by Ksh 330 one month after the first case was detected, implying a decrease of 38 percent compared to pre-COVID-19 levels of Ksh 858 per week. This could be due to the crisis severely affecting urban wage workers, or immigrants in more advanced economies, who are an important source of remittances for families in the countryside: in our data 50 percent of remittances are from a relative outside the community.

In response to this income loss, households might resort to several risk-coping strategies. We do not observe significant increases in loans, loan repayments received nor incoming Harambee contributions to generate additional cash (Columns 3–5, Table 2). If anything, the amount borrowed since the start of the epidemic decreased slightly. Perhaps surprisingly, households have reacted to the crisis by withdrawing less money from their savings, with significant declines in the last three weeks of our study period, amounting to a decrease of Ksh 199 in the final week. This could indicate that households are not yet willing to utilize their savings at this stage in the crisis, but rather prepare for worse times ahead.

Table 3 breaks down income from work into sub-categories. Most of its decline is due to decreasing income from (informal) business (Column 1), formal employment (Column 2) and, to some

extent, income from crop sales (Column 3) and casual labor (Column 5). The first two categories also make up the largest share of total income underscoring that households have been affected in their main livelihoods. The insignificant results in Column 4 show that households have not increased livestock sales to raise additional income.

For outflows (Table 4), we observe a sharp and rising drop in household expenditures of up to Ksh 569 in the final study week, compared to a pre-COVID-19 average of Ksh 2,414 (Column 1), i.e. a 24 percent decrease in weekly expenditures over a one-month period. Gifts and remittances also decreased with 36 percent compared to pre-pandemic levels (Column 2). Other strategies to cope with the income loss are to reduce lending to others (Column 3), postpone repayment of outstanding loans and credit (Column 4), and reduce outgoing Harambee contributions (Column 5). Also, households have reduced savings, especially immediately after the first COVID-19 case was detected and in the last study week (Column 6).

A major concern is whether families have been able to uphold their food expenses since the lockdown measures were put in place. Despite the decline in income, families spend the same amount of money on food as before the crisis struck (Fig. 3 and Column 1 of Table 5). However, households spend much less on education and transportation, in line with the school closures and travel restrictions (Columns 2–3, Table 5).⁶ This may have given households some room in their budget to maintain food expenditures. Whereas spending on communication has started to decline (Column 4, Table 5), we do not observe a significant change in spending on recreation, ceremonies or funerals (Column 5, Table 5), nor on other consumption groups – including short-term business and agricultural investments.⁷

Table 6 investigates households' preparedness to cope with this shock. Three quarters of households (75.9 percent) had some formal or informal savings at baseline, 77.4 percent owned livestock, and 39.3 percent owned cattle.⁸ Households also possessed other assets that could be sold during times of need, 68.5 percent owning land and 44.2 percent having agricultural produce in stock. Most households (59.8 percent) had a loan outstanding at baseline.

Households with savings at baseline withdraw less money from their savings than the households without savings at baseline. This heterogeneous effect appears to be independent of the level of savings since withdrawals are not significantly related to having savings above or below the median amount of savings. A potential explanation is that households generally try to hold on to their savings as much as possible in the early weeks of the pandemic, and that those with prior savings habits are better able to do so. Households with an outstanding loan at baseline appear less able to maintain their income when the pandemic hits than those without outstanding loans, suggesting an association between longer-term limited income-generating capacity and vulnerability.

For baseline ownership of cattle, land and agricultural stock, we do not find evidence of heterogeneous effects on income, expenditures, and other financial flows. This is consistent with the findings that households did not resort to selling livestock (Table 5). Households that owned livestock at baseline were better able to maintain food expenditure; however, they did not differ systematically on other financial flows.

⁶ There is a peak in transportation expenditure in the week of 13 March – potentially related to individuals traveling home in anticipation of the lockdown (Figure 3), which might increase the pre-COVID average. Excluding this week from the analysis yields slightly smaller, yet still significantly negative estimates for four of the five post-COVID weeks.

⁷ Results available upon request.

⁸ Note that the baseline occurred in November 2019, four months before the COVID 19-pandemic struck, and so may not provide an accurate picture of savings and assets right before COVID-19 pandemic.

⁵ This share is 34 percent among households with any loan.

Table 1
Baseline characteristics of households in the sample.

	Study sample	Kakamega	Kisumu	Kenya
County				
Kakamega (residence of households)	0.697			
Kisumu (residence of households)	0.303			
Household composition				
# of household members	5.070	4.788	3.995	3.979
# of members age 0–5 years	1.382	0.836	0.648	0.649
# of members age 6–12 years of age	1.092	1.022	0.816	0.787
# of members age 13–18 years of age	0.538	0.823	0.599	0.567
# of members age 19–64 years of age	2.000	1.908	1.804	1.822
# of members age 65 and over	0.058	0.198	0.129	0.155
Characteristics of the head				
Age in years	37.086	46.834	46.681	44.557
Female head	0.235	0.349	0.308	0.323
Head is married	0.920	0.758	0.715	0.693
Educational status				
No schooling	0.037	0.115	0.030	0.135
Incomplete primary	0.321	0.398	0.305	0.276
Complete primary	0.327	0.152	0.236	0.169
Incomplete secondary	0.092	0.107	0.101	0.092
Complete secondary or higher	0.223	0.228	0.328	0.328
Main occupation				
None	0.144	0.045	0.022	0.049
Own business	0.220	0.241	0.372	0.245
Farm owner	0.061	0.331	0.083	0.264
Casual labor (including casual farm work)	0.391	0.096	0.132	0.123
Wage work	0.183	0.287	0.392	0.320
Livelihood activity				
Any member in household engaged in own business	0.294	0.339	0.515	0.324
Any member in household engaged in own farm work	0.073	0.479	0.158	0.362
Any member in household engaged in casual labor	0.459	0.134	0.193	0.164
Any member in household engaged in wage work	0.242	0.519	0.504	0.415
Total amount of savings	12,996.7			
Loan amount outstanding	3,898.6	8,169.0	5,019.9	17,020.5
Household has loan at formal institution ^a	0.205	0.077	0.061	0.116
Amount of money lent out	1,874.8			
Observations	328	493	497	21,658

Notes: Estimates for Kakamega, Kisumu and Kenya are derived from the Kenya Integrated Household Budget Survey 2015/16 and sampling weights are used to account for the sampling design of the survey. Information on savings and money lent out was not available in the KIHBS. ^a includes banks, microfinance institutions and shop credit.

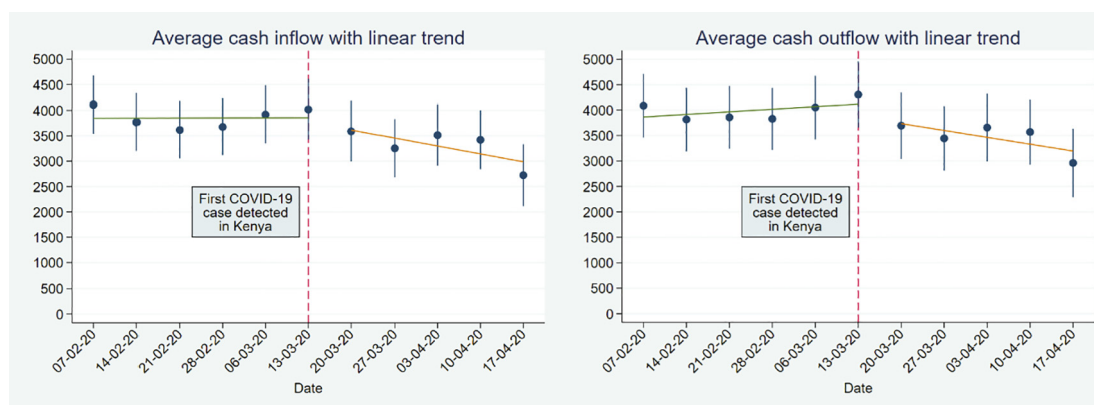


Fig. 1. Average cash inflow (left) and outflow (right), with linear trend. Notes: The dots represent the weekly average, with a 95% confidence interval.

5. Discussion

This paper uses detailed high-frequency data to estimate the short-term economic effects of the COVID-19 pandemic on low-income rural households in Kenya, and their strategies to cope with declining incomes. Our results suggest that income from work decreased with almost one third in the five weeks following the first confirmed case in Kenya. Gifts and remittances – a major source of income – reduced by more than one third. Because of the limited spread of COVID-19 by the end of the study period, the decline in income is primarily a result of the lockdown measures and subsequent economic downturn.

These results are unlikely to be driven by independent seasonal effects. A similar Financial Diaries study conducted pre-COVID among 120 households in a neighboring rural area (Nandi county) showed a similarly slight decrease in income and expenditures until the end of February; but a steady increase in income and expenditures from early March onwards until at least the end of April (Geng, Janssens, Kramer, & van der List, 2018, Fig. 1).

We do not find evidence that households coped through increased borrowing or withdrawing savings. Instead, households reduced the gifts and remittances given to others; they also lent out less money, postponed loan repayments, and deposited less savings. Households also significantly reduced expenditures,

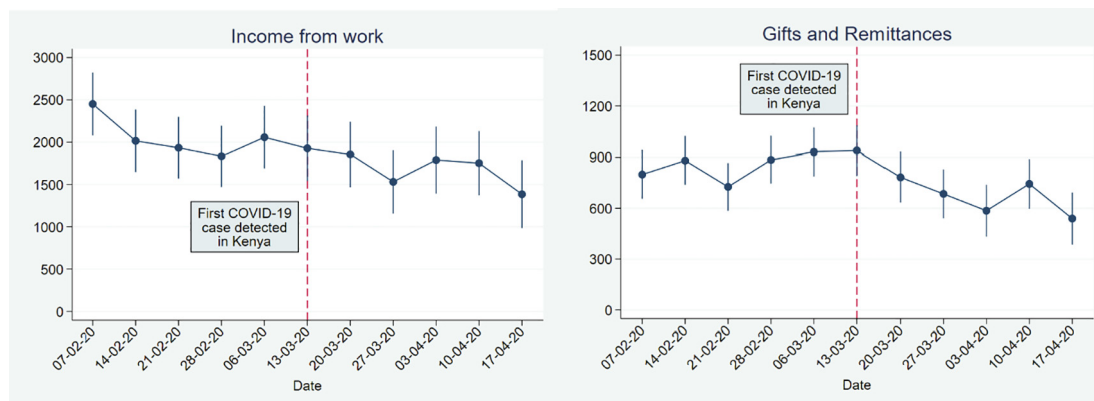


Fig. 2. Trends in selected inflow variables, income from work (left) and gifts/remittances (right). Notes: The dots represent the weekly average, with a 95% confidence interval.

Table 2
Change in weekly cash inflow variables after 17 March, compared to the period 4 February – 16 March.

	(1)	(2)	(3)	(4)	(5)	(6)
	Income from work	Gift/ remittance received	Money borrowed	Loan/credit repayment received	Harambee contribution received	Savings withdrawn
17 March–23 March	-187.1 (117.1)	-83.7 (63.6)	-60.3** (23.4)	42.2 (47.2)	7.8 (5.1)	-20.2 (73.8)
24 March–30 March	-524.0*** (101.7)	-189.4*** (61.2)	26.9 (43.9)	-31.7 (28.3)	3.9 (4.1)	-15.3 (57.8)
31 March–6 April	-354.9** (157.2)	-296.7*** (57.5)	199.8 (228.8)	10.2 (23.2)	2.8 (4.2)	-195.1** (88.7)
7 April–13 April	-354.2*** (117.2)	-130.0** (60.3)	-50.3** (23.8)	35.8 (40.1)	88.0 (89.2)	-211.0*** (63.9)
14 April–20 April	-666.1*** (117.6)	-329.9*** (64.2)	-3.5 (32.6)	-39.1 (27.0)	-28.6 (27.4)	-198.8*** (70.0)
Mean between 4 February–16 March	2036.1	858.3	94.8	138.3	18.8	699.1
Household FE	YES	YES	YES	YES	YES	YES
Observations	2,995	2,995	2,995	2,995	2,995	2,995

Notes: This table presents estimates from household fixed-effects (FE) regressions, with standard errors clustered at the household level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3
Change in weekly income after 17 March, by source of income, compared to the period 4 February–16 March.

	(1)	(2)	(3)	(4)	(5)	(6)
	Business income (revenue)	Income from employment (salary)	Income from farming (crop sales)	Income from livestock sales	Income from casual labour	Other income
17 March–23 March	-120.9 (100.4)	56.4 (133.5)	-11.7 (25.6)	-24.8 (23.0)	-23.4 (18.2)	49.6 (38.7)
24 March–30 March	-219.9** (92.0)	-233.3*** (57.6)	-51.3*** (14.1)	-21.8 (22.1)	-47.4** (19.5)	7.7 (12.0)
31 March–6 April	-300.9*** (111.8)	-12.0 (117.4)	-23.3 (24.3)	-6.4 (28.6)	-85.1*** (21.9)	51.6 (41.8)
7 April–13 April	-106.1 (114.3)	-79.5 (82.6)	-57.9*** (13.7)	-24.8 (22.5)	-33.8 (29.7)	12.4 (21.7)
14 April–20 April	-249.3*** (91.5)	-312.9*** (73.1)	-41.0* (24.6)	-26.5 (23.8)	-39.5 (38.5)	6.0 (11.9)
Mean between 4 February–16 March	1254.5	470.3	108.6	26.1	186.2	27.7
Household FE	YES	YES	YES	YES	YES	YES
Observations	2,995	2,995	2,995	2,995	2,995	2,995

Notes: This table presents estimates from household fixed-effects (FE) regressions, with standard errors clustered at the household level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

especially on schooling and transportation, in line with preventive measures such as school closures and travel restrictions. These strategies enabled households to keep their food expenditures at par in the short-term, but at the cost of reduced informal risk-sharing between households. We find little evidence that baseline

savings and assets increased household resilience. However, households with an outstanding loan at baseline seemed more vulnerable to income loss during the lockdown than others.

Few other studies give such a detailed picture of household finances before and after the onset of the current pandemic, espe-

Table 4
Change in weekly outflow variables after 17 March, compared to the period 4 February–16 March.

	(1)	(2)	(3)	(4)	(5)	(6)
	Expenditures	Gift/ remittance given	Money lent out	Loan/credit repayment given	Harambee contribution	Savings deposited
17 March–23 March	-31.2 (169.1)	-2.2** (0.9)	-60.9** (24.7)	-108.8*** (31.9)	4.9 (5.2)	-117.8** (53.0)
24 March–30 March	-266.2** (111.1)	-2.4 (1.6)	-59.8* (30.8)	-136.1*** (29.9)	1.2 (3.9)	-170.2*** (46.8)
31 March–6 April	-286.6* (161.5)	-2.8* (1.6)	-93.6*** (30.7)	-144.5*** (34.8)	-1.9 (2.3)	-99.5 (76.2)
7 April–13 April	-285.3** (132.7)	-2.8* (1.5)	-19.9 (35.8)	-164.3*** (29.1)	-4.8*** (1.7)	-65.8 (52.4)
14 April–20 April	-568.7*** (127.6)	-3.5** (1.6)	-104.3*** (30.0)	-188.4*** (33.5)	-4.4** (1.7)	-240.3*** (51.1)
Mean between 4 February–16 March	2413.5	4.1	203.6	518.8	6.7	654.5
Household FE Observations	YES 2,995	YES 2,995	YES 2,995	YES 2,995	YES 2,995	YES 2,995

Notes: This table presents estimates from household fixed-effects (FE) regressions, with standard errors clustered at the household level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

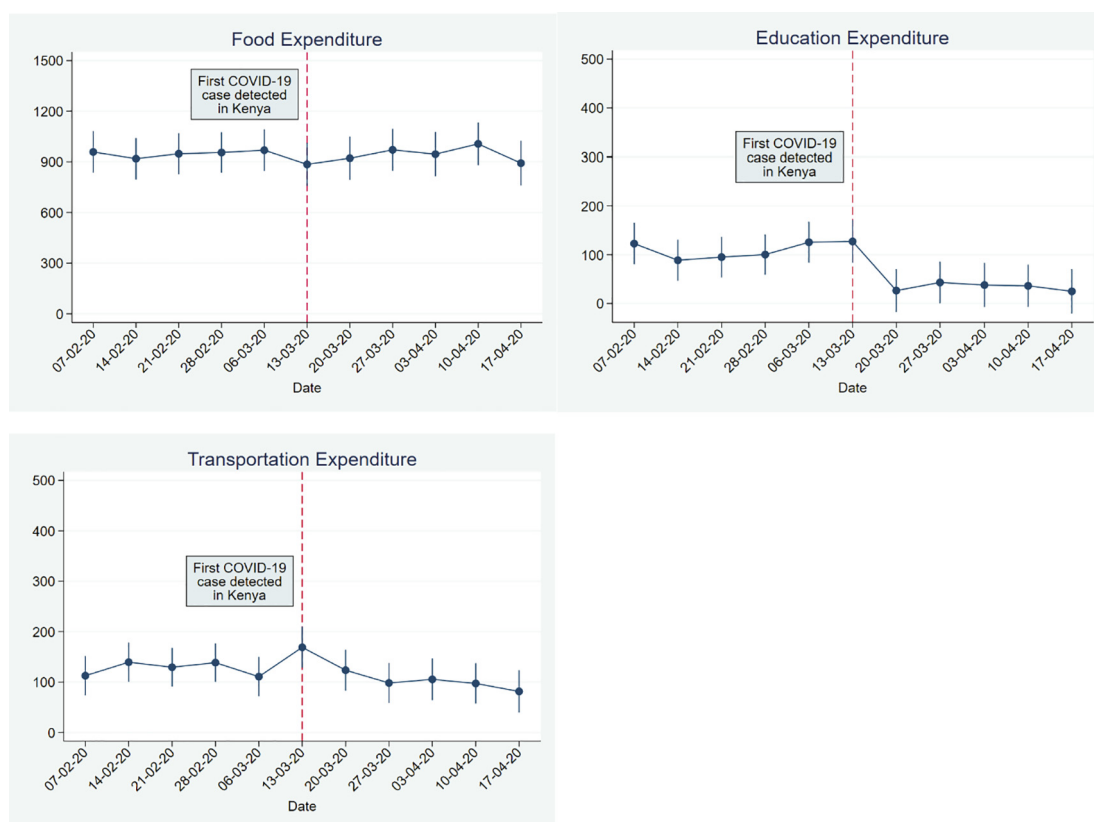


Fig. 3. Trends in weekly expenditures for selected sub-groups: Food, education, and transportation. Notes: The dots represent the weekly average, with a 95% confidence interval.

cially from low-income countries.⁹ An exception is a comparable diaries study in Bangladesh, which follows 60 households daily, showing a 75 percent drop in daily earnings in the first week of the lockdown in Bangladesh (Hrishipara Daily Diaries, 2020). This is a stronger decline than our findings, potentially due to the (peri-)urban nature of their sample compared to our rural mostly self-employed population.

Our findings on income effects provide depth to the emerging results from one-time phone surveys across the African continent

⁹ Baker et al. (2020) and Carvalho et al. (2020) show high-detail pre- and post-COVID-19 transaction data from the US and Spain, respectively.

and other low-and middle-income regions. In Senegal, 86 percent of respondents reported a below-average income during the early stages of the pandemic (Le Nestour, Mbaye, Sandefur, & Moscoviz, 2020). In a nine-country study, BRAC International, 2020 found that income loss is common across study sites, ranging from 47 percent of respondents in Myanmar to 93 percent in Liberia reporting that their income ‘reduced a lot’, or ‘completely stopped’. The biggest losses were reported by those engaged in small businesses or casual work, like our findings. In contrast, they find strong negative effects on food consumption with most respondents in Liberia, Philippines, Uganda, and Rwanda reporting ‘a lot’ less food consumption than before the COVID-19 crisis,

Table 5
Change in weekly expenditures for selected sub-groups after 17 March, by category, compared to the period 4 February–16 March.

	(1)	(2)	(3)	(4)	(5)
	Food	Education	Transportation	Communication	Recreation/ ceremonies/ offerings/ funerals
17 March–23 March	-5.0 (45.5)	-82.1*** (15.9)	-7.9 (18.2)	-2.5 (4.6)	13.7 (16.4)
24 March–30 March	28.4 (46.2)	-71.2*** (14.1)	-35.2*** (12.1)	-2.4 (4.8)	-11.3 (9.0)
31 March–6 April	-21.9 (50.1)	-76.0*** (11.6)	-35.5*** (13.2)	-4.1 (5.5)	18.3 (24.4)
7 April–13 April	48.9 (50.5)	-68.6*** (13.0)	-43.1*** (14.0)	-12.0*** (3.6)	303.1 (324.1)
14 April–20 April	-58.6 (46.5)	-70.8*** (10.6)	-61.3*** (13.6)	-9.1** (4.5)	-103.9 (89.4)
Mean between 4 February–16 March	939.9	109.6	132.8	52.9	77.4
Household FE	YES	YES	YES	YES	YES
Observations	2,995	2,995	2,995	2,995	2,995

Notes: This table presents estimates from household fixed-effects regressions, with standard errors clustered at the household level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 6
Heterogeneity analysis, comparing change in financial transactions after 17 March, compared to the period 4 February–16 March, by subgroup.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Baseline mean	Income	Expenditures	Food	Money borrowed	Income from animal sales	Money withdrawn
Difference: Any savings at baseline	0.759	-41.8 (194.3)	-136.6 (173.5)	28.7 (56.2)	-185.7 (159.0)	-26.7 (30.1)	-224.9** (93.1)
Difference: More than median savings (Ksh 2530) at baseline	0.500	-37.8	33.8	67.6	-68.9	-34.5	-131.6
Difference: Any loan at baseline	0.598	(157.6) -299.3* (164.6)	(155.4) -140.2 (158.4)	(57.3) -40.8 (54.8)	(80.8) -128.1 (97.9)	(44.5) -42.8 (38.4)	(85.8) 32.1 (83.3)
Difference: Household owns any livestock	0.774	-95.5 (156.8)	128.2 (164.3)	162.3** (65.5)	27.9 (63.6)	-23.7 (29.2)	-7.5 (105.2)
Difference: Household owns any cattle	0.393	51.9 (158.0)	-66.4 (158.3)	73.8 (57.9)	-109.6 (68.0)	46.6 (39.2)	-104.7 (90.4)
Difference: Household owns any land	0.686	-101.6 (197.5)	-143.0 (199.1)	-100.1 (71.2)	-169.1 (126.2)	-28.3 (32.8)	29.5 (110.9)
Difference: Household has any agricultural product in stock	0.442	-191.4 (156.2)	-12.7 (154.5)	-38.1 (60.3)	-93.3 (72.2)	-39.8 (52.0)	-6.0 (88.2)

Notes: This table presents results from a difference-in-difference analysis, comparing the mean before and after the first COVID-19 case, for each subgroup specified. The estimate shown in the table is the interaction between a post-COVID dummy and the subgroup dummy. The regression includes household fixed-effects, with standard errors clustered at the household level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

potentially due to the more urban nature of their samples. A major disadvantage of these surveys is that they lack pre-COVID-19 data and rely on retrospective self-reported changes in income or food consumption. Moreover, our data allow us to assess the financial coping strategies of households dealing with the economic downturn.

Some caution is warranted though. Our results on food expenditures focus on spending – not on consumption since the diaries only capture financial transactions. This might partially explain differences with surveys on self-reported food consumption. Given the rural nature of our sample, this most likely strengthens our results on short-term food security, to the extent that households could consume home-grown foods or purchase food at lower prices. Lower food prices in food-producing areas could result from a breakdown in the food markets because of transportation restrictions. However, this also underscores that our findings should not be extrapolated to an urban population. Likewise, the sample consists of families with small children – young single adults or old-age people might have fared differently, dependent on their employment status and dependence on remittances.

Another potential limitation concerns the shift to phone-based interviewing: we cannot preclude some underreporting occurred during the first week or two of the transition. However, the trust built up during several months of weekly meetings since 2019

combined with intensive training of field workers and supervisors, helped in easing the transition, reducing concerns about low data quality after the pandemic. Attrition remained low and, to the extent it occurred, there was no systematic bias in which households dropped out of the sample.

What do our findings imply for government relief measures in Kenya? If the crisis and preventive measures persist, households' income could continue to decline. While households were able to maintain food spending during the initial weeks after the first measures, this could become more difficult as time passes. Income levels need to be protected to avoid food insecurity. Our findings on reduced gifts, remittances, and informal borrowing and lending also suggest that most households were in it alone – at least during the initial stages of the pandemic. Whereas in other times rural households rely on informal credit (Udry, 1994) or support from their social networks in case of need – especially when dealing with idiosyncratic shocks such as illness or injury (De Weerd & Dercon, 2006; Fafchamps & Lund, 2003; Geng et al., 2018), these informal risk-sharing arrangements faltered when households throughout the region were affected. Previous research suggests that households may sell productive assets to smooth consumption during covariate shocks (Nguyen, White, & Ma, 2019; Rosenzweig & Wolpin, 1993), but we find no evidence that households resorted to selling assets such as livestock in the short-run.

The Kenyan government has announced several economic support measures, including tax relief, reduction of VAT, and a reduction of income and business tax (Were, 2020). As most of our households are employed in the informal sector, these relief measures may not reach them. The most relevant measure seems to be the cash transfer to the elderly, orphans, and other vulnerable members, distributing 8,000 shillings to more than 1 million beneficiaries during the week of 20 April.¹⁰ The latest figures show that 36 percent of Kenyans still live below the poverty line of US\$1.90 per day, amounting to more than 19 million citizens (Awiti, Dennis, Mutie, Sanya, Angelique, & Wankuru, 2018). To protect consumption and food security of all the poor and vulnerable, safety net measures need to be expanded. Mobile money transfers can play a major role in this regard, but challenges such as a lack of centralized household registries remain an issue (Chacha et al., 2020). At the other end, the food supply chain should be protected to keep down food inflation and ensure households are able to purchase food at their preferred markets.

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.

Acknowledgements

We are grateful for funding from the Health Insurance Fund, Amref Health Africa and PharmAccess Amsterdam through the i-PUSH programme (National Postcode Lottery) and the Joep Lange Institute. We would like to thank the two anonymous reviewers and the editor for their constructive comments.

References

- Awiti, C. A., Dennis, A. C. K., Mutie, C. K., Sanya, S. O., Angelique, U., Wankuru, P. C., et al. (2018). Kenya economic update: Policy options to advance the Big 4 - unleashing Kenya's private sector to drive inclusive growth and accelerate poverty reduction (No. 125056; pp. 1–88). The World Bank.
- Baker, S. R., Farrokhnia, R. A., Meyer, S., Pagel, M., & Yannelis, C. (2020). *How does household spending respond to an epidemic? consumption during the 2020 covid-19 pandemic* (No. w26949). National Bureau of Economic Research.
- BRAC International. (2020). Rapid food and income security assessment Round 2: How are BRAC International volunteers and programme participants coping with COVID-19. BRAC International.

- Carvalho, V. M., Hansen, S., Ortiz, A., Garcia, J. R., Rodrigo, T., Rodriguez Mora, S., et al. (2020). *Tracking the Covid-19 crisis with high-resolution transaction data* (No. DP14642). Centre for Economic Policy Research.
- Chacha, P. W., Angelique, U., Sienaert, A., Mutie, C. K., Afram, G. G., Belli, P., et al. . *Kenya Economic Update: Turbulent Times for Growth in Kenya - Policy Options during the COVID-19 Pandemic*, 148076, 1–70.
- De Weerd, J., & Dercon, S. (2006). Risk-sharing networks and insurance against illness. *Journal of Development Economics*, 81(2), 337–356.
- Dercon, S. (2002). Income risk, coping strategies, and safety nets. *The World Bank Research Observer*, 17(2), 141–166.
- Fafchamps, M., & Lund, S. (2003). Risk-sharing networks in rural Philippines. *Journal of Development Economics*, 71(2), 261–287.
- Geng, X., Janssens, W., Kramer, B., & van der List, M. (2018). Health insurance, a friend in need? Impacts of formal insurance and crowding out of informal insurance. *World Development*, 111, 196–210.
- Gerszon Mahler, D., Lakner, C., Castaneda Aguilar, R. A., & Wu, H. (2020). The impact of COVID-19 (Coronavirus) on global poverty: Why Sub-Saharan Africa might be the region hardest hit. <https://blogs.worldbank.org/opendata/impact-covid-19-coronavirus-global-poverty-why-sub-saharan-africa-might-be-region-hardest>.
- Gupta, S., Nguyen, T. D., Rojas, F. L., Raman, S., Lee, B., Bento, A., et al. (2020). *Tracking Public and Private Response to the Covid-19 Epidemic. Evidence from State and Local Government Actions*. National Bureau of Economic Research.
- Hrishipara Daily Diaries. (2020). Hrishipara Daily Diaries—Corona virus. <https://sites.google.com/site/hrishiparadailydiaries/home/corona-virus>.
- Kahn, L.B., Lange, F., & Wiczer, D.G. (2020). Labor Demand in the Time of Covid-19: Evidence from Vacancy Postings and Ui Claims. National Bureau of Economic Research.
- Le Nestour, A., Mbaye, S., Sandefur, J., & Moscoviz, L. (2020). Phone survey on the Covid crisis in Senegal. *Harvard Dataverse*.
- Ministry of Health. (2020). COVID-19 outbreak in Kenya. Daily situation report 66. Ministry of Health.
- Montenovo, L., Jiang, X., Rojas, F.L., Schmutte, I.M., Simon, K.I., Weinberg, B.A., et al. (2020). Determinants of Disparities in Covid-19 Job Losses. National Bureau of Economic Research.
- Nguyen, G. T. H., White, B., & Ma, C. (2019). When Faced with Income and Asset Shocks, Do Poor Rural Households in Vietnam Smooth Food Consumption or Assets? *The Journal of Development Studies*, 55(9), 2008–2023.
- Population Council. (2020). Kenya: COVID-19 knowledge, attitudes and practices—Responses from Second Round of Data Collection in Five Informal Nairobi Settlements (Kibera, Huruma, Kariobangi, Dandora, Mathare) [COVID-19 Research & Evaluations Brief]. Population Council.
- Rosenzweig, M. R., & Wolpin, K. I. (1993). Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investments in Bullocks in India. *Journal of Political Economy*, 101(2), 223–244.
- Sumner, A., Hoy, C., & Ortiz-Juarez, E. (2020). Estimates of the impact of COVID-19 on global poverty (WIDER Working Paper 2020/43). UNU-WIDER.
- Udry, C. (1994). Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria. *The Review of Economic Studies*, 61(3), 495–526.
- Were, M. (2020). COVID-19 and socioeconomic impact in Africa (WIDER Background Note 2020/3). UNU-WIDER.
- World Health Organization. (2020). WHO Coronavirus Disease (COVID-19) Dashboard. <https://covid19.who.int/>.
- Zollmann, J., Ng'weno, A., Gachoka, A., & Wanjala, C. (2020). When hustling fails: The impact of coronavirus mitigation efforts on ordinary people's livelihoods. <https://fsdkenya.org/blog/when-hustling-fails/>

¹⁰ The Star Kenya: <https://www.the-star.co.ke/news/2020-04-19-inua-jamii-beneficiaries-to-get-sh8000-each-from-monday/>