

Coping with COVID-19 shocks in rural Nepal

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Abstract

We examine shocks experienced by rural Nepali households during the COVID-19 pandemic. Households primarily experienced income and price shocks during a government-imposed lockdown. During this time, households managed to effectively protect consumption, and mostly relied on credit (26%), asset sales (10%) and savings (8%). Debt levels nearly doubled, with limited changes to savings. We then leverage a long-term randomized control trial (RCT) to assess whether beneficiaries of a livestock livelihood program are more resilient. Program beneficiaries are 6 percentage points less likely to take out new loans.

KEYWORDS

asset smoothing, consumption smoothing, coping, COVID-19, credit, savings, shocks

JEL CLASSIFICATION

O10, O16, O13, O12, D14, G51

Recent global events have repeatedly left poor households vulnerable to negative shocks. These shocks include the COVID-19 global pandemic and its related disruptions to global supply chains, rising energy and food prices, direct and downstream effects of wars in Ukraine and elsewhere, and increasingly extreme weather-related shocks imposed by climate change. When poor households are faced with a negative shock, their response options are often limited. Some households may choose to respond by limiting current consumption, reducing food security. Others may choose to sell assets or use savings in order

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to protect consumption, at a cost of reduced productivity in the future. Households with access to finance may instead choose to take on debt. Credit can help households maintain food security and productivity in the short run, but overuse of credit may result in long run debt traps. In this paper, we use disruptions related to COVID-19 in rural Nepal as a case study for better understanding coping mechanisms and policy options for improved long-term resilience among the global poor.

We answer three questions. First, what shocks did rural Nepali households face during the first year of the COVID-19 pandemic? Second, how did households cope with these shocks? Third, did participation in a social protection program 6 years prior to shock exposure improve household resilience? To answer these questions we implemented a phone survey in March 2021 to collect detailed information about shocks experienced in the previous year and how households responded to those shocks. The sample includes households that participated in a randomized evaluation of a livestock livelihood program from 2014 to 2017 (Janzen et al., 2018), which accommodates answering the third question. The multifaceted social protection program included the formation of self-help groups, encouragement to save, training on livestock production, and a small cash transfer (approximately 55 USD). Some beneficiaries also received a livestock transfer (valued at 60 USD).

We find households faced a variety of shocks, with the most prevalent being decreases in income and high food prices. We also find that households primarily coped by borrowing (26%), although many relied on savings (8%) or sold livestock (10%). We find little evidence of changes in food consumption. Program participants were six percentage points less likely to use credit, a reduction of one third. Program participants were three percentage points more likely to sell livestock than other households, although this effect is modestly statistically insignificant (p value = 0.136). They were not more or less likely to use savings to cope. Previous research by Janzen et al. (2022) shows program participants had lower debt levels and more savings *ex ante*, before the onset of the pandemic, which may have helped improve economic resilience *ex post*.

This paper contributes to a rich literature studying how poor households have responded to negative shocks historically (Carter & Lybbert, 2012; Fafchamps et al., 1998; Hoddinott, 2006; Rosenzweig & Wolpin, 1993; Robinson, 2012) and more recently given recent innovations in mobile money (Blumenstock et al., 2016; Jack & Suri, 2014; Riley, 2018). We do this in the context of shocks caused by COVID-19. COVID-19 is a quintessential global shock. Two years into the pandemic more than one million lives lost worldwide can be attributed to the deadly disease (CDC, 2022). Although the pandemic affected us all, the effects were felt in different ways by different individuals in different contexts. Some individuals had pre-existing conditions that made them more susceptible to the disease. Access to life saving equipment, medicines, and vaccines varied widely across continents and over time, and continues to be inequitable. Government responses also varied, but many responded with lockdown policies and other social distancing measures designed to prevent disease spread. Such policies slowed economic activity and had major implications for global supply chains. Adherence to social distancing recommendations also varied widely across communities and cultures.

Like other papers in this special issue, this paper adds to recent analyses exploring the effects of COVID-19 on households living in developing countries. Egger et al. (2021) analyze household survey data from Africa, Latin America, and Asia, including Nepal. They observe significant declines in employment and income in all settings in March 2020. Among nationally representative samples, the share of households who lost employment ranged from 29% in

Burkina Faso to 49% in Colombia. The share of households who experienced income drops ranges from 25% in Kenya to 87% in Colombia. In a sample of rural households from the western Terai region of Nepal, they find that 19% of households experienced reduced employment and 39% reported reduced income. Bundervoet et al. (2022) utilize representative data from 31 low and middle income countries, accounting for roughly one-fifth of the global population.¹ They find that across the entire sample, 36% of respondents lost employment and 65% reported income reductions. They also find that food security was lower among households who experienced an income shock and that disruptions to schooling were more common in relatively poor countries in the sample compared to relative wealthy ones. In a study on COVID impacts in Ethiopia, Malawi, Nigeria, and Uganda using nationally representative samples, Josephson et al. (2021) find that 77% of households experienced income loss a 26 percentage point. They also observe an increase in food insecurity in Nigeria, the only country in their study for which they have pre-COVID data. Gupta et al. (2021) reports severe losses of income (40% on average) in India that recovered fairly quickly to within 10% of 2019 levels.

Like all of the aforementioned papers, we describe how poor people in developing countries were impacted economically by the COVID-19 pandemic and subsequent lockdown measures. We then investigate how people coped with shocks brought on by these events. In their study of COVID impacts in four African countries, Josephson et al. (2021) explore a variety of potential coping mechanisms: using savings, reducing food or non-food consumption, getting help from friends and family, getting government or NGO assistance, and selling assets. They find the most common measures taken were using savings and reducing food consumption. Gupta et al. (2021) finds that in India, many people coped with losses of income by changing occupations. Egger et al. (2021) finds that in rural Kenya, Bangladesh, and Sierra Leone many households resorted to cutting back on food consumption. We look at a wider variety of potential coping strategies than these studies, and uniquely consider the use of credit as a coping mechanism, which we find to be the most common. We also describe the dynamics of coping by looking at coping strategies used before the pandemic and during three distinct phases after it began.

One important question facing policy makers is whether there are ways to increase the resilience of poor households *ex ante*. In a final contribution, we seek to answer this question by evaluating if a social protection program designed to improve overall welfare also alters the coping strategies individuals utilize in response to shocks. The anti-poverty program we assess is similar to other large-scale multifaceted programs that have been found to increase income, consumption, assets, and savings (Bandiera et al., 2017; Banerjee et al., 2015; Bedoya et al., 2019; Janzen et al., 2022; Phadera et al., 2019). This paper analyzes the program impact on resilience in the wake of shocks, many years after the program was initially implemented. Phadera et al. (2019) study the impact of one such program on resilience and finds that beneficiaries have higher mean income with lower variance than a comparison group. Macours et al. (2022) show consumption and income of beneficiaries receiving a productive investment grant or vocational training were more resilient to weather shocks. Neither of these studies examines the impact on how households adjust their specific coping strategies in the wake of shocks. Leveraging a randomized control trial begun in 2015 (Janzen et al., 2018, 2022), we compare the coping mechanisms employed by program beneficiaries and non-beneficiaries during the first year of the pandemic.

The paper proceeds as follows. We first describe the context and sample. Next, we present the kinds of shocks households reported. We then analyze how households responded to those

shocks. Last, we estimate the impact of a social protection program on coping strategies before closing with some concluding remarks.

CONTEXT AND SAMPLE

Our study takes place in rural Nepal. To limit the spread of COVID-19, the Nepali government implemented a national lockdown on March 24, 2020 that prohibited domestic travel, closed the border, and limited non-essential services (Srivastava et al., 2021). The national lockdown was kept in place for almost 4 months, until July 21, 2020. Adhikari et al. (2021) present qualitative evidence that Nepal's lockdown and transport restrictions had severe consequences for rural Nepali households. To help households cope, in July 2020 the Nepali government offered discounts on electricity and internet, as well as staple foods (rice, flour, lentils, salt, sugar, and oil) from the Nepal Food Corporation and Salt Trading Corporation (Central Bank of Nepal, 2020).

Figure 1 shows the trajectory of COVID-19 cases in Nepal during the first year of the pandemic (Ritchie et al., 2020). The figure shows a small peak in case counts during the lockdown which falls just before the lockdown ended. However, case counts during the lockdown pale in comparison to peak caseload in early October when almost 4000 confirmed new cases were being reported daily.

The lockdown was strictly enforced in urban areas, but less so in rural areas. This was largely a matter of logistics. A typical rural village is 30 min walking distance from the closest paved road (Walker et al., 2019). Unlike in urban areas, police and security forces were not checking for compliance and enforcing the lockdown in rural areas, so small kiosks in rural areas often remained open. Although rural households could go about their daily routine, local prices were affected due to supply chain interruptions. Even so, as Egger et al. (2021) point out, the initial shock and lockdown actually struck during the postharvest period in South Asia. This meant many subsistence farmers likely had grain stocks to draw down, and were not impacted

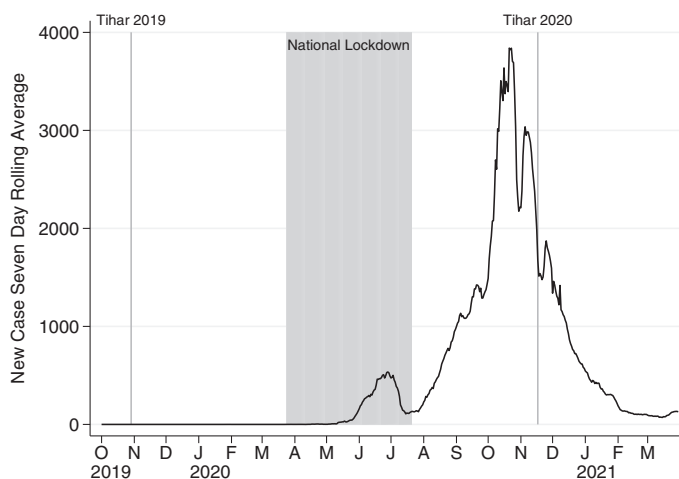


FIGURE 1 Nepal's official nation-wide COVID-19 new cases over time. This figure plots nation-wide COVID-19 cases (rolling average) in Nepal from October 2019 through March 2021. Data source: Johns Hopkins University CSSE COVID-19 Data, retrieved from Our World in Data. Key reference points for phone survey-based recall data are also shown: Tihar 2019, the national lockdown, and Tihar 2020.

as severely as if the shock had occurred during the last 4 months of the year when deprivation levels typically rise.

Against this backdrop, in March–April 2021, we administered a phone survey to 1247 rural Nepali households in the Western Hills and Central Terai regions. The sample is not nationally representative. It is a subset of households selected in 2014 for participation in a randomized evaluation of a livestock transfer and training program implemented by Heifer International, a large international non-governmental organization (Janzen et al., 2018, 2022). The organization targeted rural villages with high poverty rates and experience with basic livestock rearing. Once villages were selected, a sample frame was created based on a complete list of households within the village. The village list was stratified by those residing in a central targeted community (*tole* in Nepal), and those outside the central community. Households were randomly selected from the village list for participation in the study. The respondent for each household was typically the female head of household, as these women were the primary targets of the intervention. Individual phone numbers were recorded in 2018 and used to conduct the phone survey for this study. The response rate was 94%, which is extremely high.

The survey was retrospective, asking about experiences over the previous 18 months, thereby covering the time period from late October 2019 to late March 2021. To make recall easier, we constructed four recall periods, each anchored around significant events. The initial recall period began with the important Tihar festival on October 27, 2019, 5 months before the lockdown. The second recall period begins and ends with the national lockdown, a period salient in the minds of respondents. The third period begins at the conclusion of the national lockdown and continues until Tihar festival on November 14, 2020. As Figure 1 shows, case counts spiked in this period, with case counts starting to fall in the month or so before the Tihar festival. The final recall period continues from Tihar up to the date of the interview.

Our study analyzes behavior over the first year of the pandemic. One limitation is the constantly evolving nature of the pandemic. In the months that followed data collection, Nepal was hit with the devastating Delta wave (Akhikari et al., 2022). The government of Nepal responded with another lockdown beginning in late April and lasting 4 months. Unfortunately, we cannot directly analyze how households responded during the second wave and subsequent lockdown.

EXPERIENCING SHOCKS

In this section, we describe the shocks reported by respondents. Here, a shock is defined as an event the individual was adversely affected by, whether or not it was a result of the COVID-19 pandemic. Slightly more than half of all respondents reported experiencing at least one shock in the past 18 months, with almost a third of all respondents only reporting one shock, 16% reporting two and only 8% reporting three or more shocks.

Figure 2 displays the percentage of households who reported experiencing each shock, either before or after the onset of the pandemic. The most common were a decrease in non-remittance income (22% of households), serious illness (16%), increasing food prices (14%),² and falling agriculture prices (11%). Although serious illness is widely reported, we generally cannot distinguish between COVID-19 cases and other illnesses. Only a handful of the illnesses or deaths are directly reported as being related to COVID-19. Self-reported data is not likely to be a good indicator due to limited access to testing in rural Nepal. The remaining shocks commonly reported—namely income and price shocks—could plausibly stem from lockdown-induced disruptions to commerce and mobility. That said, price shocks still affected only a

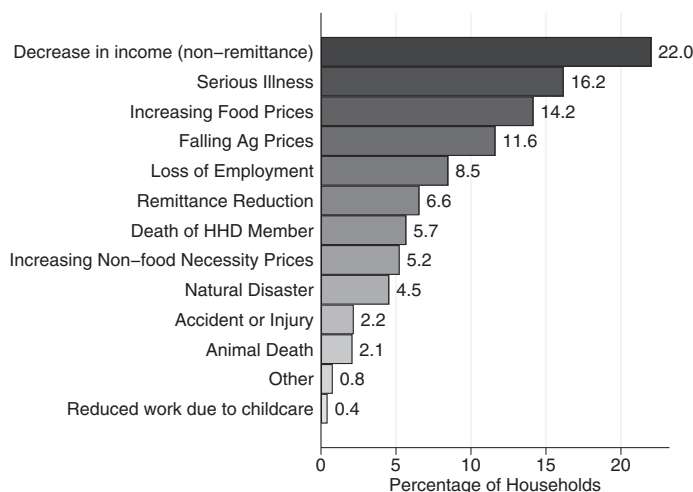


FIGURE 2 Percentage of households reporting shocks from October 2019 to March 2021. This figure shows the percentage of all households reporting experiencing a given shock. Respondents were allowed to select multiple kinds of shocks. Survey question: “Over the past 16 months how you or the members of your household been adversely effected by the following events?” *N* = 1247.

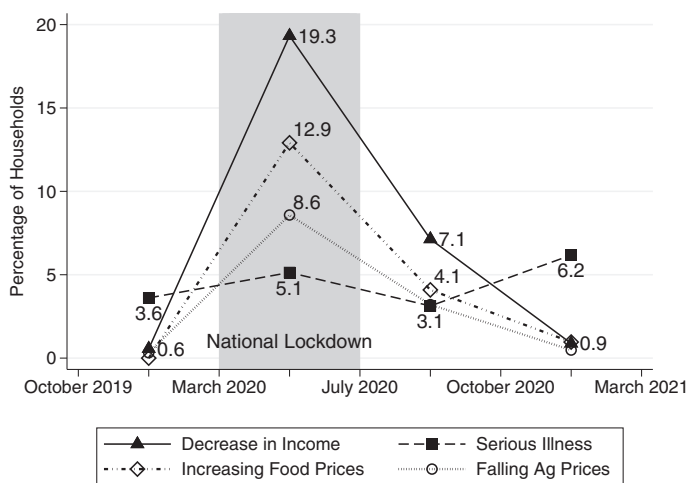


FIGURE 3 Percentage of households reporting shocks in each time period. This figure shows the percentage of all households reporting experiencing a given shock in each of four recall periods. More than one shock could be experienced in each period, and the same type of shock could be experienced in multiple periods. *N* = 1247.

minority of households, which suggests government discounts may have been effective in keeping prices stable in most rural villages.

To further assess whether these shocks are related to pandemic and lockdown, we plot shocks reported in each of the four recall periods. Figure 3 shows the percentage of households reporting each of the four most common shocks across time. Reports of serious illness remain largely consistent across time. In contrast, reports of decreases in income, increases in food prices and falling agricultural prices all spike during the lockdown, before slowly returning to

pre-lockdown levels between October 2020 and March 2021, despite COVID-19 cases reaching new highs during this period. Although we cannot rigorously identify the impact of the national lockdown because it happened everywhere in Nepal, this pattern of shocks over time suggests that the lockdown was primarily responsible for the shocks people faced.

COPING WITH SHOCKS

Poor households faced with economic shocks are generally thought to have limited options for coping. They may face a choice between reducing household consumption or selling assets to maintain consumption (Carter & Lybbert, 2012; Hoddinott, 2006; Kazianga & Udry, 2006). Either decision can have long-term consequences for household economic mobility and future welfare. Access to finance presents an alternative to consumption or asset smoothing, but unsustainable debt levels are concerning as well.

In this section, we describe the strategies households used to cope with the shocks presented in Section 2. Specifically, Figure 4 reports the percentage of households who indicated using a particular coping strategy, where coping strategies could be selected. Questions about coping strategies were only asked to those reporting exposure to at least one shock between October 2019 and March 2021—everyone else is assumed to have not used any coping strategies. Thus, when we state that a certain percent of households employed some coping strategy, it is the percent of all households, not just those that reported experiencing a shock.

When poor households are forced to cope with shocks, a primary concern is that they sacrifice consumption, particularly food, leading to long term negative consequences for children. We find limited evidence of consumption destabilization in this setting. Changes in food consumption, for example, changing food types, eating smaller portions, and cutting the number of

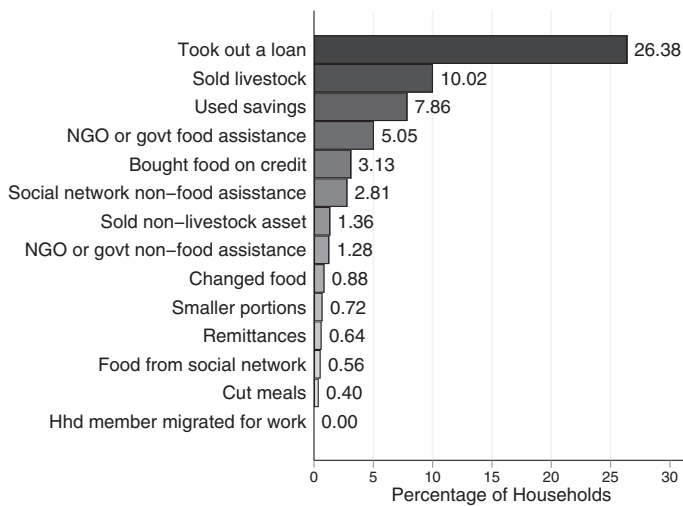


FIGURE 4 Percentage of households using coping strategies from October 2019 to March 2021. This figure reports the percentage of all households reporting utilization of a specific coping strategy in response to experiencing a shock. Respondents were allowed to select multiple strategies. Survey question: “To cope with these events, what did your household do in the past 16 months?” Respondents who reported no shock exposure are assumed to have employed no coping strategies. $N = 1247$.

meals, are reported by less than 2% of households. Instead, we observe minor changes in how some households acquire food. Figure 4 shows 5% received food assistance from a non-governmental organization or the government, and 3% purchased food on credit.

Rather than cutting back consumption, households drew on cash and asset reserves. Figure 4 shows that 10% of households sold livestock and 8% used savings. The most common coping strategy was to use credit, which 26% of households did. These findings demonstrate how households in this context were self-reliant, with few households relying on aid or support from social networks. The findings are consistent with a 2019 pre-pandemic study of risk and vulnerability in rural Nepal that shows that households typically take loans or use savings to deal with shocks (Walker et al., 2019). Figure 5 further unpacks how these three primary strategies were utilized over time. As expected, households were most likely to take out a loan, sell livestock, or utilize savings during the national lockdown. After the national lockdown, the use of credit and savings dropped precipitously, although not all the way to pre-pandemic levels. Livestock sales fell too, but more steadily.

Given their importance, we take a closer look at how respondents used saving and credit to cope with shocks. Only 37% of respondents reported being “well-informed” about household finances, so we are unable to analyze savings and debt at the household level. Instead, we consider savings and debt for the female head of household (the respondent). Figure 6a presents the percentage of respondents with any non-zero savings or debt over time, while Figure 6b presents individual savings and debt levels over time. Although 8% of households reported using savings as a coping strategy, we do not observe significant changes to average individual savings levels over time. Roughly four out of every five women in the sample has savings at any point, with an average balance of USD 262 over time.

In contrast to savings, the percentage of respondents with any debt doubles from roughly one quarter of the sample in October 2019 to more than half by March 2021. Respondents who previously had no debt took on debt during this time, especially during the national lockdown.

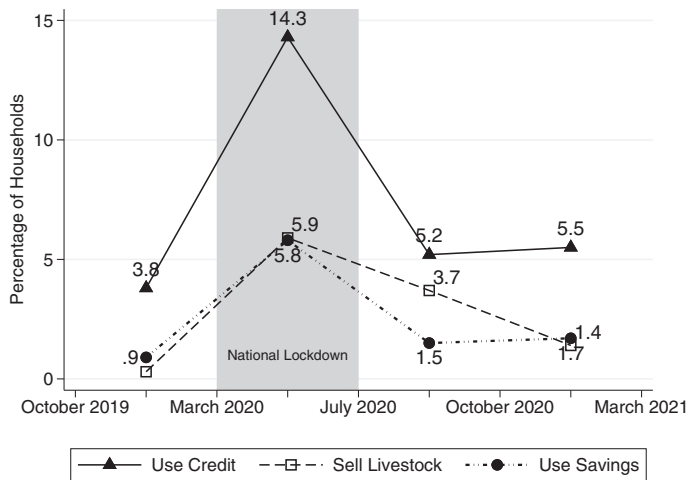


FIGURE 5 Percentage of households using coping mechanisms in each time period. This figure shows the percentage of all households reporting utilization of a specific coping strategy in each of four recall periods. More than one coping strategy could be utilized in each period, and the same strategy could be experienced in multiple periods. Respondents who reported no shock exposure are assumed to have employed no coping strategies. $N = 1247$.

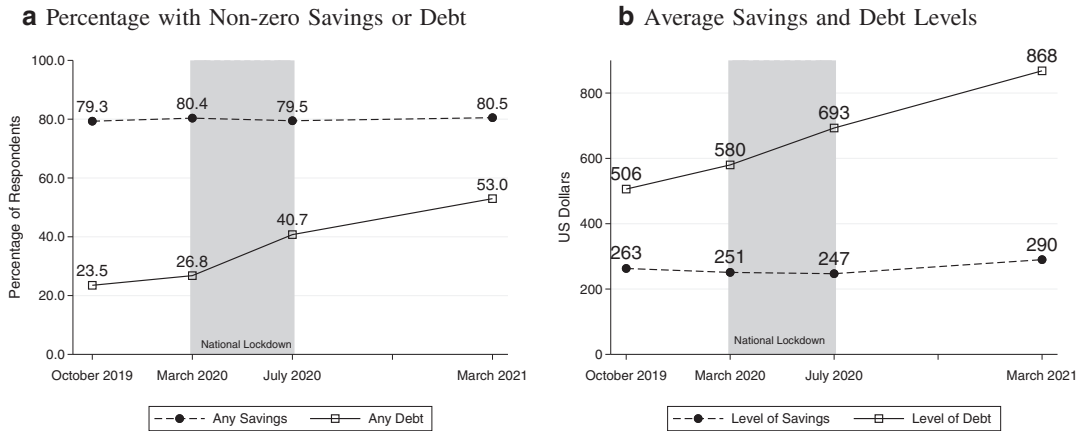


FIGURE 6 Savings and credit over time. These figures show financial outcomes (savings and debt) for all households at four different points in time. (a) reports the percentage of households with any savings or debt at each reference point in time. (b) reports the average amount of savings and debt at each reference point. Averages are calculated including households without any savings or debt. $N = 1247$.

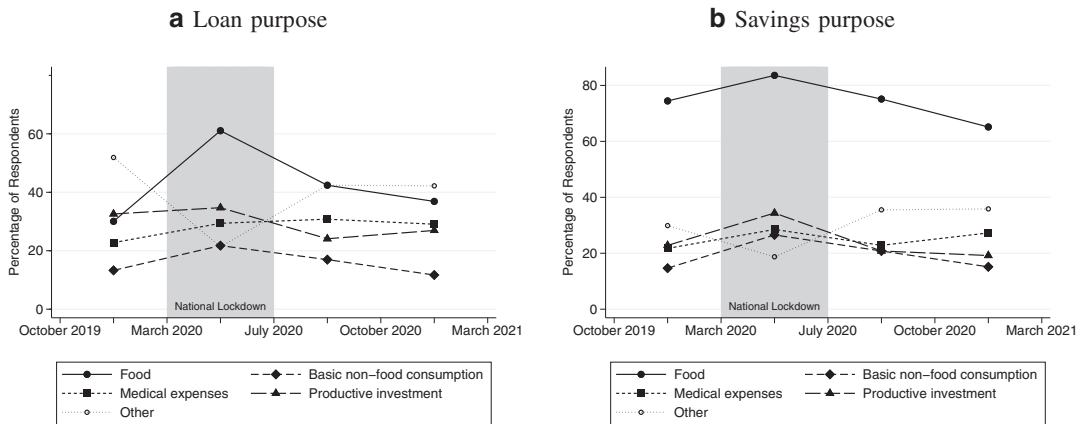


FIGURE 7 Purpose of savings and loans over time. These figures report the purpose of savings and loans over time. Survey question: “[In the [reference period], what did your household use [savings/credit] to purchase?” Basic non-food consumption includes clothing or other basic necessities. Productive investment includes agricultural, livestock and business investments. Other expenses include housing, education, special occasion, and other.

Moreover, average debt levels rose from USD 500 in October 2019 to USD 870 by March 2021, a 70% increase.

Finally, Figure 7 shows the primary purpose of savings and loans over time. Loans and savings can be used for more than one purpose, so the total amount may not sum to 100. Figure 7a shows that prior to the lockdown one third (30%) of loans were used at least partially for food, one third were used for productive investment (33%), one quarter (23%) were used for medical expenses, and 13% were used for basic non-food consumption (e.g., clothing). Just over half (52%) of loans were used for miscellaneous expenses that include housing, education, special

occasions, and other things. These patterns change during the lockdown. During the lockdown, the use of loans for food consumption doubles, while loans for miscellaneous expenses drops in half. After the lockdown, loan uses return to the pre-lockdown norms.

Figure 7b shows savings are primarily used for purchasing food during all four periods, and using savings to purchase food increases by 9 percentage points during the national lockdown (from 74% to 83%). Following a pattern similar to loan use, using savings for miscellaneous expenses declines by 11 percentage points—a decline of one third. After lockdown, savings behavior quickly returned to the pre-lockdown norms.

IMPACTS OF A LIVESTOCK LIVELIHOOD PROGRAM ON RESILIENCE

One important question about anti-poverty programs is whether they help households cope with shocks. Our data uniquely positions us to test whether a multifaceted livestock transfer and training program helped beneficiaries cope with the COVID-19 pandemic and subsequent lockdown. Our sample includes 809 households that were randomly selected to participate in a social protection program beginning in 2014, and 439 who were assigned to a control group. The program was implemented by Heifer International from mid-2014 to mid-2017. It includes several key components. First, the organization facilitated the formation of women's self-help groups. Importantly, group members were encouraged to contribute to group savings accounts, which might offer protection when faced with an unanticipated economic shock. Second, beneficiaries participated in a series of technical trainings to support a new livelihood based on goat production. Third, all beneficiaries were provided a small amount of cash support for home gardens, fodder and forage production, and goat shed construction or improvement (approximately 55 USD total). Some beneficiaries also received two doe goats, valued at 60 USD each.

Janzen et al. (2018) present short-run evidence that the program increases financial inclusion and women's empowerment after 1.5 years. Thompson (2018) shows beneficiaries are more food secure following a major earthquake in 2015, shortly after the start of the intervention. In a more comprehensive analysis, Janzen et al. (2022) finds that after 3.5 years the program results in larger goat herds, greater goat profit, more women's decision-making over goat enterprises, and adoption of best practices related to goat rearing. Beneficiaries also have more savings and less debt.³ Those studies rely on baseline data collected in mid-2014 before the intervention began, and in-depth household surveys conducted in 2016, 2017, and 2018. The analysis presented here uses a vector of five baseline controls (collected in mid-2014) and phone survey data collected in 2021.

We consider three binary outcomes related to household coping strategies: using a loan, using savings, or selling livestock in response to a recent shock. If the respondent did not experience a shock, then they are also assumed to not utilize any of the coping strategies. To analyze program impacts for each of these outcomes, we estimate the following OLS regression, which allows treatment effects to vary over time:

$$Y_{ivt} = \alpha + \beta T_v + \sum_{t=0}^3 \delta_t \tau_t + \sum_{t=0}^3 \gamma_t (T_v \times \tau_t) + \mathbf{X}'_{iv} \theta + S_v + \varepsilon_{ivt} \quad (1)$$

The dependent variable, Y_{ivt} , is the outcome of interest for individual i in village v at time t . Treatment T_v is a binary variable for residing in a randomly assigned treatment village. τ_t is a

binary indicator variable for each of the four time periods of the telephone survey. The four time periods are before lockdown ($t = 0$), during lockdown ($t = 1$), immediately following lockdown ($t = 2$), and the final period prior to the interview ($t = 3$). \mathbf{X}_{iv} is a vector of de-meaned control variables to improve precision that includes age, years of education, and three binary indicator variables equal to one if the household had positive savings, debt, or recently sold livestock (excluding chickens) at baseline. S_v is a vector of de-meaned stratification bin dummies. We cluster standard errors at the village level (the level of treatment).

In Equation (1), α is the average outcome for control households in the first period considered, prior to the national lockdown. δ_t captures outcome dynamics, specifically the difference in outcomes for control households between period t and the initial $t = 0$. β represents the treatment effect of the program 5 years after joining, shortly before the pandemic (i.e. in the first period of this analysis). Dynamics of treatment effects are represented by γ_t , which shows the additional difference between treatment and control households between period t and the initial $t = 0$.

TABLE 1 Average likelihood of employing a coping strategy and treatment effects over time.

	(1) Used loan	(2) Used savings	(3) Sold livestock
Control mean $t = 0$ ($\hat{\alpha}$)	0.031** (0.013)	0.018** (0.007)	0.002 (0.005)
Control mean $t = 1$ ($\hat{\alpha} + \hat{\delta}_1$)	0.172*** (0.029)	0.075*** (0.017)	0.040*** (0.010)
Control mean $t = 2$ ($\hat{\alpha} + \hat{\delta}_2$)	0.038** (0.015)	0.025*** (0.008)	0.035*** (0.012)
Control mean $t = 3$ ($\hat{\alpha} + \hat{\delta}_3$)	0.041*** (0.014)	0.016** (0.007)	0.017* (0.009)
Treatment effect $t = 0$ ($\hat{\beta}$)	-0.004 (0.015)	-0.004 (0.006)	0.001 (0.006)
Treatment effect $t = 1$ ($\hat{\beta} + \hat{\gamma}_1$)	-0.060* (0.035)	-0.016 (0.022)	0.027 (0.018)
Treatment effect $t = 2$ ($\hat{\beta} + \hat{\gamma}_2$)	0.009 (0.018)	-0.005 (0.009)	-0.003 (0.016)
Treatment effect $t = 3$ ($\hat{\beta} + \hat{\gamma}_3$)	0.011 (0.018)	0.012 (0.009)	-0.004 (0.010)
Observations	4840	4840	4840
R^2	0.042	0.029	0.039

Note: Results based on OLS regression of Equation (1) with clustered (village) standard errors in parentheses. Outcome variables are binary indicators of whether a respondent used that coping strategy. The four time periods are before lockdown ($t = 0$), during lockdown ($t = 1$), immediately following lockdown ($t = 2$), and the final period prior to the interview ($t = 3$). De-meaned controls include age, years of education, and three binary indicator variables equal to one if the household had positive savings, debt, or recently sold livestock (excluding chickens) at baseline. De-meaned stratification bin dummies are also included.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Table 1 shows our estimation results for coping strategies utilized in response to shocks. Each column corresponds to an outcome: (1) the probability that a household took out a loan, (2) the probability that a household used savings, and (3) the probability that a household sold livestock. Rows 1–4 present average outcomes for the control group in each time period. Looking back to equation 1, these average estimates are $\hat{\alpha}$ in the period before the pandemic, $\hat{\alpha} + \hat{\delta}_1$ during lockdown, $\hat{\alpha} + \hat{\delta}_2$ at the end of the lockdown until November 2020, and $\hat{\alpha} + \hat{\delta}_3$ between November 2020 and March 2021. Rows 4–8 represent treatment effects for the same three outcomes in each of the same four time periods. These estimated treatment effects are $\hat{\beta}$, $\hat{\beta} + \hat{\gamma}_1$, $\hat{\beta} + \hat{\gamma}_2$, and $\hat{\beta} + \hat{\gamma}_3$ in equation 1.

Table 1 shows the most common coping strategy for control households is using loans. As expected based on the descriptive analysis presented in Figure 5, the use of loans increased substantially (five-fold) during the national lockdown ($t = 1$). However, treated households are 6 percentage points less likely to use a loan to cope with shocks during the national lockdown ($t = 1$). This is a 34% reduction relative to the control mean of 17.2 percent during the lockdown. Instead, treated households are 2.7 percentage points more likely to sell livestock during lockdown (modestly statistically insignificant, p value = 0.136), which is nearly twice as likely as in the control group. Although reliance on savings increases substantially for control households during lockdown, we see no significant treatment effect on the probability of using savings in any time period, and we see no impacts on using loans or selling livestock in subsequent periods.

CONCLUSION

Recent dialogues centered on climate change have highlighted the heightened vulnerability of poor households in developing countries. These households are the most vulnerable to extreme weather-related shocks imposed by climate change. Other recent global events, including inflationary effects of supply chain disruptions due to the COVID-19 global pandemic and the war in Ukraine have repeatedly left poor households vulnerable to negative shocks. When poor households face economic shocks, as they often will, their options are limited. A reduction in consumption risks heightened food insecurity, but consumption smoothing is also costly. Households without access to formal finance often resort to asset sales, but that can limit future productivity. Formal and informal financial tools provide yet another option, but credit available to poor households often come with a high interest rate.

During the first year of the pandemic, rural Nepali households faced income and price shocks, especially during Nepal's 3 month national lockdown. When local shocks hit rural Nepali communities, many will typically rely on income from migrants abroad. But in a global pandemic, migrants were also affected negatively. Perhaps remarkably, these households managed to maintain food consumption, with no evidence of a food security crisis. To cope with these shocks, households relied on credit and savings, and sold livestock, especially during the national lockdown. The average annual interest rate for these loans is 18%. Just like the other options available to households, taking out a loan in this context is costly.

One limitation of our study is that the sample is not nationally representative of rural Nepal, limiting external validity. The sample is, however, representative of the types of communities where Heifer intervenes, which is a relevant population for investigating how the rural poor cope with shocks. These kinds of communities often benefit from aid provided by the government and non-governmental organizations. We leverage this sample because of its

advantage as the setting of an RCT of a social protection program implemented prior to the pandemic. This feature allows us to answer an important research question: does a social protection program actually improve resilience in the wake of shocks? The anti-poverty program we study here increased savings and lowered debt *ex ante* (Janzen et al., 2022) after 4 years. This puts beneficiaries in a stronger financial position prior to experiencing a shock 5 years after the program started. The national lockdown presented households in this region with a plethora of realized shocks. Although debt levels increased throughout the pandemic, treated households were less likely to take out a loan. For these households, a better *ex ante* financial position may have improved their long term resilience.

Just as poor households face difficult tradeoffs when deciding how to respond to shocks, policymakers also face difficult tradeoffs when it comes to protecting the vulnerable. One common response is to provide cash, food aid, or other kinds of humanitarian assistance after the shock occurs. Such aid likely protects against the worst possible outcomes and should not be withheld. But government resources could also be put toward improving resilience *ex ante*, before the shock occurs. Janzen et al. (2021) use simulations to illustrate how a market for insurance, which protects vulnerable households against shocks, can reduce poverty and the total cost of social protection in the long run. Their theoretical exercise reveals important theoretical gains, but in the real world creating functional insurance markets has proven challenging and demand has often been weak (Platteau et al., 2017).

This paper suggests another avenue for improving *ex ante* resilience. Multifaceted anti-poverty programs like the one studied here seek to expand livelihood opportunities, increase assets, and encourage savings. These kinds of programs have been shown to improve household welfare (Bandiera et al., 2017; Banerjee et al., 2015; Bedoya et al., 2019; Janzen et al., 2022), including financial inclusion. In essence, the accumulated wealth and better financial position may help households self-insure against future shock exposure. In doing so, households become more resilient.

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ENDNOTES

¹ Nepal was not one of these countries.

² This aligns with the findings of Afesorbor and Lim (2023) in this special issue, who present evidence of food price inflation in South Asia at this time.

³ Janzen et al. (2018) and Janzen et al. (2022) describe multiple treatment arms and spillover analysis for two different populations. The impact of those differential program effects on a wide range of outcomes is the main

subject of Janzen et al. (2022) and will not be evaluated in this paper. Instead, the analysis presented here pools two treatment arms and two populations for a simple comparison of treated and control households in the context of a major covariate shocks several years later.

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