



Risk and Vulnerability in Nepal

Findings from the Household Risk and Vulnerability Survey

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Executive Summary

This report summarizes the findings of a unique panel survey of rural households in Nepal, conducted between 2016 and 2018 by the World Bank with financing from the UK Department for International Development (DfID). The survey covered 6,000 households in rural and peri-urban areas nationwide. The objective of the survey was to better understand the exposure of households to major natural and socio-economic shocks, their means of coping with these shocks, and the impact of shocks on household welfare. While most households appear to be able to withstand a range of smaller shocks to assets and income, larger and more covariate shocks continue to pose a major risk to household assets, food security and overall welfare. These effects persist for up to two years following the shock. Our findings point to the importance of having established formal social assistance to help the chronically poor build their resilience, and assist all households to cope in the event of major shocks.

Frequency and Size of Shocks

Almost 90 percent of households reported at least one shock during the study period. Each year, on average one in three households was affected by a shock. The most frequently reported shocks were the major series of earthquakes that took place in April and May 2015, and the riots and blockades in late 2015 and early 2016 (figure 1). Aside from the earthquake and blockade, there was a major drought in the far-west and mid-west hills in 2015-16, and localized floods and landslides on an annual basis. While there were no major covariate shocks reported in the second and third waves of the survey, one third of households in 2016-17 and one quarter of households in 2017-18 reported at least one shock.

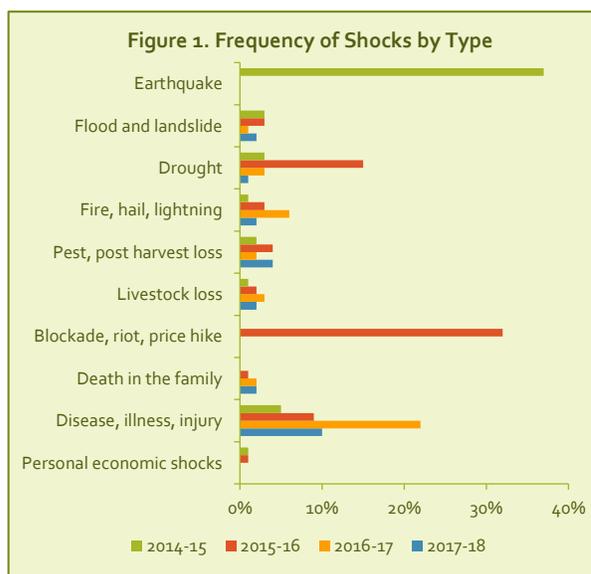


Table 1. Shock frequency and size (percent)

Shock	Share of households	Average loss [^]
Earthquake	36.6	12.3
Flood, Landslide	2.2	7.2
Drought	5.6	1.1
Fire, Hail & Lightning	2.7	1.8
Pest & Post-Harvest Loss	3.0	0.6
Livestock Loss	2.2	3.0
Blockade	32.5	2.1
Death	1.5	12.4
Disease & Injury	11.3	4.6
Other	0.7	8.8
Any shock (annual average)	35.3	6.5

Note: Shares of households are annual averages except for earthquake and blockade. [^] Self-reported loss of income/assets, as percentage of household assets

Each year, households lost an average 1.5 percent of assets to shocks, and those suffering shocks lost an average of 6.5 percent of assets (table 1). The proportion of shock-affected households losing more than 10 percent of assets was 6.8 percent in 2015-16, 11.6 percent in 2016-17, and 10.7 percent in 2017-18. The average loss for households reporting a shock was highest for the poorest quintile, at 6.8 percent of assets, declining to 1.5 percent of assets for the richest quintile.

We find that certain types of household are more prone to shocks. Farm-owning households more frequently reported agricultural shocks, especially middle-income households that owned and farmed

their own plots. Wage earners and the self-employed were more likely to be affected by the blockade. The most remote households were more likely to report flood, landslide and agricultural shocks, and less likely to report being impacted by the blockade. Poorer households were overall more likely to report shocks, especially drought, livestock loss, disease and injury, and death of a family member.

Coping Strategies

Households reported using a range of coping strategies to manage shocks, the most common being dissaving and borrowing. Savings were relied upon more frequently by wealthier households and those with bank accounts, while borrowing was more common among poorer households. Ownership of bank accounts was less common in remote areas, impeding the ability of households in these areas to borrow and save. Those households that relied on credit to cope paid very high interest rates. Loan interest rates were higher for households that borrowed as a coping strategy, for the poor, and for households in remote areas. Controlling for other household characteristics, we estimate that the poorest quintile paid on average 2.6 percentage points higher interest rates than the richest quintile, and those in the most remote areas of Nepal paid around 4.7 percentage points more than households in more accessible areas. While formal lenders charged much less than informal lenders, the above difference in interest rates remained even after controlling for the source of the loan. We also found that loans from friends and relatives carried interest rates as high or higher than those charged by local moneylenders.

A minority of households reported resorting to negative coping strategies, such as cutting food consumption and selling assets. Cuts to food consumption were reported by around 20 percent of shock-affected households, slightly more among the poorer quintiles. If this results in lower caloric intake, it could imply negative long-term consequences of shocks on human capital, especially for the young. Asset sales were reported as a coping mechanism by up to 10 percent of households, more commonly among poorer households. Asset sales were more common following large shocks such as flood and landslide and livestock loss, and less common following smaller shocks like fire, hail and lightning and pest, plant disease and post-harvest loss. The exception to this was the 2015 earthquake, following which few households reported selling assets. Some households reported that shocks interrupted children's schooling. Following the earthquake and blockade, interruptions to schooling were as common or more common among wealthier households, likely reflecting temporary school closures or access issues. However, a small proportion of poorer households reported interruptions to schooling for idiosyncratic shocks, suggesting financial or labor constraints as a cause.

Remittances played a role in assisting households following the 2015 earthquake, and migrant-sending households were in general more resilient. Receipt of remittances is common in Nepal: 32 percent of households in the sample reported receiving remittances in 2016, and this proportion rose to 38 percent in 2018. Remittances made up more than half of household income for those receiving them. We found that remittances were 16 percent higher on average among affected households one year after the 2015 earthquake, and 10 percent higher two years later. For other shocks, however, we found no impact on remittances received. This may be because remittances were already at their maximum before shocks hit, or because some remittances are coming from internal migration that is also affected by shocks. It does not appear that remittances themselves can be relied upon as informal insurance for all except the most severe shocks, although they do provide a source of income that is in principle uncorrelated with other income and can help households build a buffer against shocks. We found consistent evidence that migrant-sending households had greater access to bank accounts, more

commonly used savings to cope, and were less likely to borrow, sell assets, or take their children out of school.

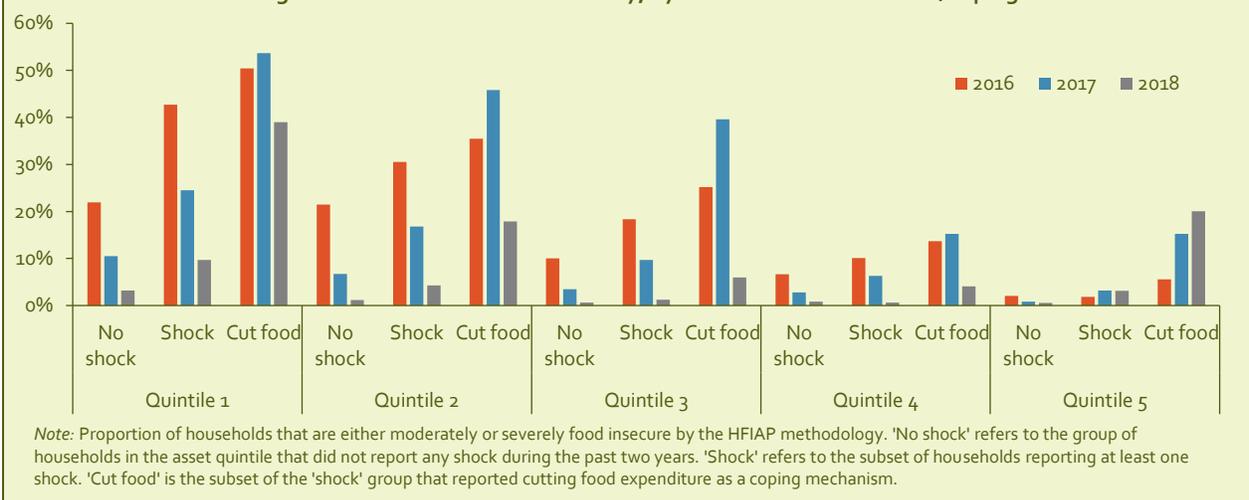
There is limited ad hoc public assistance available to households suffering shocks.

Around one in four households receives regular cash transfers, but no single program covers more than 16 percent of the population. Cash transfers do appear to be received by the intended groups (the elderly, single women, lower castes, and people with disabilities), but do not reach all poor households. Aside from these regular transfers, there were very few reports of households receiving public assistance in response to shocks, other than following the 2015 earthquake. With support from development partners, NGOs, and CSOs, the government was able to mobilize an extensive response, and around one-third of earthquake-affected households in the study reported receiving some assistance. We found that the targeting of the earthquake housing reconstruction grants was relatively unbiased in terms of household characteristics. In contrast, households experiencing floods, landslides and droughts rarely reported receiving assistance from government or NGOs.

Box 1. Debt Traps in Nepal

Purna Maya is Hari Bahadur’s second wife. When he met Purna Maya, she was suffering from several ailments. Eating most food bothered her stomach, and there was not much nutritious food to eat at home. The treatments for these ailments had been costly. Just the day before the interview, she had gone to a traditional healer to cure her stomach pains. For the price of a rooster, the healer had given her some rice to carry around in a *patuka* (cloth belt) around her stomach. Purna Maya had borrowed NPR 175,000 over the past three years from local women’s savings groups to cover her mounting medical expenses. However, the couple was struggling to repay these debts and lately Purna Maya had been avoiding going to the group meetings. This time, Hari Bahadur was thinking of going to the local bank in the market center to explore the possibility of getting loans. Aged 63 and 52, Hari Bahadur and Purna Maya are too young to receive the old age allowance. With little family or community support, their situation captures the downward spiral of debt and poverty that threatens Nepali households hit by shocks.

Figure 2. Incidence of Food Insecurity, by Asset Quintile and Shock/Coping Status



Welfare Impacts of Shocks

Our analysis indicates extensive vulnerability to shocks in Nepal. We examined the impact of shocks on assets, per capita consumption and food security using regression analysis and propensity score matching techniques. We found significant impacts of shocks on household assets and food insecurity. Households that reported cutting food expenditures were more frequently classified as food insecure, as shown in Figure 2. This vulnerability to food insecurity extends even to wealthier households, again illustrating the importance of having mechanisms to assist shock-affected households regardless of their ex ante characteristics or living conditions.

Shocks have significant negative impacts on household assets and food security. We estimate that shocks reduced assets by 3-5 percent on average, and caused a similar rise in moderate to severe food insecurity. The main driver of this result was the 'natural disasters' group of shocks, for which the immediate loss of assets was around 12 percent, and assets were still 7 and 4 percent lower among this group in the second and third year after the shock. Both estimates are in line with the data on self-reported losses summarized in table 1. There was some evidence that food insecurity rates remained higher as well. For agricultural, economic and health shocks, the impacts were smaller, and households appear to have recovered more rapidly. We found less evidence of impacts of shocks on per capita consumption, although we found that a one-standard deviation monsoon rainfall shock translates into losses of over 10 percent in farm income and a fall of 3.3 percent in food consumption among households in the most paddy-intensive areas (mainly in the terai). However, we found that households send members to work elsewhere when rainfall is low, so that consumption *per capita* barely responds to rainfall.

Policy Recommendations

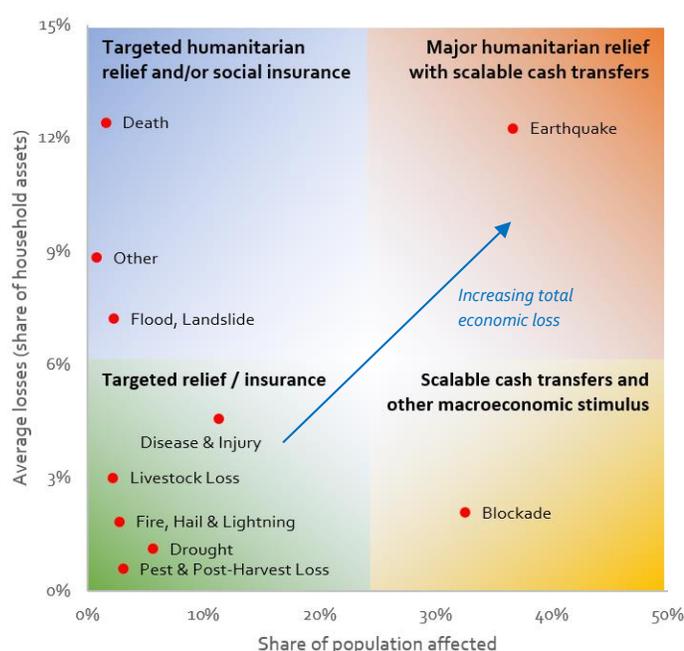
These results indicate that improvements in Nepal's safety net could better protect households from welfare losses in the event of shocks. Nepal's existing welfare programs are static and do not aim to address vulnerability to shocks ex ante or respond to shocks ex post. Policy makers in Nepal tend to use the term 'vulnerable' to refer to specific groups (such as the elderly and the disabled) that are subject to lifecycle vulnerabilities and socioeconomic exclusion and are therefore in need of long-term assistance. Consequently, the main cash transfer programs are targeted to certain demographics or geographies deemed to be chronically vulnerable by this definition. However, this study demonstrates the *economic* vulnerability of a much larger population, especially the rural poor. Social safety net programs need to be 'scalable', that is, capable of expanding their beneficiary lists temporarily to include these economically vulnerable people and prevent unanticipated shocks from causing long-term damage to their assets, health and livelihoods.

Shocks and their impacts are diverse, and call for a range of tailored policy responses (figure 3). Massive and widespread disasters (top right box of figure 3), such as the earthquake, demand a major coordinated humanitarian response. Governments will typically rely on external financing (whether drawn from humanitarian aid, contingent financing or reinsurance contracts) to cover the cost of such events. Scalable safety nets can be useful in delivering relief rapidly to a large part of the most vulnerable population. For widespread events with smaller losses (bottom right box of figure 3) – such as civil disturbances or macroeconomic crises – scalable cash transfers, along with other fiscal stimulus programs, can help offset the impact. Shocks that hit more concentrated groups but still have major impacts, such as death, flood/landslide, and other economic shocks, demand assistance targeted to

that group (top left box of figure 3). This can come in the form of geographically targeted humanitarian relief (for example, in the case of flood) or in the form of social insurance (for death, job loss, etc.). Finally, at the bottom left of figure 3 we see smaller shocks affecting smaller groups. Households can be protected against these shocks through geographically targeted or industry-specific relief and risk management programs (for example, state-contingent mechanisms, climate change mitigation and adaptation programs).

In order to be able to assist households to cope with shocks, Nepal's social protection programs need to be adaptive. There are two aspects to an adaptive safety net: (i) static programs that support all chronically poor households; and (ii) a mechanism to scale up assistance temporarily to help vulnerable households cope with shocks. Nepal needs to work on both aspects: expand the coverage of regular cash transfer programs, and develop a scalable safety net.

Figure 3. Size and impact of shocks, and recommended policy responses



- **First, regular cash transfers to the chronically poor can help them build their resilience against shocks.** It is essential that all individuals who are eligible to receive social assistance (such as the old age pension) are enrolled and receiving it regularly. Nepal should also explore how to expand basic social assistance to chronically poor households that do not fall into the existing five target categories. The new Social Security Act (2018), which expands the target groups of the Social Security Allowances to include *economically poor*, provides the basis for this approach. To achieve this objective, a more nuanced targeting methodology will be needed to determine the broader set of economically poor and vulnerable households.
- **Second, scalable safety nets help both poor and non-poor households cope with shocks.** In the aftermath of large covariate shocks, a scalable safety net can temporarily increase benefit amounts for existing beneficiaries (vertical expansion) and expand coverage to non-beneficiaries whose economic situation deteriorates beyond a given threshold (horizontal expansion). This requires policy makers to establish a capacity to identify and register applicants for assistance and assess their need, ideally through an integrated social registry that is secure and accessible by the various government agencies involved in disaster response.

Mechanisms for coordination between local government, welfare and disaster management agencies should be established ahead of the shock. Social protection systems can provide a channel for delivering rapid cash and in-kind assistance, provided the response is well planned and coordinated. By investing in early warning systems such as flood and drought forecasting, government can better

preposition cash and relief packages in disaster-prone areas and identify in advance which households are likely to be most vulnerable.

In addition to developing a scalable safety net, Nepal would benefit from developing and testing specific programs that can mitigate shocks and their impacts:

- Programs that help farmers **adapt to a changing climate** can reduce their exposure to losses from agricultural shocks. For instance, our findings regarding the impact of monsoon rainfall on paddy farming incomes imply that better water management techniques may help protect households from losses in the dry season following negative monsoon rainfall shocks.
- **Risk management instruments** can cover losses from agricultural shocks specific to a particular crop or region (for instance, insurance against drought in the Karnali region).
- **Public works schemes**, such as the Prime Minister's Employment Programme, could be of benefit to farmers affected by agricultural shocks, and others whose income patterns are seasonal and unpredictable.
- The **child grant program**, one of the Social Security Allowances, appears to be well-targeted and can help households better manage shocks without interrupting their children's education. This program could be a platform for vertical expansion in the event of a major covariate shock. At present it is limited to children under five in 13 of the poorest districts, and to all Dalit children, but the government plans to scale it up gradually to other parts of the country.
- Finally, given the evidence that borrowing is a major but costly coping strategy, households could benefit from initiatives to improve **access to affordable credit**, especially for poorer households and those in remote areas.

Investing in adaptive social protection not only protects households and promotes social inclusion, but also contributes to long-term economic growth. First, it can safeguard human and physical capital by ensuring households do not need to resort to negative coping strategies. Second, since there is evidence that households mitigate risk by restricting themselves to income-generating activities with lower and less volatile returns, the protection afforded by a reliable safety net can encourage households to take on riskier, higher-return activities. This can further support productive inclusion and economic growth.

Chapter 1. Introduction

Context

Nepal has made significant progress in reducing poverty over the past decade, with the official poverty rate falling from 46.1 percent in 2003-04 to 15 percent in 2010-11 (World Bank 2019). Nevertheless, a large proportion of the population remains clustered just above the poverty line. In a synthetic panel study of national household survey data, Tiwari et al. (2016) found there was significant churning of households near the poverty line between 2003 and 2010, with roughly two-fifths of the poor in 2010 having been classified as nonpoor in 2003. They cited a recent Gallup World Survey report finding that 90 percent of Nepalis see themselves as 'suffering' or 'struggling'.

Under these circumstances, it is likely that many households above the poverty line remain susceptible to shocks that could push them into poverty. For Nepal to eradicate poverty, vulnerable households need to be protected against major reversals in wellbeing. The 2016 World Risk Index ranks Nepal 108th out of 171 countries in terms of overall risk, scoring 'high risk' for lack of coping capacities (81.1 percent), vulnerability (55.9 percent), lack of adaptive capacities (48.6 percent), and susceptibility to shocks (38.1 percent) (Garschagen et al. 2016). In addition to its exposure to earthquakes, which was highlighted by a series of major tremors in 2015, Nepal is exposed to numerous other natural hazards including floods, landslides, drought, and epidemics (Government of Nepal 2008). It is likely that climate change may increase the frequency of disasters such as floods (Government of Nepal 2015). Economic and social shocks can likewise threaten welfare through impacts on assets, income and prices.

Shocks and Safety Nets

For the purposes of this report, we define shocks as the occurrence of one or more events that result in a loss of welfare of individuals or the broader community. The literature typically distinguishes between *idiosyncratic* shocks, which affect specific individuals or households within a community, and *covariate* shocks, which affect a large proportion of the community simultaneously. Covariate shocks tend to be especially damaging to the welfare of households, since their widespread impact reduces the capacity of households to rely on informal support networks to cope (Dercon 2002). However, there is evidence in the literature that mortality, morbidity, job loss, and other household-specific idiosyncratic shocks can also be large and damaging, and that households may not be able to fully insure against these shocks through informal support (Heltberg and Lund 2009).

International research and policy experience make a compelling case for government intervention in situations where informal support mechanisms fail. Households may be unable to rely solely on personal savings and informal assistance to fully offset the expense and disruption of shocks. They may be forced to resort to harmful coping strategies such as selling assets, taking children out of school, and reducing food consumption. These coping strategies can have long-lasting consequences for the human and physical capital of households (Dercon 2004, Hoddinott 2006). Children's health and educational attainment can be affected, reducing their lifetime earnings prospects and making it more likely that they and their children will be poor (Skoufias 2003).

The set of households vulnerable to shocks extends beyond the chronically poor to include near-poor households that have limited assets, limited access to informal or public safety nets, or relatively

greater exposure to major shocks. Hence the size of the population that can be considered 'vulnerable' may vary by geography and other characteristics, even after controlling for wealth, and is likely to be greater for more substantial shocks. Understanding the structure of this vulnerable population, not only from a static welfare perspective but also from a risk-exposure perspective, is critical to the design of a dynamic safety net. Since shocks may impact households through different channels, and elicit different coping mechanisms, it is also important from a policy perspective to understand how households respond to each type of shock.

The Case of Nepal

The government of Nepal operates a wide range of social protection programs, comprising social insurance, cash and in-kind social assistance, and various labor market programs. The government's portfolio of social protection programs has increased steadily in the past two decades, with current spending around 3.7 percent of gross domestic product (GDP), approximately three-fifths of which is allocated to civil service pensions. Social assistance programs, managed by a range of ministries, are not explicitly targeted to the poor but are instead categorical entitlements – going to groups such as the elderly, the disabled and families with children. While many of these programs exist ostensibly to promote social inclusion, by helping those considered socially and/or economically vulnerable, the mechanism by which this works is not well articulated. Moreover, many households that qualify for this assistance do not receive it.¹ In light of this, Nepal's existing social protection system is not well equipped to help households manage the consequences of shocks. There is a need to improve coverage of the poor and to develop a scalability function to make it possible to identify and assist non-poor households affected by shocks.

The literature to date on how shocks affect households in Nepal, and to what extent households can draw on savings or informal support, has been limited due to lack of data. Existing national household survey data (the latest being the Nepal Living Standards Survey 2010/2011 (NLSS III)) do not have sufficient information to study the experiences of households coping with shocks. Moreover, the studies of shock impacts to date have focused on rainfall shocks and the 2015 earthquake. For the reasons outlined earlier, in order to develop an effective scalable safety net it is important to understand how households respond to a broader range of shocks.

To fill the knowledge gap on shocks and their impacts in Nepal, the World Bank conducted a panel survey of risk and vulnerability with financing from the UK Department for International Development (DfID). The survey covered 6,000 households in rural and peri-urban areas nationwide, but excluding households in the Kathmandu Valley (Kathmandu, Bhaktapur, and Lalitpur). Households were interviewed during the same period (between June and August) in 2016, 2017 and 2018, making it possible to track the evolution of their consumption and welfare over the two-year period.

¹ For example, a study of national household survey data found that undercoverage (that is, the proportion of eligible households not enrolled) in the old age allowance and single women's allowance programs was around 40 percent (World Bank 2014).

This report presents an in-depth analysis of the panel dataset. Although the richness of the data set makes it possible to analyze a wide range of subjects relating to the lives of rural Nepalis, we focus in this report on characterizing the shocks observed during the study period, households' responses to these shocks, and the consequent welfare impacts of the shocks. There is scope for further research on aspects of health, education, employment and business activity. It should be noted that because the survey sample is rural and peri-urban, the inferences presented here may not necessarily carry over to households in metropolitan areas. An additional limitation is that, given this was a quantitative study, we cannot speak at length to the social implications of shocks, their impacts on gender gaps or intrafamily dynamics. Understanding these aspects is essential to developing a fully informed risk management policy, and they are therefore worthy of further research.

Outline of the Report

The report is structured as follows. Chapter 2 describes the panel survey: the research questions, details on the questionnaires, sampling, and data collection. Chapter 3 provides an overview of household characteristics which serves as a basis for understanding the subsequent results. Chapter 4 summarizes the incidence and size of shocks reported by households, from which we seek to understand what factors determine a household's likelihood of suffering specific shocks. In Chapter 5 we examine in more detail the actions households reported taking to cope with shocks, and the role of borrowing and remittances in helping households cope. Chapter 6 presents an in-depth statistical analysis of the impact of shocks on household assets, consumption, income and food insecurity. Chapter 7 concludes with a summary of the results and some policy recommendations.

Chapter 2. Survey Methodology

Overview

The objective of the three-year panel survey was to provide the government of Nepal with empirical evidence on the patterns of exposure to shocks at the household level and on the vulnerability of households' welfare to these shocks. The survey was intended to collect data that can guide the design of programs to help households manage shocks. The key research questions were:

- What significant adverse events are faced by households during a given year?
- What strategies do households employ, and what systems of informal support do they rely on (ex ante and ex post) to cope with these events?
- How are households' short- and medium-term welfare affected by these events?
- What formal government assistance do households receive? Is it sufficient to help them cope?

Sampling Design

The sample frame was all households in non-metropolitan areas of Nepal, per the 2010 Census definition, excluding households in the Kathmandu valley (Kathmandu, Lalitpur and Bhaktapur districts). The country was stratified into 11 analytical regions, or *strata*, defined to correspond to those used in the NLSS-III (excluding the three urban strata used there). The strata are defined as shown in table 2.1. To increase the concentration of sampled households, we limited our sampling to 50 of the 75 former districts in Nepal, which were selected with probability proportional to size (the measure of size being the number of households).² The selected districts are shown in bold in table 2.1.

Primary Sampling Units (PSUs) were selected with probability proportional to size from the entire list of wards in the 50 selected districts, one stratum at a time. The number of PSUs per stratum is proportional to the stratum's population share, and corresponds closely to the allocations used in the LFS-II and NLSS-III (adjusted for different overall numbers of PSUs in those surveys). The selected PSUs are depicted in map 2.1, and the full list of sample wards is provided in appendix table 1.

In each of the selected PSUs (administrative wards), survey teams compiled a list of households in the ward and selected 15 households at random from the list. A further 5 households were selected as potential replacements. During the fieldwork, one VDC (Lapu) was inaccessible and was replaced by Hastichaur using PPS sampling on that stratum (excluding the already selected PSUs). All other sampled PSUs were reached and a full sample of 6,000 households was interviewed in the first wave. Survey respondents were given NPR 200 (about US\$2) in each wave as a token of appreciation for their time.

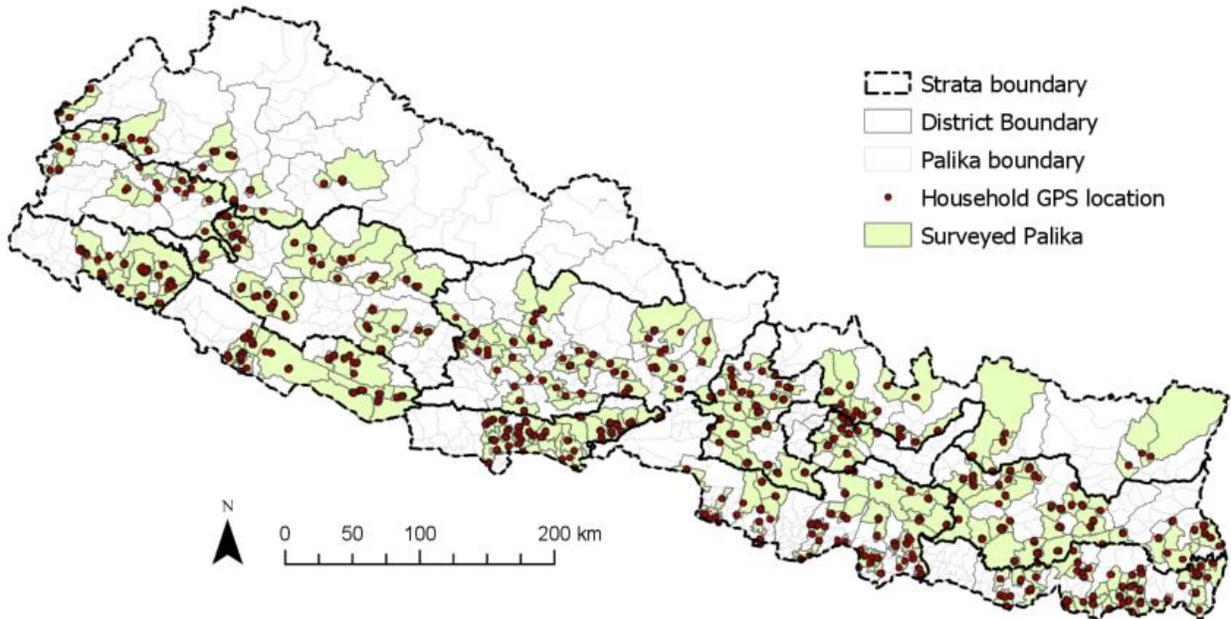
² In 2017, Nepal adopted a new constitution which abolished the former districts and replaced them with provinces and palikas. Since our sampling units were the districts, we refer to them for convenience in this report, but use the new administrative boundaries for all of our maps.

Table 2.1. Division of Districts by Stratum

Stratum	Districts (Bold indicates district was included in sample)	No. of PSUs*
Mountain	Bajhang, Bajura, Darchula, Dolakha, Dolpa, Humla, Jumla, Kalikot, Manang, Mugu, Mustang, Rasuwa, Sankhuwasabha, Sindhupalchok, Solukhumbu, Taplejung	40
Far Western Hill	Achham, Baitadi, Dadeldhura, Doti	18
Mid Western Hill	Dailekh, Jajarkot, Pyuthan, Rolpa, Rukum, Salyan, Surkhet	34
Western Hill	Arghakhanchi, Baglung, Gorkha, Gulmi, Kaski, Lamjung, Myagdi, Palpa, Parbat, Syangja, Tanahu	48
Central Hill	Dhading, Kavrepalanchok, Makwanpur, Nuwakot, Ramechhap, Sindhuli	48
Eastern Hill	Bhojpur, Dhankuta, Ilam, Khotang, Okhaldhunga, Panchthar, Terhathum, Udayapur	39
Far Western Terai	Kailali, Kanchanpur	18
Mid Western Terai	Banke, Bardiya, Dang	24
Western Terai	Kapilbastu, Nawalparasi, Rupandehi	35
Central Terai	Bara, Chitawan, Dhanusa, Mahottari, Parsa, Rautahat, Sarlahi	48
Eastern Terai	Jhapa, Morang, Saptari, Siraha, Sunsari	48
Total		400

* 15 households were interviewed in each PSU.

Map 2.1. Surveyed Locations



Following a panel design, efforts were made to reinterview as many of the Wave 1 households as possible in Waves 2 and 3. In Wave 2, a sample of 6,005 households was interviewed. Among these households, 5,835 households were from Wave 1 were reinterviewed, and 165 new households were added to replace Wave 1 households that could not be reinterviewed. Additionally, five households that had split since Wave 1 were also interviewed. In Wave 3, a sample of 6,051 households was interviewed. The number was higher because some households interviewed in Wave 1 but not in Wave 2 were reached again in Wave 3. Of the 6,051 households, 192 were replacement households and four were split households. A summary of the interviews carried out in each wave of the survey is presented in table 2.2.

Table 2.2. Sample sizes across the three survey waves

	Total	Initial sample	New in Wave 2	New in Wave 3	Split in 2017	Split in 2018
Wave 1 (2016)	6,000	6,000	-	-	-	-
Wave 2 (2017)	6,005	5,835	165	-	5	-
Wave 3 (2018)	6,051	5,696	154	192	5	4
Interviewed in all three waves	5,654					
Interviewed in Wave 1 and 2	123					
Interviewed in Wave 2 and 3	181					
Interviewed in Wave 1 and 3	42					

Table 2.3 summarizes the reasons for nonresponse. In both Wave 2 and Wave 3, migration and lack of an appropriate person to interview in the household (usually meaning no adult present) were the most common reasons. In total, 5,654 households were interviewed in all three waves, giving a retention rate of 94%.

Questionnaires

A multitopic questionnaire was completed for each of the surveyed households. A community questionnaire was also completed with a representative of each PSU, normally a ward or VDC official. The questionnaires were pre-tested before each wave in Kabhrepalanchok district

(out of sample), in order to assess their use under actual field conditions, and finalized based on the enumerators' field experience, feedback obtained, and the quality of responses.

The household questionnaire contained 16 modules: the household roster; education; health; housing and access to facilities; food expenses and home production; non-food expenditures and inventory of durable goods; jobs and time use; wage jobs; farming and livestock; nonagricultural enterprises and activities; migration; credit, savings, and financial assets; private assistance; public assistance; shocks; and anthropometrics (for children less than five years). A full summary is provided in appendix table 2. Where possible, the style of questions was kept similar to those used in the NLSS-III questionnaire for comparability reasons. In some cases, new modules needed to be developed. The shocks questionnaire was developed by the World Bank team. A food security module was added based on the design recommended by Coates et al. (2007), and a psychosocial questionnaire was prepared by social development specialists in the World Bank. The section on government and other assistance was also expanded to cover a broader range of programs and elicit information such as experience with enrollment and frequency of payment.

The community questionnaire was fielded to a senior community representative at the VDC level in each of the 400 PSUs. The purpose of the community questionnaire was to obtain further details on access to services in each PSU, to gather information on shocks at the community level, and to collect market price data. The questionnaire had six modules: respondent details; community characteristics;

Table 2.3. Reasons for nonresponse

	Wave 2		Wave 3	
	No.	%	No.	%
Appropriate person to interview not found	53	32.1	49	25.5
Migrated out of the district	44	26.7	74	38.5
Migrated out of the VDC	27	16.4	32	16.7
Migrated out of the ward	19	11.5	22	11.5
House not found	11	6.7	8	4.2
Refused to participate in the survey	11	6.7	7	3.6
Total	165	100	192	100

access to facilities; educational facilities; community shocks; household shocks; and market prices. Further details are provided in appendix table 3.

Fieldwork and Data Entry

Fieldwork for all three waves of the survey was conducted by Full Bright Consultancy (Pvt.) Ltd, based in Kathmandu. The survey was fielded from June-August 2016 for the first wave, June-August 2017 for the second wave and June-August 2018 for the third wave. Survey teams dealt with some seasonal floods in all three waves, but fieldwork remained unaffected. Tatopani VDC had to be visited later than planned in Wave 1 due to floods. In Wave 2, local elections in some areas coincided with the fieldwork, leading to minor delays.

The field staff were selected based on their academic background, field work experience and performance in a personal interview. There were 14 teams comprising 14 supervisors and 50 interviewers assigned for Waves 1 and 2. Wave 3 data collection was done by 12 teams comprised of 12 supervisors and 43 interviewers. The teams were composed of 4–6 members and led by one supervisor each. In each wave, a third of the enumerators were women.

The survey data collection was done using Computer Assisted Personal Interview (CAPI), with each enumerator assigned a tablet running Survey Solutions.³ In Waves 2 and 3, some of the data about the household and community collected in Wave 1 were prefilled in the questionnaire to be validated in the subsequent waves of the survey. Based on this, residual

Box 2.1. Strategies to ensure a high retention rate

Various steps were taken to achieve the very high retention rate in the survey:

- Phone numbers of the household head and two neighbors were collected. Having phone numbers allowed the team to contact respondents in advance to schedule a suitable time for an interview. If the respondent could not be reached, neighbors could be asked to track them down or inform the team if they had moved away. Phone numbers were also used to contact respondents if required during data cleaning.
- Respondent photographs were taken in the first wave, and then printed out for subsequent waves. Photographs made it easy to locate the respondent, and to remind respondents that the survey team had visited the household in the past.
- As much as possible, enumerators were assigned to the same areas in each wave. The survey teams built up a good rapport with the respondents and were mostly able to interview the same households over the three years. In each wave, respondents were reminded that they would be visited at approximately the same time the following year. The survey also allowed for a different respondent from the same household, provided the respondent was a knowledgeable member.
- Where appropriate, the CAPI form was prefilled with data from previous waves. Prefilling data that was unlikely to have changed (such as family members' names, household location and housing characteristics) reduced the time burden on respondents. Each data point was double-checked and updated as required. For some questions, this process made it easier to follow up on information provided in previous rounds, such as on loans outstanding.
- As a token of appreciation, a small gift of NPR 200 was given to respondents each wave to thank them for their time (approximately 1-2 hours each year).

These steps helped build trust between the survey teams and respondents, resulting in a high retention rate.

³ Survey Solutions is a CAPI software produced by the World Bank. Further details can be found at <https://mysurvey.solutions/>.

errors in data from the earlier waves could be detected and corrected. Data collected in the field was validated by the supervisor of each team and data checkers based in the survey firm office. Back checks for a random selection of data was done over the phone to verify data and confirm that surveys were performed correctly.

Data Access

The full dataset and documentation are freely available online at:

<https://microdata.worldbank.org/index.php/catalog/2905>.

Chapter 3. Household Characteristics

In this section, we summarize key characteristics of the sample households, including demographics, housing, education, consumption, labor, migration, and private and public transfers. The sample was drawn to be representative of the country's non-metropolitan areas in 2016, using the 2010-11 Census as the sampling frame. Statistics presented here are population-weighted and can be interpreted as representative provincially and nationally at the non-metropolitan level. Overall, the results are comparable with those from the Nepal Living Standards Survey (2010-11).

Demographics

A summary of household characteristics is provided in appendix table 4, along with summary statistics from the rural sample of the Nepal Living Standards Survey (2010-11). The means of the two surveys are relatively close, although the data are not entirely comparable given the five-year gap between the surveys. The average household size in our survey sample was 4.8 in 2016, slightly higher in mountain areas and lower in hill areas. The share of children under five was 14 percent, and 32 percent were aged 65 and over. The dependency ratio (i.e., the ratio of these groups to other adults) was 0.76. Nepali was the main language spoken by just over half the sample. In terms of ethnicity, Brahmin/Chhetri and Adibasi/Janajati each make up approximately one third of households in the sample. Almost half of the household heads in our sample were between 35 and 54 years of age in 2016, and 22 percent of households were female-headed. Education outcomes among household heads were limited: only 18 percent had studied to grade 10 or beyond, and 43 percent never attended school (table 3.1).

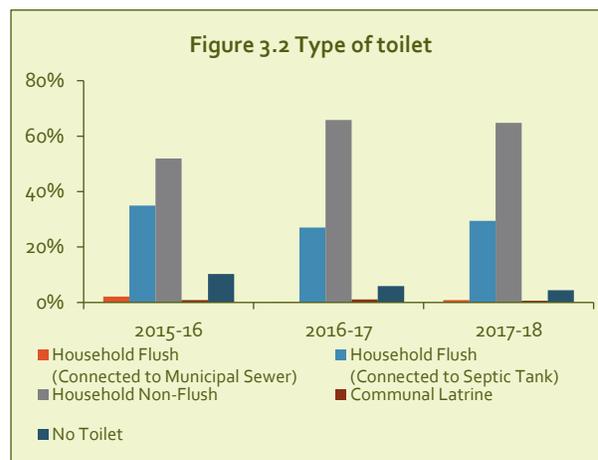
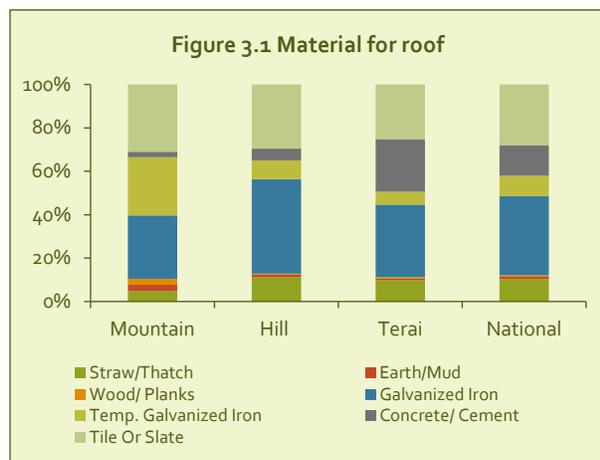
Table 3.1. Household Head Characteristics (%)

	Mountain	Hill	Terai	National
Female Head	1.9	12.5	9.5	22.2
Age of Head				
15-24	0.1	1.0	0.5	2.1
25-34	1.4	5.9	5.5	13.9
35-54	4.9	21.0	21.7	47.6
55-64	2.3	10.2	9.1	20.9
65+	1.2	8.7	6.6	15.6
Education of Head				
None or preschool	4.5	19.9	18.7	43.1
Class 1 to 9	3.8	19.1	3.5	38.6
Class 10, SLC, or Intermediate	1.4	6.8	7.4	15.9
Bachelors or higher	0.1	1.0	1.0	2.3

Housing

In rural areas ownership of houses is universal: 98 percent of households own their home. However, the quality of housing is relatively low. Only 23 percent of households live in dwellings with outer walls of cement-bonded bricks and concrete, while 44 percent are built with mud bonded bricks and stones. The roofs of 37 percent of the houses are galvanized iron, 27 percent tile or slate and about 13 percent concrete. Two in ten housing units are made of temporary roofing material such as straw, thatch and temporary iron (Figure 3.1). The foundations of 42 percent of houses are mud-bonded and 32 percent have wooden pillars. Only 14 percent of households had houses with cement-bonded foundation and 11

percent have pillar-bonded foundation. The average number of household members per room was 0.8 and the average number of rooms per household was 3.2.



There has been a notable improvement in water and sanitation facilities in the sample area over the three waves. The share of households reporting piped water supply as their main source of drinking water increased from 48 percent in 2015-16 to 53 percent in 2017-18, and the share reporting using a non-flush toilet grew from 52 percent in 2015-16 to 65 percent in 2017-18. The share of households without a toilet declined from 10 percent in 2015-16 to 4 percent in 2017-18 (figure 3.2).

Remoteness

Measuring remoteness (in terms of access to services) is a challenge in Nepal, where traditional linear distance measurement calculations do not adequately reflect the rough terrain and underdeveloped, poorly maintained infrastructure. The survey collected extensive locational information from households: GPS locations, names of villages and estimated average travel time and distance to markets, hospitals, banks, schools, and paved roads. However, the self-reported travel times are subjective and possibly erroneous. We therefore used a more sophisticated measure of remoteness, using GIS techniques to convert various factors (e.g. topography, road type and land surface) into travel times.⁴

To ensure the accuracy of the GPS locations collected for survey households, the coordinates of each household were collected in each wave of the survey. GPS coordinates that fell outside the boundary of the surveyed village were eliminated from the data set. This process narrowed the data set from 6,367 households to 6,250 with credible coordinates. If the GPS coordinates fell within the village boundary for more than one year, we computed the household location as the geographic average of the data points.

Table 3.2 summarizes the mean and median travel times to the nearest paved road, medical facility and bank based on the HRVS data and the GIS model. Paved roads are most accessible to households, with

⁴ For details on the methodology, see Banick and Kawasoe (2019).

a mean travel time of around 30 minutes, while banks are least accessible with mean travel time over one hour. While average and median time of the developed model and survey results are similar, we found that the correlation got weaker for longer distances, roughly over two hours. This indicates that the self-reported travel times may be used confidently in this range, but we should employ alternative data, such as the GIS model, for analysis of larger distances.

For the purposes of this report, we define household remoteness by quintile of the measure of travel time to the former DDC office, using the GIS model. Ideally, we would have used distance to nearest health facility or bank, however the available data does not map all of the facilities in Nepal. The quintile ranges for travel time to DDC were 0-40 minutes, 41-70 minutes, 71-110 minutes, 111-186 minutes, and more than 186 minutes.

Table 3.2. Comparison of GIS-estimated and self-reported travel times (in minutes)

	Paved Road*		Medical Facilities		Bank		DDC
	Self-reported	GIS model	Self-reported	GIS model	Self-reported	GIS model	GIS model
Mean travel time	30.2	28.6	38.9	39.9	86.4	62.4	116.0
Median travel time	10.0	9.5	25.0	20.8	45.0	28.2	83.9

Note: * Road excluded path and VR, as the HRVS questionnaire asked about time to drivable or black-topped road.

Access to Basic Services

Slightly more than half of households relied on mud stoves for cooking, which has negative consequences for the health of household members, particularly women and children who spend more time inside the house. Three in four households relied on firewood as the primary fuel for cooking; 15 percent reported using cylinder gas, and 5 percent dung. Eight in ten households reported having access to electricity. Mobile penetration was high, with 96 percent of the households reporting owning at least one mobile phone. About 7 percent of households had access to email and internet. Four in ten households had a bank account. Remoteness affects access to basic services. Half of households in the least remote quintile had a bank account, compared with one-fifth in more remote areas. Use of firewood as source of cooking fuel also increases with remoteness: almost all households living in the most remote quintile used firewood as primary fuel source, compared to just over half of households in the least remote quintile.

Education

Looking at all members of the sampled households, 40.7 percent had attended school in the past, 29.2 percent were attending school or other educational institutions and 30.1 percent had never attended school (table 3.3). Women in the sample had less education than men, with 38 percent of women having never attended school compared to 21.2 percent of men. Of those who had attended or were currently attending an educational institution, 52 percent were in government or community schools or campuses. Only 29.4 percent of those who ever attended school had completed the senior leaving certificate or above.

Table 3.3. Educational attainment of household members (percent)

	All	Males	Females
Attendance status			
Never attended school	30.1	21.2	38.0
Attended school in the past	40.7	47.7	34.5
Currently attending school	29.2	31.1	27.5
Highest grade (among those who ever attended school)			
Pre-school to Class 2	6.5	5.9	7.2
Class 3 to Class 5	22.7	22.8	22.4
Class 6 to Class 8	22.6	23.4	21.5
Class 9 to 10	16.2	16.5	15.7
SLC/SEE	12.4	12.3	12.6
Intermediate/+2	11.5	11.3	11.6
Bachelors	4.2	4.6	3.7
Masters or higher	1.3	1.8	0.8

Consumption and Assets

Consumption expenditure was constructed using responses to an itemized questionnaire on food and non-food consumption. Food expenses and home production were elicited with a 7-day recall period, while non-food expenditures were collected over a 12-month recall period. The only exception was telecommunication expenses, which were collected for 'a typical month'. Spatial price adjustments were made for food and non-food items separately. Our primary approach to spatial adjustment was to deflate food and non-food expenditures separately using the regional (mountain, hill and terai) annual food and non-food consumer price indices published in the 11-month CME tables by the Nepal Rastra Bank (2018). The mean total consumption per capita was NPR 34,106 in 2015-16, NPR 36,956 in 2016-17, and NPR 41,182 in 2017-18 (table 3.4).

Table 3.4. Mean consumption and assets by quintile (in NPR)

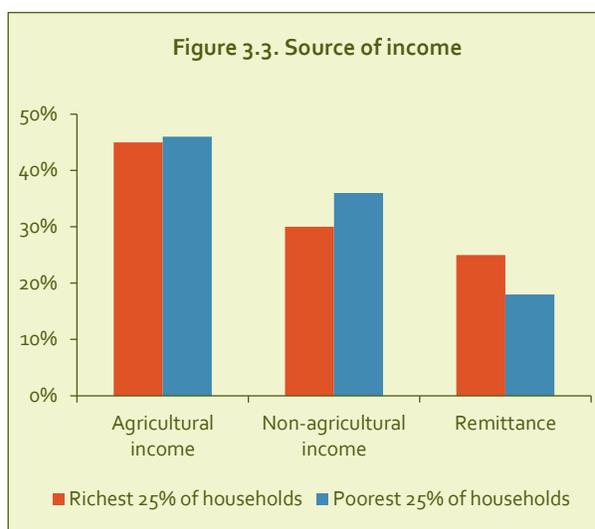
Quintile	Mean consumption per capita			Mean household assets		
	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
Poorest	14,199	14,649	21,010	809,346	1,094,633	1,085,852
Second poorest	21,323	22,303	28,994	1,377,367	1,680,336	1,585,611
Middle	28,108	29,020	35,851	1,786,873	2,242,568	2,384,884
Second richest	37,387	37,816	44,997	3,341,288	3,918,394	3,798,680
Richest	69,513	80,994	75,059	7,764,974	8,257,152	9,547,235

Note: Consumption and assets are tabulated by their respective population-weighted quintiles.

Following Sahn and Stifel (2003), we construct an asset index for analysis in this report. The asset index is a broader measure of household wealth, encompassing the value of durable assets, human capital and housing wealth. The latter two could not be collected through the interviews, because they are difficult to measure and in the case of housing, pricing is difficult given the lack of a deep real estate market. The index is constructed using principal components analysis, which estimates weights

reflecting the importance of each variable in the index in explaining variation in log household assets. In this survey, the variables included in the calculation of the index include dwelling characteristics, durable goods, house ownership, livestock ownership and indicators such as education and age of the household head, which capture the stock of human capital. The ten assets with the highest weight in the index are cement-bonded bricks or stone wall (for housing); fans/heaters/petrolamp; kerosene stove; concrete or cement roof; use of cylinder gas; pillar bonded foundation; cable TV or internet; radio/cassette player/TV/VCR; bicycle; and motorcycle/car. The asset index is measured in the same units as total assets, the means of which are shown by quintile in table 3.4.

Households in the sample were heavily involved in agriculture. Land was owned by 84 percent of households, among which 22 percent were small landholders (less than 0.5 hectares), half owned medium sized plots (0.5–2 hectares), and 14 percent were large landholders (over 2 hectares). Livestock ownership was high, with 80 percent of households owning some livestock. Households in the Terai were less likely to own land than those in the Mountain or Hill regions. There was considerable variation in ownership of durable goods. Three in ten households in the poorest asset quintile owned electronics, compared to nine in ten households in the richest quintile. Less than 20 percent of households in the poorer quintile owned a bicycle, while 45 percent in the second richest quintile and 70 percent in the richest quintile owned one. Telephones were the only durables where difference the difference was negligible—80 percent of the poorest households owned at least one telephone, and 90 percent or more in the other quintiles reported telephone ownership.



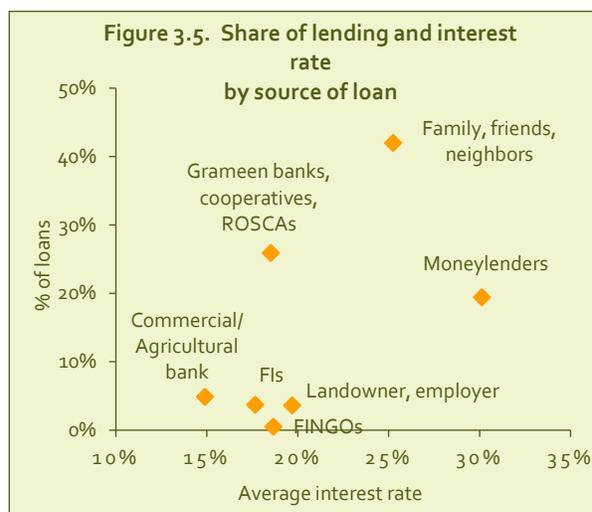
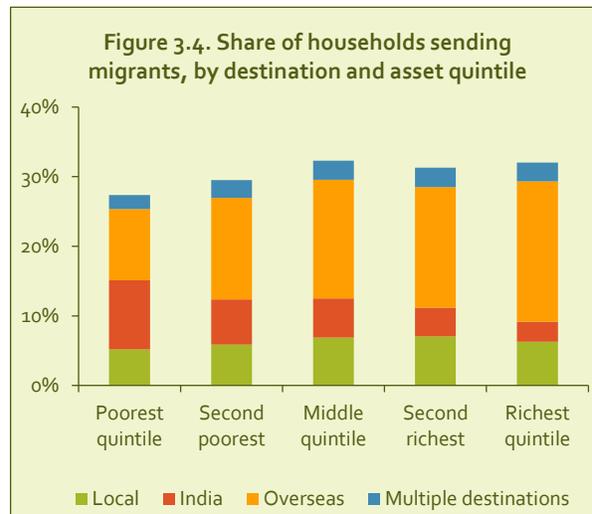
Labor and Migration

Given the rural nature of the survey, it is not surprising that nearly nine in 10 households had members involved in agriculture. Agriculture was the sole occupation for 46 percent of households, and wage and self-employment for 5 percent and 3 percent of households respectively. The remaining households were engaged in multiple sectors: 31 percent in both agriculture and wage employment, 3 percent of households in agriculture and self-employment. About 3 percent of the households reported relying on all three employment types. Among employed household members, 87 percent of women were engaged in agriculture compared to 58 percent of men. For men, non-agricultural wage work was more common. Child labor was reported by 2.5 percent of respondents.

The average annual household income was NPR 195,706 in 2015-16, NPR 217,225 in 2016-17 and NPR 240,055 in 2017-18. Figure 3.3 provides a breakdown of household income for the poorest and richest 25 percent of households (in terms of per capita expenditure). Across the three waves of the survey, 45 percent of total household income came from agriculture, 32 percent from non-agricultural employment, and 23 percent from remittances. The share of income deriving from non-agricultural

employment was greater among poorer households, and remittances comprised a slightly greater share of income for richer households.

We defined 'migrant' in the survey as any person who had not lived in the household during the previous six months but was still contributing financially to the household. Among the households surveyed, around three in 10 households had at least one migrant. The proportion fell from 32 percent in 2016 to 26 percent in 2017, before rising again to 34 percent in 2018. Figure 3.4 summarizes the share of households with migrants by destination and asset quintile, averaged over all three waves. The proportion of households with migrants was higher for the richest three quintiles. The share of households with internal migrants was 5.2 percent among the poorest quintile and between 6 and 7 percent for the richest three quintiles. Households in the poorest quintile were more likely to have migrants in India (9.9 percent, versus 2.9 percent among the richest quintile), while richer households were more likely to have migrants in international destinations (20.2 percent in the richest quintile, versus just 10.2 percent in the poorest). A small fraction of households had migrants in multiple destinations. Around one-third of households reported receiving remittances. As is to be expected, the average annual remittances received by households with migrants overseas was much higher (at NPR 232,000 per year) than that received by households with internal migrants only (NPR 76,200) or migrants to India only (NPR 83,970).



Note: Data are for all three waves of the survey (averaged). Interest rates are reported in annualized terms. FI = Financial Intermediaries, FINGOS = Financial NGOs; ROSCA = Rotating Savings and Credit Agency.

Borrowing

Borrowing was quite common in our sample, with 62 percent of households reporting outstanding loans across the three survey rounds. Four in 10 households had borrowed money from friends or family, while a quarter had borrowed from cooperatives and ROSCAs and about 20 percent of households from moneylenders (figure 3.5). The average outstanding balance was approximately NPR 78,024. Average annualized interest rates vary considerably depending on the source. The most commonly reported sources were family and friends, charging an average annualized rate of 25 percent, cooperatives (18.5 percent), and moneylenders (30 percent). Employers and established financial intermediaries were less commonly relied upon for loans, and charged much lower interest rates.

Trends in Social Assistance

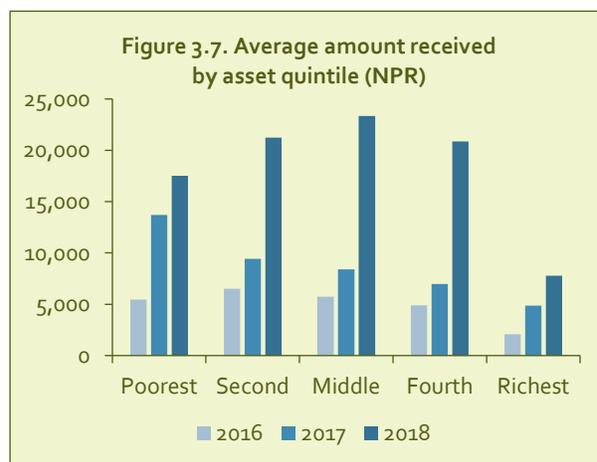
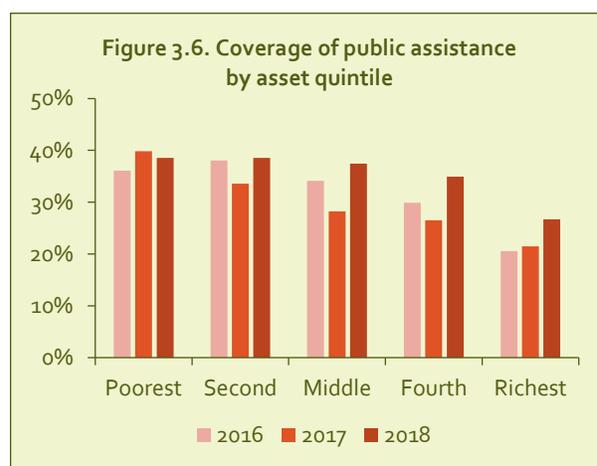
Participation in cash transfer programs generally expanded during the three-year survey period. Table 3.5 shows the proportion of households in the sample (population weighted) that reported receiving each type of cash transfer by year. The first three columns show that there was a major expansion of the old age pension, and small expansions of the single women's pension and child grant. All programs continue to benefit a small minority of households, however, and the share of households receiving any program increased from 23.1 percent in 2016 to 35.3 percent in 2018. It is important to note that no single program reaches more than 16 percent of the population, and the program with the highest coverage is the old age allowance, which is strictly categorical based on age. This means that no existing program could serve as a platform for rapidly scaling up cash assistance to households in the event of a major shock. Around 9 percent of households received the single women's allowance in the survey period; once again, this program targets very specific households. Other programs covered less than five percent of the survey sample, including public works, which was focused on the earthquake districts and diminished after 2016.

Figure 3.6 shows that in terms of coverage, cash transfers were moderately pro-poor, with around 40 percent of the poorest asset quintile and one-quarter of the richest quintile receiving benefits. Average cash transfers were larger in absolute terms for the poor in 2016 and 2017, but in 2018 transfer amounts and coverage both rose across all quintiles as earthquake housing grant payments were distributed, for which payments were on average greatest among the middle quintile (Figure 3.7).

Average amounts received by participating households rose over the three years for most programs (table 3.6). Old age pension receipts in 2018 averaged about NPR 2,000 per month, while the single women's pension and disability benefit averaged about NPR 1,000. (Note these amounts are at the household level, and there may be multiple beneficiaries in some households.) Payments of earthquake relief were almost NPR 145,000 on average per receiving household in

Table 3.5. Participation in social assistance programs (percent of households)

Program	2016	2017	2018
Old age pension	11.5	14.3	16.2
Single women's pension	8.5	8.6	9.2
Disability benefit	1.0	0.9	1.1
Child grant	1.4	1.8	3.0
Safe motherhood	2.7	1.2	2.5
Earthquake relief	10.8	6.4	8.3
Emergency relief	0.0	0.0	0.1
Public works	2.4	0.4	0.2
Any program	23.1	30.1	35.3



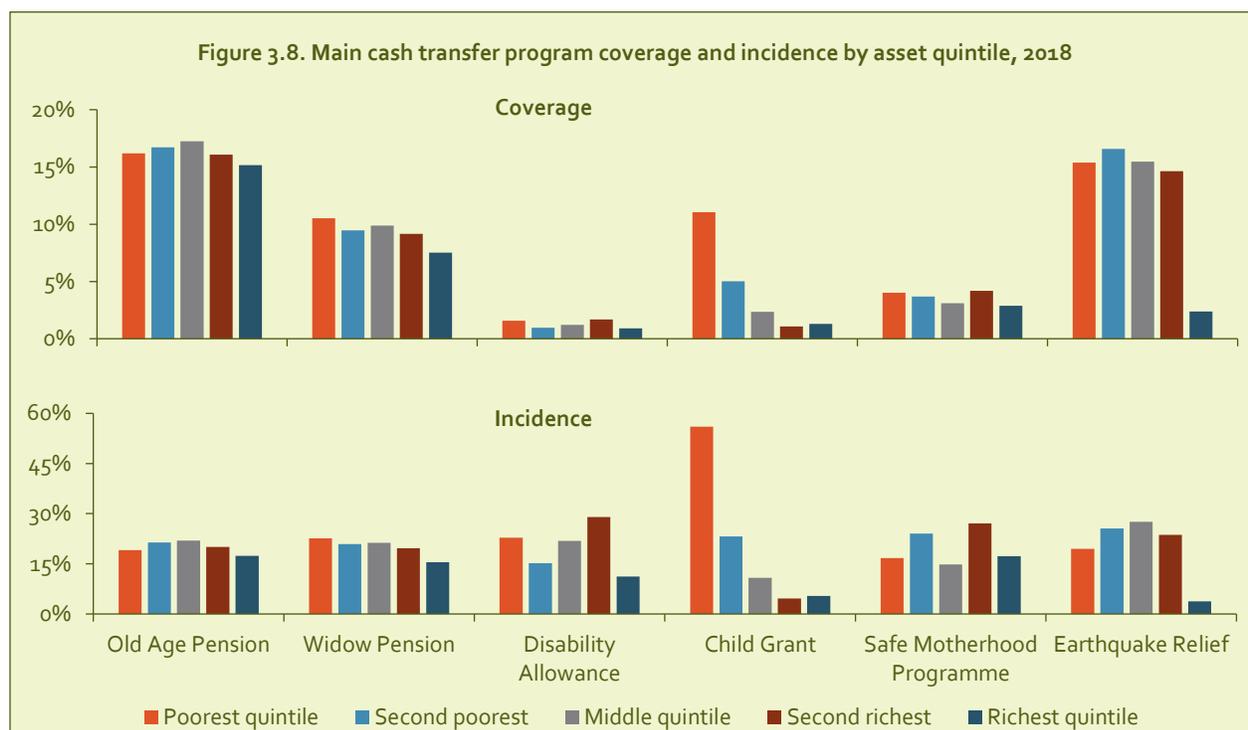
2018, about 3.5 times mean household consumption.

Figure 3.8 shows the coverage and benefit incidence of the main cash transfer programs by asset quintile for 2018. (We do not include public works here because there were few observations.) Coverage is defined as the share of each quintile receiving benefits from the program, while benefit incidence is the share of total reported benefits received by each quintile. This breakdown shows that most of the main cash transfer programs are modestly targeted (or at least neutrally targeted) to the poor. The exception is the child grant, which is strongly pro-poor in terms of coverage and incidence.

Table 3.6. Average benefits from cash transfer programs

Program	Average amount received (NPR)*		
	2016	2017	2018
Old age pension	11,101	24,259	26,972
Widow pension	6,715	11,593	12,042
Disability allowance	8,206	10,330	14,691
Child grant	3,012	5,089	4,938
Maternal incentive scheme	1,001	1,043	1,157
Earthquake relief	25,489	62,664	144,954

*Average annual benefit reported by households in program.



We assess the targeting of cash transfers and public works in more detail by estimating probit regressions of the probability of receipt on household characteristics. The results are reported in appendix table 5. Looking at column 1, we see strongly positive coefficients on elderly people and people with disabilities in the household, and for female-headed households. This is to be expected given the main cash transfer programs categorically target these groups. Having children in the household is significantly negatively correlated with receipt of cash transfers, despite there being a child grant, perhaps because this program is limited to selected regions of the country. Once these categorical targeting characteristics are taken into account, we find that cash transfers are indeed targeted to asset-poor households. We also see that agricultural wage workers and migrant-sending

households are less likely to receive cash transfers, and those with bank accounts more likely (which is unsurprising, as some programs pay benefits directly into bank accounts). Determinants of participation into public works programs (appendix table 5, column 3) are somewhat different. Wage workers were slightly more likely to participate, and those with bank accounts much less likely. Controlling for other household characteristics, we find that poorer households were significantly more likely to engage in public works.

Columns 2 and 4 include dummies for whether the household was affected by any shock in the past year, or by the earthquake. We will return to these results in Chapter 5, but for now it is worth noting that these coefficients are positive and significant, indicating that households suffering shocks do appear to have been more likely to receive cash transfers. This is unsurprising for the earthquake, since earthquake relief is included in the public assistance measure, but there is evidence of increased assistance for households affected by other shocks as well.

Chapter 4. Shocks

During the survey reference period, 2014 to 2018, Nepal experienced various natural disasters and disruptions. The most notable shock to hit Nepal was a series of earthquakes in April-May 2015 that affected 14 districts in the western and central mountain and hill regions, and to a lesser extent other districts. The largest of the tremors was the strongest to hit the country since 1934. Together the earthquakes caused almost 9,000 deaths and destroyed or damaged almost 900,000 buildings. In late 2015 and early 2016, a blockade on the border with India interrupted shipments of fuel, food and other commodities and had major impacts on economic activity and prices nationwide. There were also various droughts and seasonal floods, and outbreaks of illness throughout the survey period. A drought in the Karnali region in early 2016 resulted in 150,000 people needing food assistance (UNOCHA 2017). Major flooding occurred in mid 2017, although by chance this did not affect areas sampled in the survey.

The survey included an unusually detailed module on shocks, which prompted respondents to report annually whether they had been affected by a wide range of negative events. We elicited details on each event, including its timing, impact on assets and income, how it affected the household, and how the household responded. Box 4.1 gives a summary of this module. We now examine the findings from this rich dataset on shocks in Nepal.

We classified the reported shocks into ten categories. Figure 4.1 shows the breakdown of shocks by type and year. Overall, 85 percent of households reported at least one shock during the four-year reference period. Table 4.1 summarizes the frequency of shocks reported by households in each year. The widespread impacts of the earthquake, drought and blockade are evident, with around half of households in the sample reporting at least one shock in each of 2014-15 and 2015-16. The frequency of shock reports fell in 2016-17 (one-third of households) and 2017-18 (less than one-quarter of households), as there were no large covariate shocks during this period.

Earthquake was the most commonly reported shock in 2014-15, with 37 percent of sample households affected, mainly in the central mountain and hill regions. Other shocks were relatively less frequent in 2014-15, including some flood/landslide, drought and disease/injury reports. The next most commonly reported shock

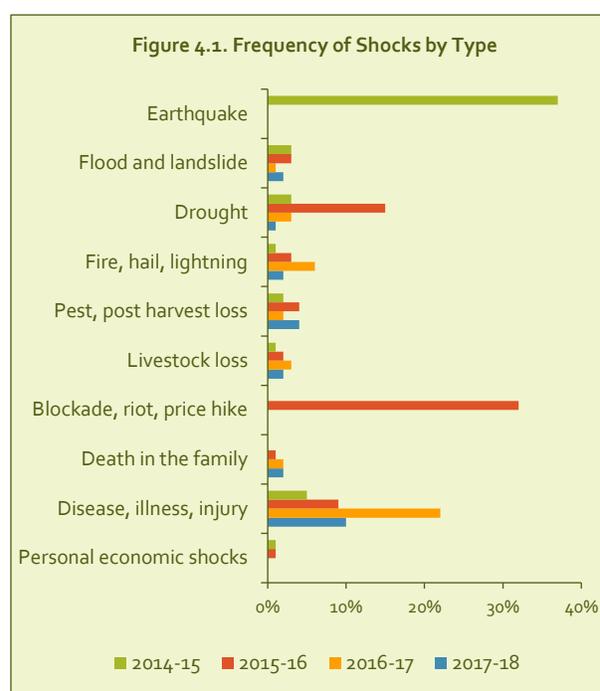


Table 4.1. Number of Shocks Reported

No. of shocks	Percentage of households			
	2014-15	2015-16	2016-17	2017-18
0	56.6	46.6	66.4	77.8
1	37.7	36.5	24.9	20.0
2	3.7	10.3	7.4	2.0
3	1.2	4.5	1.1	0.2
4	0.6	1.5	0.2	0.03
5	0.2	0.4	0.1	0
6+	0.1	0.1	0	0

Box 4.1. Shocks module

Module 15 of the survey questionnaire asked each household: "In the past 12 months, has your household experienced any of the following shocks?", followed by a list of 21 events. If the household answered 'yes' to any of these events, they were then asked if the shock led to any loss of income or assets, the amount, and how long ago the shock occurred. The enumerator then asked a series of follow-up questions:

- *Did you or any member of your household spend savings, borrow money, sell or pawn property?*
- *Did the household reduce its expenditure on foods?*
- *Did the household reduce its expenditures on non-food items?*
- *Was the education of your children affected by the shock?*
- *Did the household receive any assistance or help from others?*
- *Did you or any member of your household look for work, get employed or work more?*
- *Have there been changes in your living arrangements or the number of household members because of the shock?*

If the household answered 'yes' to any of these prompts, the enumerator then inquired for detail and coded the detailed response. From this information we can determine how the household was impacted by the shock, and what measures it took to cope with the shock. One needs to interpret such information with caution, since the data are self-reported and it is possible that the likelihood of reporting (for example, a minor event with no associated monetary loss) may vary depending on household characteristics.

was the political unrest and blockade in 2016-17, which was experienced by households in the terai and central hills as a disruption to daily activities, and by households nationwide through its impact on prices and availability of goods such as fuel. A widespread drought in the Karnali region in 2016 was reported by 16 percent of sample households. In 2017-2018, there was a spate of disease in the mid western hill area, affecting 23 percent of the sample. Other shocks occurred with similar frequency in each year. Surprisingly, flood and landslide were reported by only 2-3 percent of households each year, despite some major flood events occurring during the study period. The team examined this in detail and found that simply by chance, the sampled households were not located in the flooded areas. While poorer households were more likely to report shocks in general, there was also variation in frequency of reporting by specific shock as we will discuss in the following pages. This demonstrates that shock incidence (and, possibility, propensity to report) is correlated with other household characteristics.

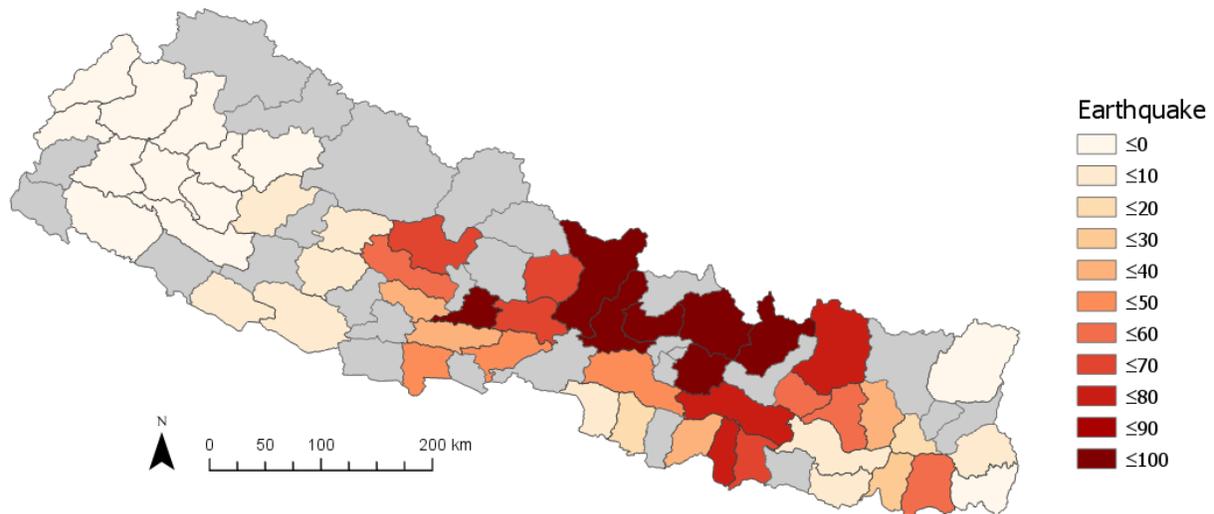
In order to further examine the incidence of shocks across the population, we ran probit regressions of the probability of reporting each type of shock as a function of household characteristics. The results are summarized in appendix table 6. We estimated a simple probit model for earthquake, which was observed only in the first wave. For the other shocks, we used a household random-effects model. The results indicate significant variation across households. Overall, farm owners, poorer households, and those in the remote areas are more likely to be affected by shocks.

In the remainder of this section we consider each of the ten shock types in turn, looking at the self-reported size of the shock (loss of income or assets as a share of total household assets); incidence by household characteristics based on simple tabulations and regressions (to see which types of household were more likely to report or be exposed to the shock); and consequences for the household (how it affected their daily activities, and what strategies they adopted to cope). Because the shocks falling into the 'personal economic shocks' category were so diverse, we do not examine them in detail here but retain them in the overall analysis.

The 2015 Earthquake

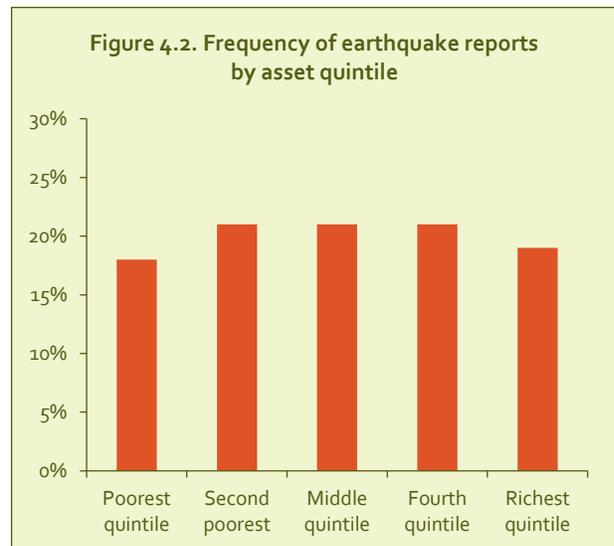
Reports of the 2015 earthquake align closely with official data, with almost 100 percent of households in the officially disaster-affected districts—Sindhupalchok, Dolakha, Gorkha, Syangja, Dhading, Nuwakot, and Kavrepalanchok—reporting the shock, and large proportions of households in other districts of the western, central and eastern regions also reporting being affected (map 4.1).

Map 4.1. Frequency of earthquake reports (2014-18)

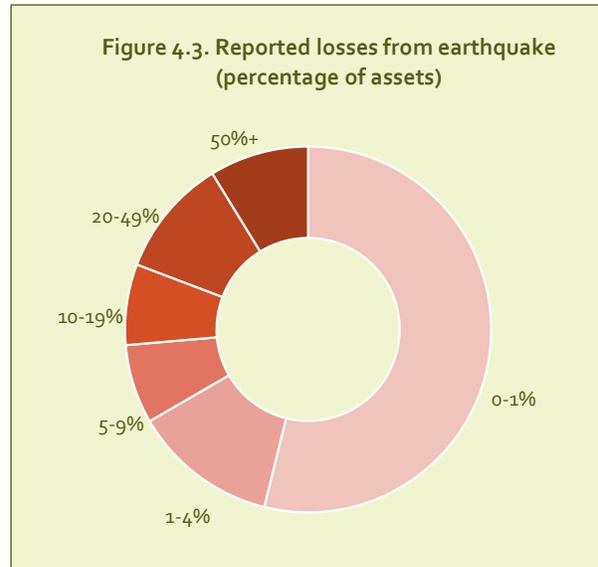


Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

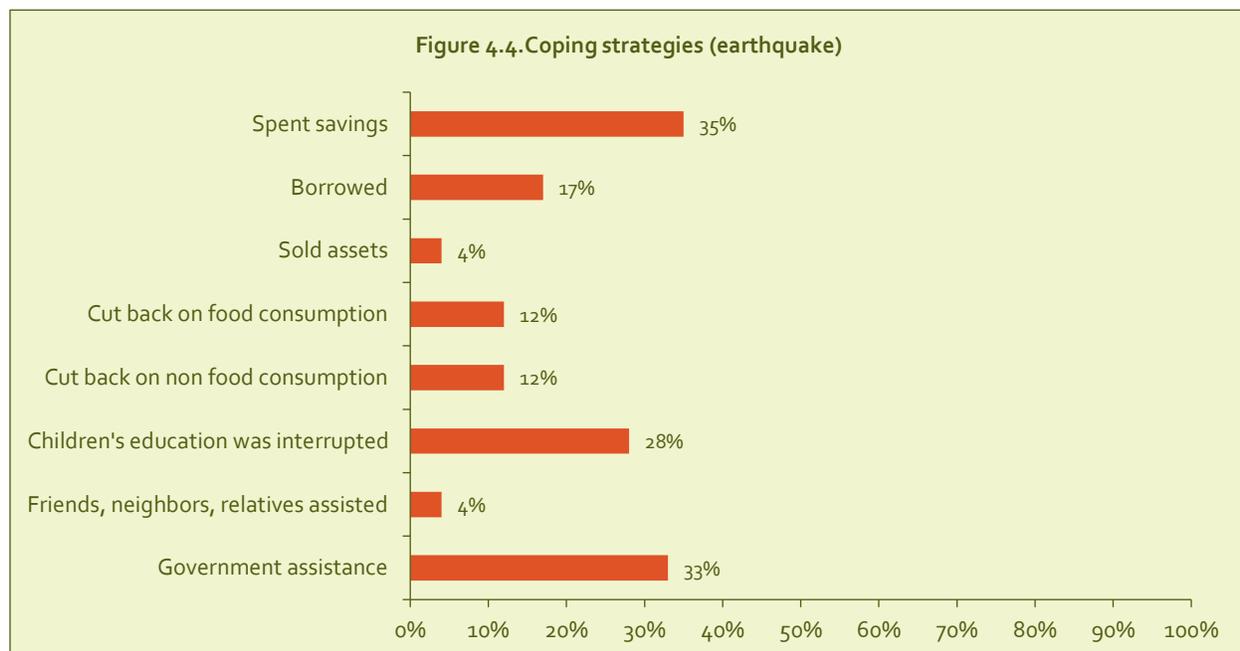
We ran a probit regression of the likelihood of a household reporting being affected by the earthquake as a function of its characteristics, including location, size, head gender, head education, head age, assets, ethnicity and occupation of household members. The results are presented in appendix table 6. Larger households and non-agricultural workers were less likely to report the earthquake shock. We found a correlation with four ethnic groups, but this is likely explained by those groups' higher representation in the earthquake-affected area. Overall, we see little difference in the incidence of earthquake by asset quintile (Figure 4.3); what pattern there is may be more reflective of representation of these national-level quintiles by households in the earthquake zone. Since we did not collect baseline data before the earthquake, we cannot infer the incidence of the shock in terms of household pre-shock assets. For subsequent shocks, we present the equivalent of figure 4.2 with the pre-shock wealth quintiles (and post-shock for just the 2017 and 2018 waves) to illustrate the size of this effect.



Just over one quarter of households affected by the earthquake suffered a loss of more than 10 percent of assets, and 10 percent reported losses of more than 50 percent of assets (figure 4.3). The mean reported loss was 12.3 percent of assets. This was among the largest reported impacts of all shocks in the survey, underscoring the magnitude of the disaster. Aside from the financial losses, households likely suffered other consequences such as disruption to daily activities, interruptions in the availability of goods, and emotional distress.



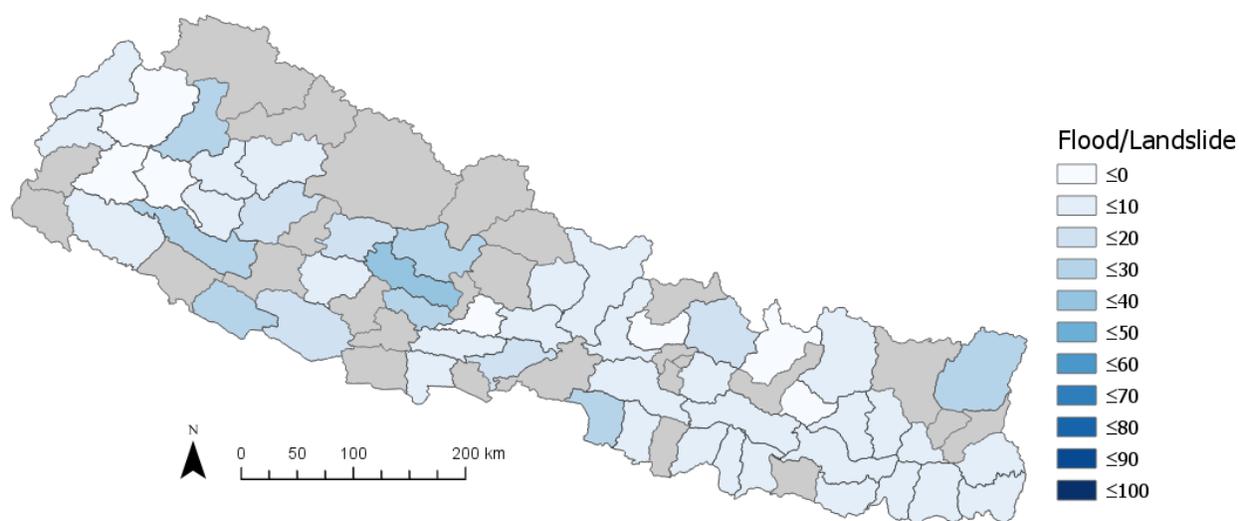
One third of the households affected by the earthquake (and 60 percent of households suffering a loss) reported dissaving in response to the disaster (figure 4.4). Interruptions to children’s education were reported by 28 percent of households, although most of these were likely temporary absences due to school closures rather than complete withdrawal from school because the frequency was much higher for rich households. One in six earthquake-affected households borrowed to cover costs, while asset sales were relatively uncommon. This is unsurprising, first because the shock caused widespread damage to assets, and second because asset markets were unlikely functioning well after such a major covariate shock. Assistance primarily came from government and non-government institutions (33 percent of households reporting), while only 4 percent reported assistance from friends and neighbors. For some households this was not enough to prevent impacts on consumption: 12 percent cut back on food and non-food spending. Relatively few households reported changing living arrangements or adjusting working patterns (such as working more, sending children to work, or changing jobs).



Flood and Landslide

Overall, we observed flood and landslide with low frequency (map 4.2). Flood and landslide were prevalent in Surkhet, Baglung and Myagdi in 2014–15, affecting 20–25 percent of households. One in five households were affected in Bajura and Taplejung in 2015-16. Despite significant flooding in 2017, we did not observe widespread reports of flood among the survey sample households in that year (table 4.2).

Map 4.2. Frequency of flood and landslide reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

Floods and landslides were more likely to affect households in the middle of the wealth distribution than the poor or the rich, primarily due to their location. Since the shock may impact assets, the exposure of households to the shock in terms of pre-shock assets may differ from the incidence of the shock in terms of post-shock assets. We therefore consider the incidence in terms of pre-shock assets in figure 4.5. The first column shows the exposure of households to flood and landslide in terms of pre-shock asset quintile. This shows that households in the middle asset quintiles actually had twice the *exposure* to flood and landslide as the poorest quintile, even though a greater proportion of households in the poorest asset quintile ex post reported the shock (shown in the second and third columns). The third column shows the frequency of the shock by ex post asset quintile for all three waves, while the second is just for waves 2 and 3 (to make it comparable to the first column, since the asset distribution for 2014-15 was not observed).

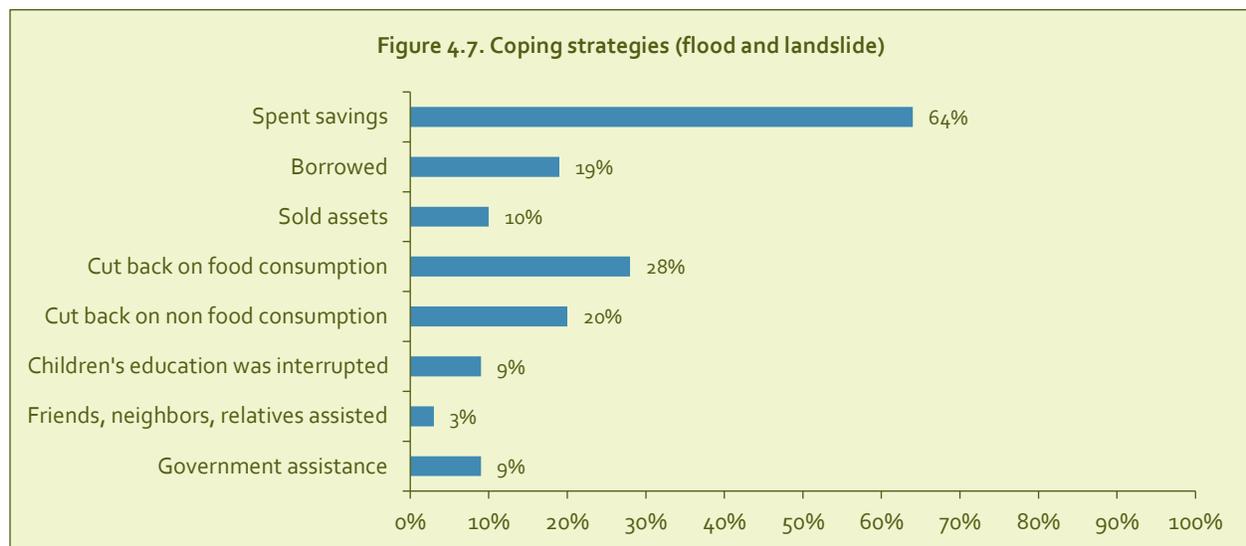
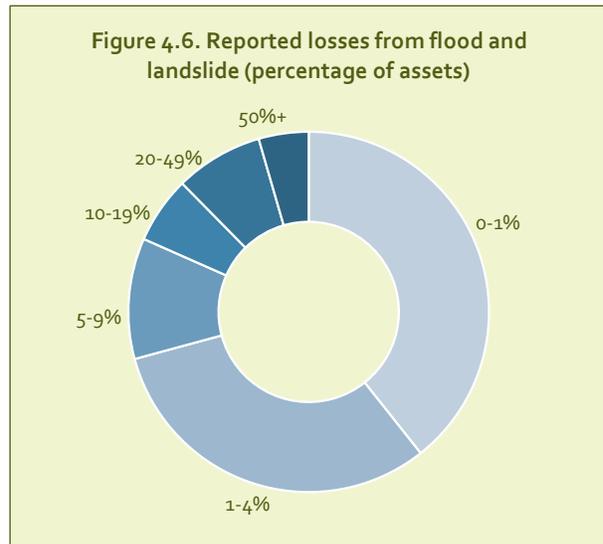
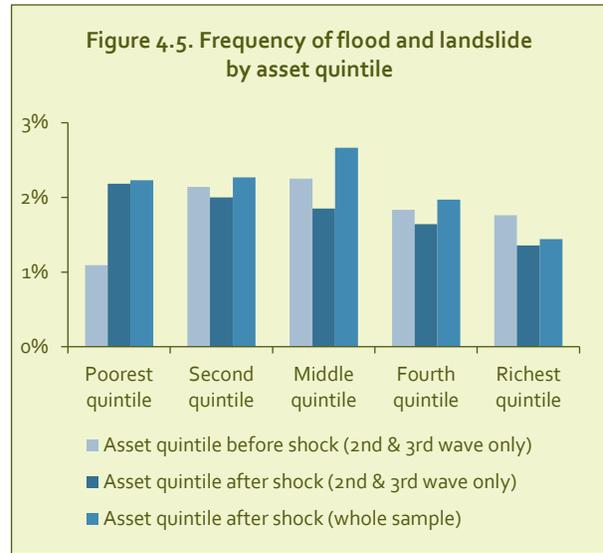
Table 4.2 Frequency of flood and landslide by region (percentage of households)

Region	2015	2016	2017	2018
Mountain	2.8	5.3	1.5	0.5
Far Western Hill	-	0.4	-	0.4
Mid Western Hill	6.3	7.5	3.1	0.2
Western Hill	7.1	3.1	3.3	0.3
Central Hill	0.8	1.1	0.1	0.3
Eastern Hill	0.9	1.9	0.3	0.3
Far Western Terai	2.6	1.9	1.1	0.4
Mid Western Terai	6.4	7.2	5.6	2.9
Western Terai	0.2	3.2	0.4	2.9
Central Terai	0.3	1.1	-	8.1
Eastern Terai	1.5	0.7	0.4	2.1
Nepal	2.6	2.7	1.3	2.3

The regression analysis in appendix table 6 shows that farm-owning households and larger households were more likely to be affected, as were those in more remote, rural areas. Once we control for these factors, and for the household's region, the pattern of incidence by assets was no longer significant. There were few other discernible patterns to flood and landslide reports, in terms of household characteristics.

Flood and landslide were associated with relatively large amounts of damage (figure 4.6). The mean loss was 7.2 percent of assets. Almost one in five affected households reported losses of more than 10 percent of assets, and 4 percent lost more than half their assets. Flood and landslide are therefore collectively the third most damaging shocks observed in this study, after death and earthquake. This also explains the size of the shifts in quintiles of affected households.

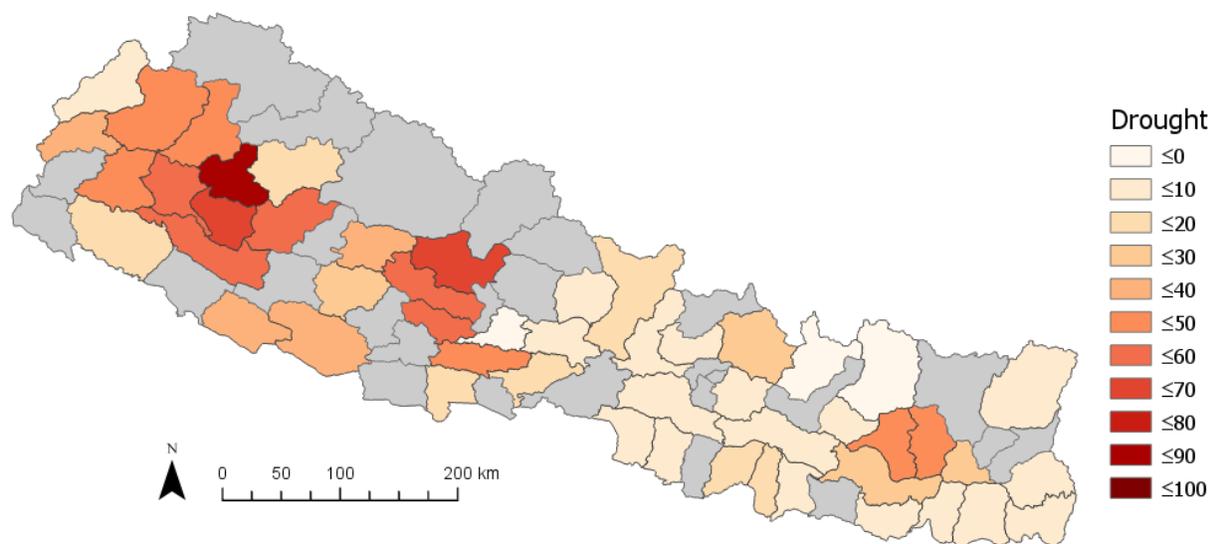
Dissaving was a more common coping strategy for flood and landslide than for other shocks (figure 4.7). Asset sales were also more frequent than observed for other shocks. For those affected by flood and landslide, it was common to cut food and non-food expenditure. Government assistance was more often reported than for most other shocks, but still only 9 percent of affected households. Assistance from friends, family and neighbors was infrequently reported.



Drought

Drought was a widespread event in 2015-16, with significant proportions of households in the western, mid western and far western regions affected. There were also isolated reports of drought in the western hill region in 2014-15 (Myagdi, Baglung and Gulmi) and in the mountain region in 2016-17 (Bajura and Bajhang). Drought episodes observed during the survey appear to have been short-lived, and we did not find evidence that drought was persistent across years for households in our sample.

Map 4.3. Frequency of drought reports (2014-18)



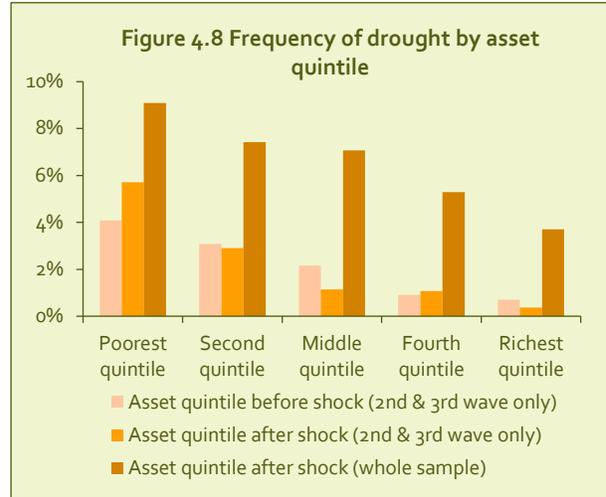
Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

Overall, drought affected poorer households more than richer households (figure 4.8), and this is true whether we consider ex ante or ex post assets. This is compounded by the fact that the areas most affected tend to be poorer than the national average, but even after controlling for other factors, poorer households were more exposed. The probit regressions reported in appendix table 6 show very similar patterns of incidence for drought as for flood and landslide, except for the location controls, which in the case of drought give a relatively higher base probability to mid western hill, far western hill and mid western terai regions. Larger and farm-owning households were more likely to report suffering from drought.

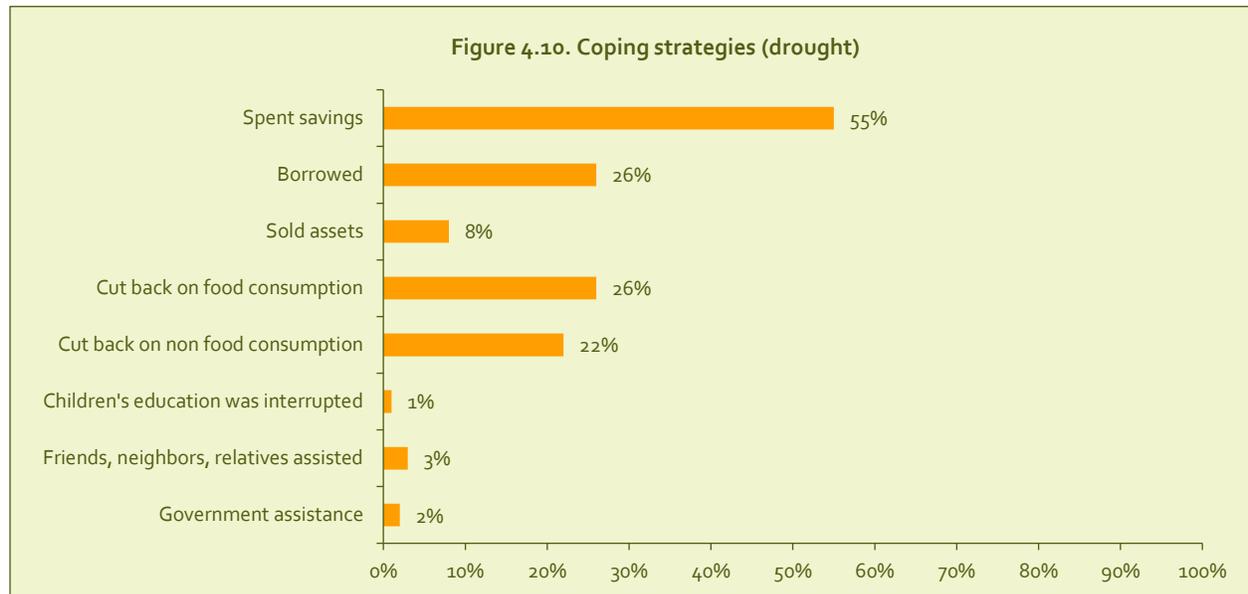
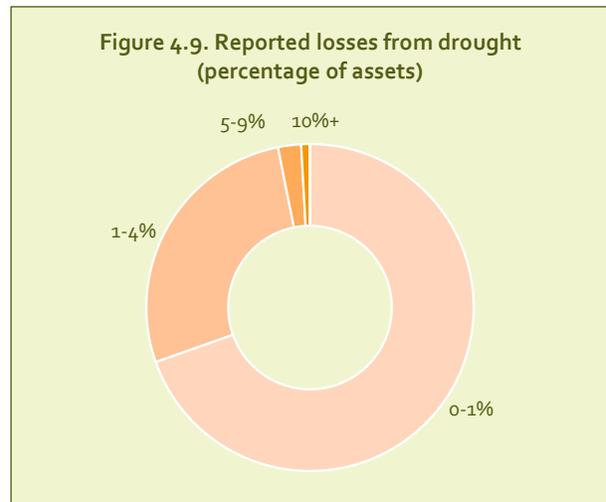
Table 4.3. Frequency of drought by region (percentage of households)

Region	2015	2016	2017	2018
Mountain	-	21.7	7.3	2.2
Far Western Hill	-	35.6	18.5	1.8
Mid Western Hill	0.2	40.2	14.2	7.7
Western Hill	12.6	17.6	0.8	0.1
Central Hill	0.1	1.7	2.8	1.2
Eastern Hill	12.0	14.0	0.5	2.2
Far Western Terai	0.4	17.8	-	-
Mid Western Terai	-	30.3	5.0	1.1
Western Terai	0.2	15.0	1.9	0.2
Central Terai	0.3	7.5	0.3	-
Eastern Terai	1.1	2.4	-	0.1
Nepal	2.9	15.1	3.3	1.2

Drought was more frequent overall than flood and landslide, but tended to have smaller material impacts on households (figure 4.9). The mean loss was 1.1 percent of assets. Around one third of households affected by the drought reported losses of less than 1 percent of assets, and 77 percent reported losses of less than 5 percent of assets. Nevertheless, 38 percent of households reporting the drought in 2015-16 also reported suffering from the riots and blockade (which occurred in the same year), and 17 percent were still recovering from the 2015 earthquake. Hence the overall impact of these other shocks is likely to have been compounded by the drought.



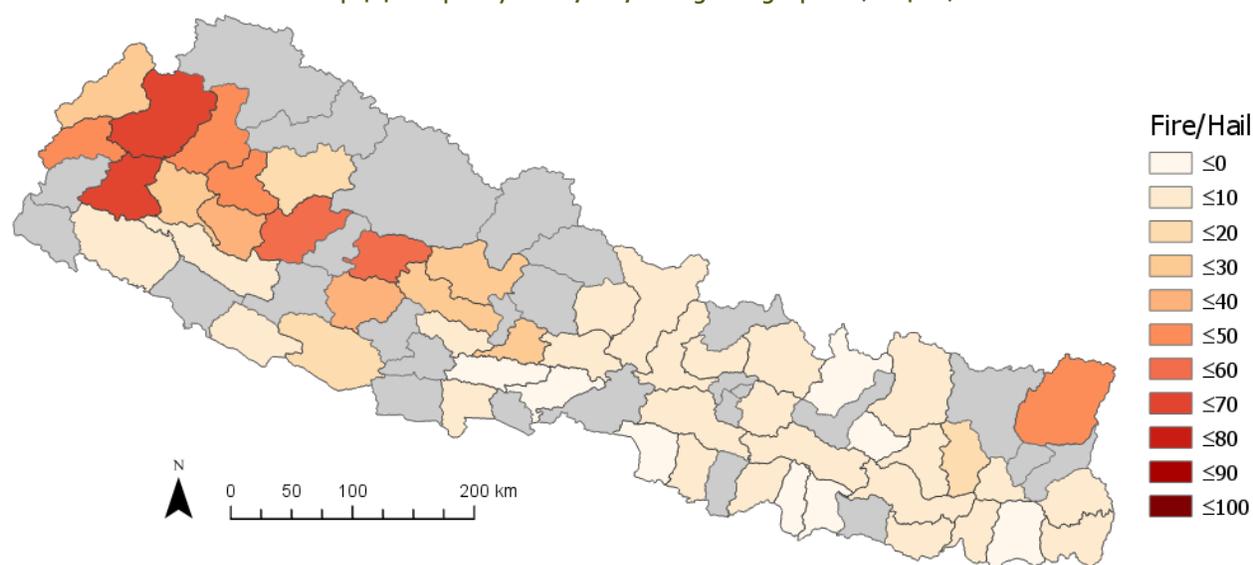
Slightly more than half of drought-affected households reported using savings to cope (figure 4.10). This is lower than for flood and landslide, but this might reflect the fact that losses were considerably smaller. Asset sales were equally (un)common for drought as for flood and landslide, at 8 percent. On the other hand, more households reported borrowing than for earthquake or flood and landslide. Impacts on consumption were similar for drought as seen for flood and landslide, while almost no assistance from informal or formal sources was reported.



Fire, Hail and Lightning

Fire, hail, and lightning were generally infrequent, but there was significant regional variation. In 2015-16, the only district reporting high rates of fire, hail and lightning was Taplejung (38 percent of households). In 2016-17 there were frequent reports in the mountain, far western hill and mid western hill regions. In Bajhang, 60 percent of households in the sample reported fire, hail or lightning. This was concurrent with a high number of drought reports in the district. In 2017-18 the shock was concentrated in the far western and mid western hill regions. There were few reports in 2014-15, and very few from the terai regions (table 4.4).

Map 4.4. Frequency of fire, hail, and lightning reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

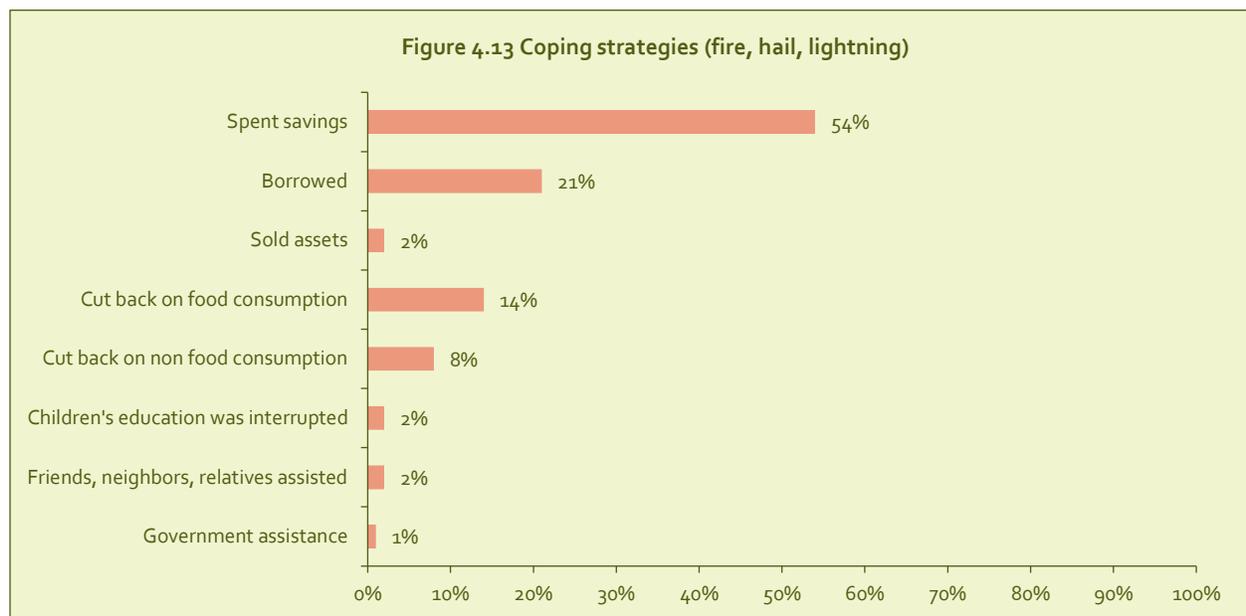
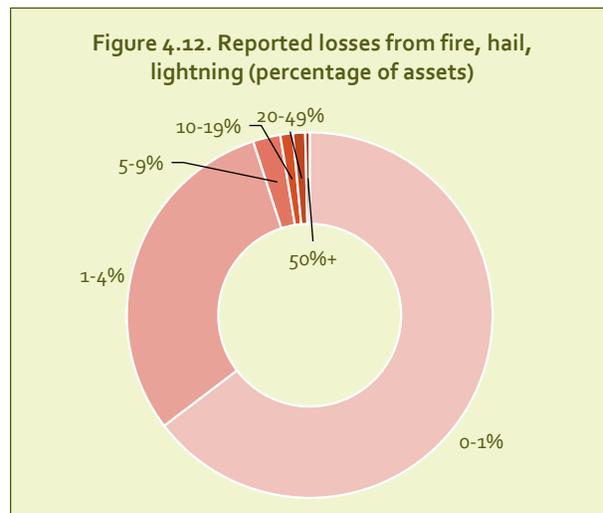
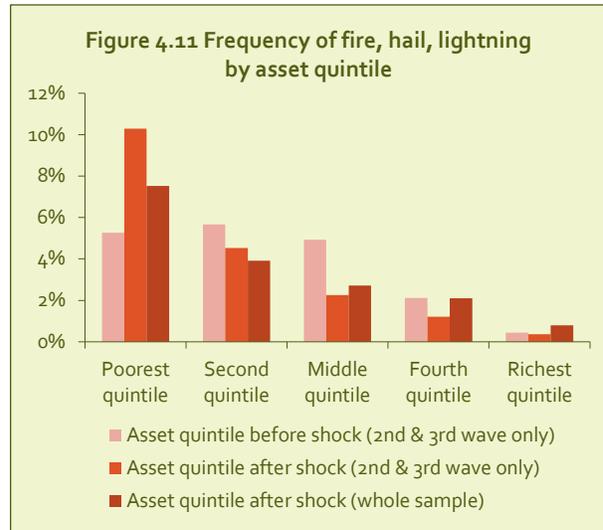
Fire, hail, and lightning were equally observed among the poorest three quintiles of ex ante assets (figure 4.11), but there were substantial downward transitions in terms of assets as a result of the shock. In terms of ex ante assets, only 5 percent of the poorest quintile reported being affected, but this rose to ten percent in terms of post-shock assets. Fire, hail and lightning disproportionately affected farm owners and geographically isolated households (appendix table 6). Female-headed households and wage workers were less likely to be affected, which might be explained by their lower rates of farm ownership. Controlling for other factors, affected households also tended to be slightly larger and live in remote rural areas.

Table 4.4. Frequency of fire, hail and lightning by region (percentage of households)

Region	2015	2016	2017	2018
Mountain	0.5	6.2	18.7	-
Far Western Hill	-	0.7	36.9	10.7
Mid Western Hill	1.6	6.3	30.6	6.7
Western Hill	1.4	3.9	0.8	5.2
Central Hill	0.3	0.7	0.8	1.4
Eastern Hill	0.9	4.3	0.5	0.2
Far Western Terai	0.4	5.6	-	1.5
Mid Western Terai	-	6.1	0.3	0.3
Western Terai	-	0.8	0.4	-
Central Terai	-	0.1	-	0.4
Eastern Terai	0.4	1.0	0.6	-
Nepal	0.5	2.8	5.6	1.9

The self-reported losses associated with fire, hail, and lightning were generally small (figure 4.12). The average loss was 1.8 percent of assets. Around two thirds of households affected by fire, hail and lightning reported losses less than 1 percent of assets, and 95 percent experienced a loss of less than 5 percent of assets. However, the magnitude of the transitions in the asset index imply that the true impact of this shock may have been greater than was reported. (We checked and found similar results for log assets.)

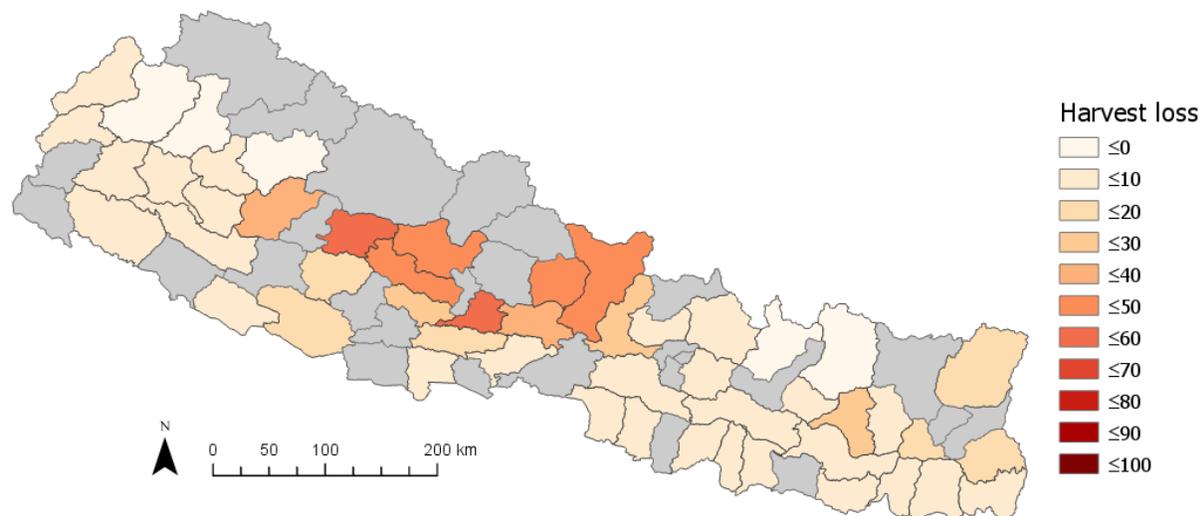
Just over half of households relied on their own savings to cope with fire, hail, and lightning, and about one in five households borrowed (figure 4.13). Reflecting the generally smaller size of these shocks, we observed fewer households cutting back on food and non-food consumption or selling assets. It appears that households did not frequently seek outside assistance for this type of shock, with very few reports of assistance from friends, neighbors and relatives or government. Children’s education was also rarely interrupted.



Pests, Plant Disease and Post-Harvest Loss

Pests, plant disease and post-harvest loss were infrequent overall, but households in the mid western and western hill regions experienced these shocks with greater frequency (table 4.5). The incidence of pests, plant disease and post-harvest loss rose nationwide in 2015-16 and 2017-18. Specific districts were disproportionately affected, such as Gulmi and Jajarkot in 2015-16, Rukum in 2016-17, and Gorkha, Lamjung and Tanahun in 2017-18 (map 4.5).

Map 4.5. Frequency of pests, plant disease, and post-harvest loss reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

Households in the middle wealth quintiles tended to be more affected by pests, plant disease and post-harvest loss; this remains true whether we look at assets before or after the shock (figure 4.14). The regression results in appendix table 6 confirm what we would expect: that these shocks were more likely to hit farm-owning households. They were also significantly more common among more remote households, and less common among female-headed households.

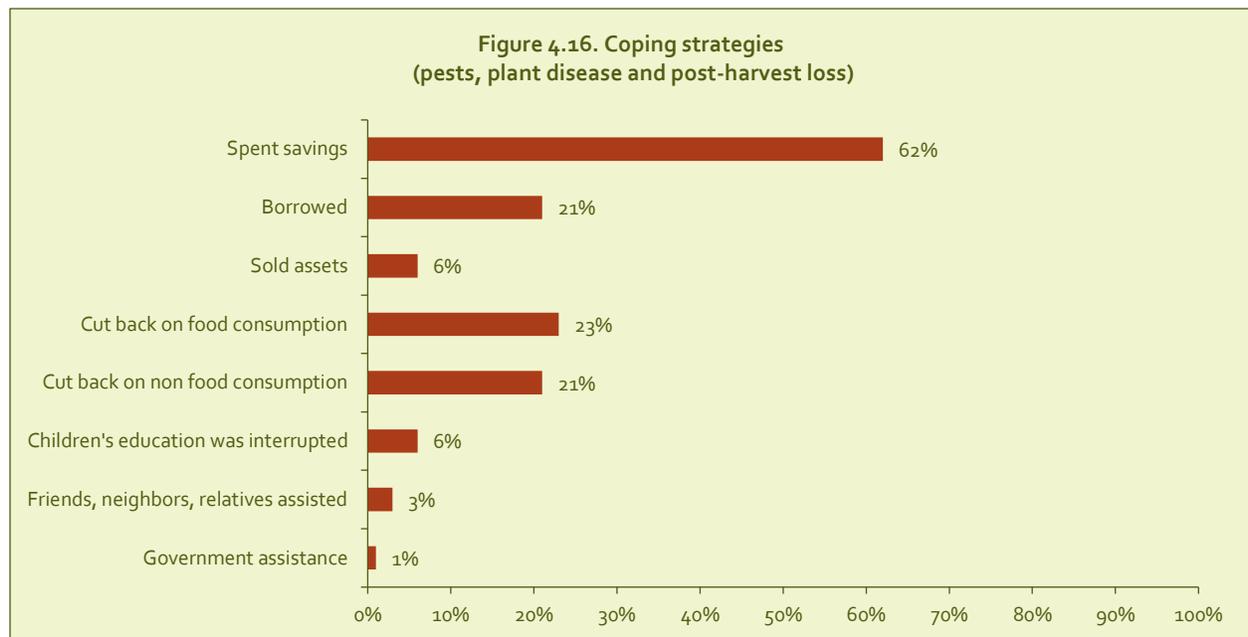
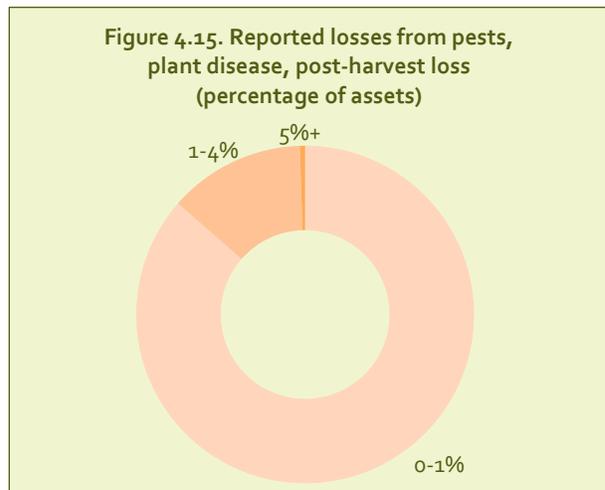
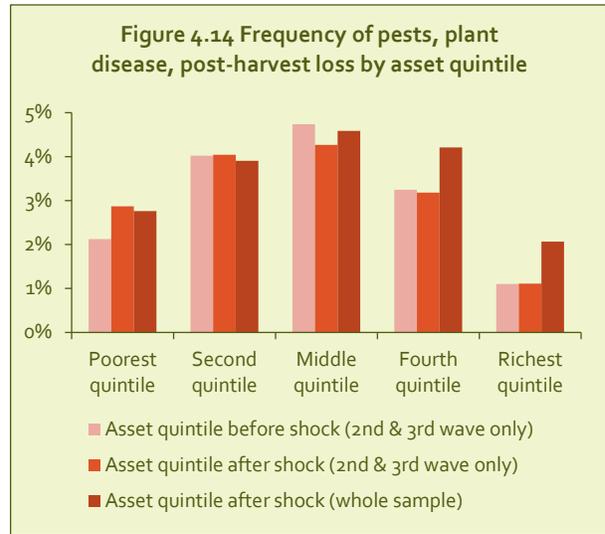
Asset losses due to pests, plant disease and post-harvest loss were very small (figure 4.15). The average loss for those reporting the shock was 0.6 percent of assets. Eighty-six percent of affected households reported less than 1 percent loss of assets, and another 13 percent experienced losses of 1-4 percent of assets.

Table 4.5 Frequency of pests, plant disease and post-harvest loss by region (percentage of households)

Region	2015	2016	2017	2018
Mountain	0.2	0.7	1.3	1.2
Far Western Hill	-	0.7	2.6	3.7
Mid Western Hill	0.6	9.8	13.3	0.8
Western Hill	7.6	8.3	2.1	21.5
Central Hill	0.4	1.4	2.4	4.7
Eastern Hill	1.4	6.0	0.5	3.2
Far Western Terai	1.9	6.7	0.4	1.8
Mid Western Terai	0.3	5.6	2.2	1.1
Western Terai	-	3.6	1.5	1.1
Central Terai	0.3	2.5	0.3	0.4
Eastern Terai	1.1	3.2	0.4	-
Nepal	1.5	4.3	2.1	4.1

The observation that the impacts of this shock were small is reinforced by our finding in figure 4.14 that the shocks were not associated with major transitions between asset quintiles.

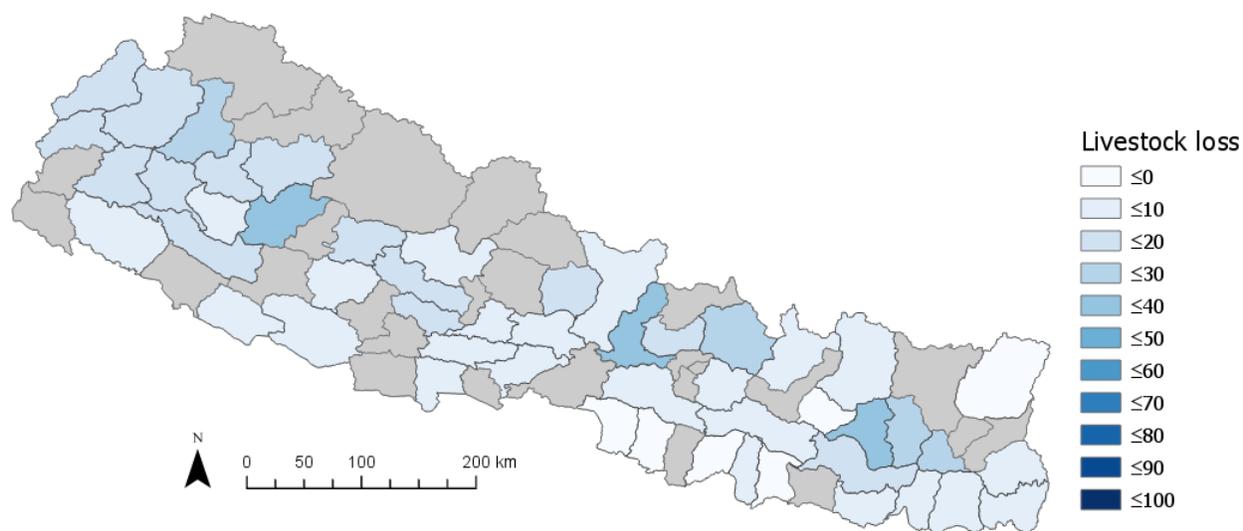
As a result of the smaller losses associated with pest, plant disease and post-harvest loss, 62 percent of affected households used savings to cope, and 21 percent borrowed. Nevertheless, some households had more difficulty coping: 23 and 21 percent cut back on food and non-food consumption, respectively. A further 6 percent of households reported selling assets. A small proportion of households (6 percent) reported interruptions to children's education, which given this is a relatively idiosyncratic shock is likely to mean children could not be sent to school for household-specific reasons (such as lack of money, or to assist with farming). Assistance from the government or friends and relatives was reported by very few households (figure 4.16).



Livestock Loss

Loss of livestock was relatively infrequent, with occasional exceptions. Overall, the shock was more common in the hill regions (map 4.6 and table 4.6). In Sindhupalchok in 2014-15, 17.3 percent of households reported livestock loss, possibly connected to the earthquake. One in three households in Dhading reported livestock loss in 2017-18, and one in four in Bajura. There were also frequent reports in successive years in Jajarkot.

Map 4.6. Frequency of livestock loss reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

Poorer households were more likely to be affected by livestock loss, even if we consider ex ante assets (figure 4.17). The share of households reporting livestock loss was greater for the poorest quintile (4.5 percent looking at pre-shock assets) compared to just 0.4 percent in the richest quintile. Again, regression analysis unsurprisingly finds farm owners more likely to be affected, and those in more remote areas slightly more likely to report livestock loss.

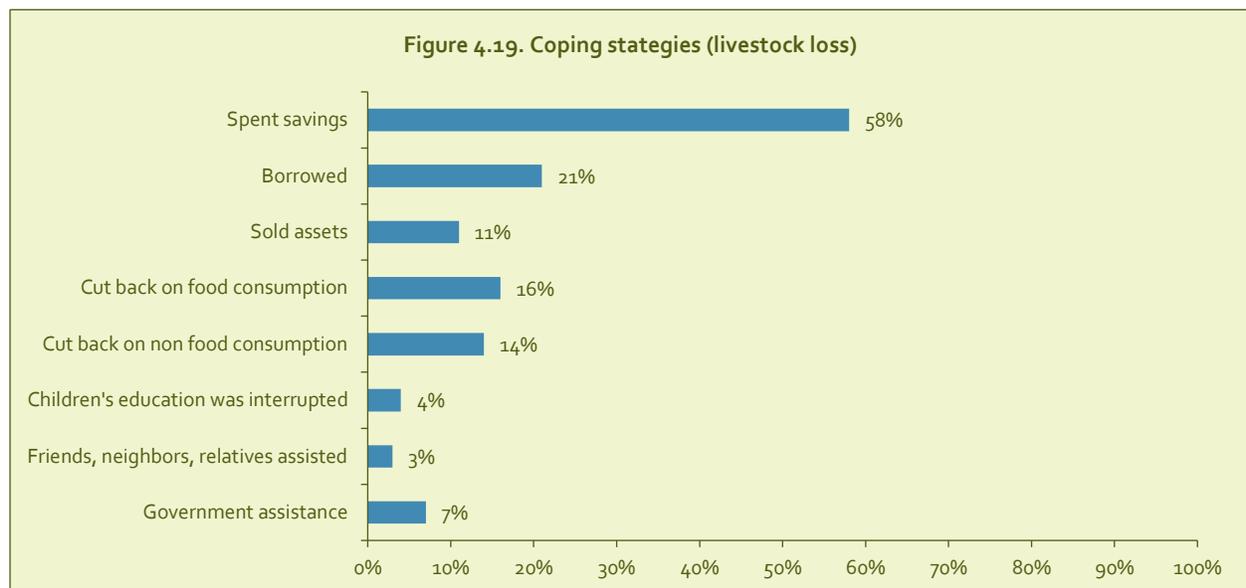
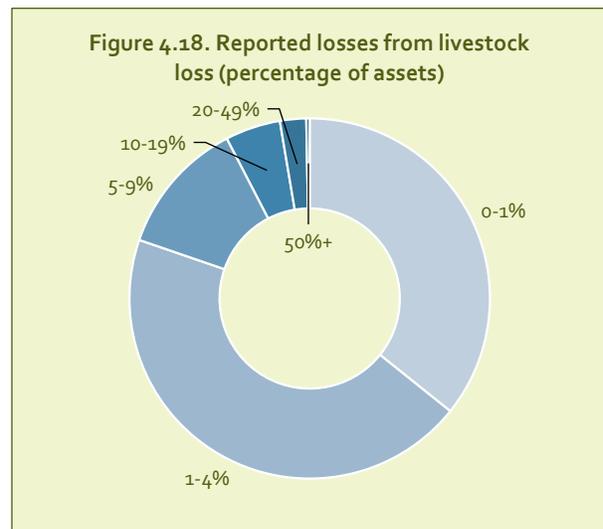
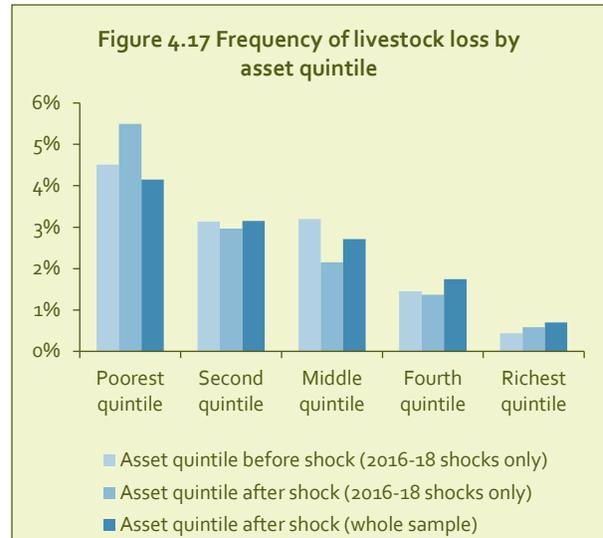
Livestock loss had a varying but substantial impact on assets (figure 4.18). Given livestock is a major asset in rural areas, especially among households that engage in farming, the loss of livestock can have a substantial impact on assets.

Table 4.6 Frequency of livestock loss (percentage of households)

Region	2015	2016	2017	2018
Mountain	4.5	2.3	5.5	3.5
Far Western Hill	-	0.4	8.1	10.3
Mid Western Hill	0.4	5.9	7.8	3.5
Western Hill	1.5	4.2	3.2	1.5
Central Hill	2.2	1.4	11.0	1.0
Eastern Hill	5.1	6.3	2.2	5.6
Far Western Terai	-	3.3	-	0.4
Mid Western Terai	-	1.7	4.2	1.1
Western Terai	-	1.5	0.4	1.3
Central Terai	-	-	0.1	-
Eastern Terai	0.1	1.8	-	0.1
Nepal	1.2	2.5	3.2	1.9

This is reflected in figure 4.17, which shows that some households experiencing loss of livestock fell into a lower wealth quintile after the shock. One third of households that lost livestock reported losses of less than 1 percent of assets, and about 80 percent lost less than 5 percent of their assets (figure 4.18).

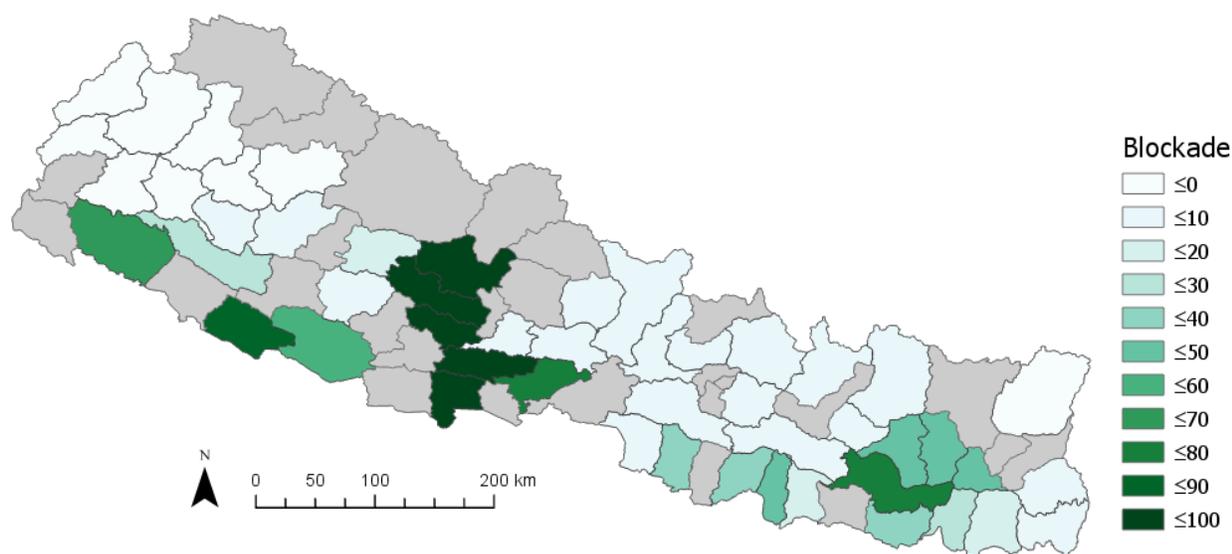
Slightly more than half of households suffering livestock loss reported using their savings to cope (figure 4.19). Borrowing was reported by one in five households, and around one in six reported cutting back on food and non-food expenditures. This is similar to the case for other shocks, which suggests households do not engage in asset smoothing (cutting consumption to preserve their herds). We did however observe a greater proportion of affected households selling other assets to cope. Assistance from friends and relatives was relatively uncommon; however, there was a greater degree of government assistance than for fire, hail and lightning and pest, plant disease and post-harvest loss.



Riot, Blockade, Fuel Shortage and Unexpected Higher Prices

During the first wave of the survey, many parts of Nepal experienced a fuel shortage, high prices and resulting riots and blockades due to trade disruptions with India that began in late 2015. These shocks were more pronounced in the terai region, though some areas in the Hill and Mountain regions also felt the effects (map 4.7 and table 4.7). Fuel shortages and high prices affected 84 percent of households in western terai, 77 percent in mid western terai and 62 percent in far western terai. Western hill region was the most affected of the hilly areas. The riots, blockades, fuel shortage and price hikes were a unique event in late 2015 and early 2016; there were few reports in other years.

Map 4.7. Frequency of riot, blockade, fuel shortage, and high prices reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

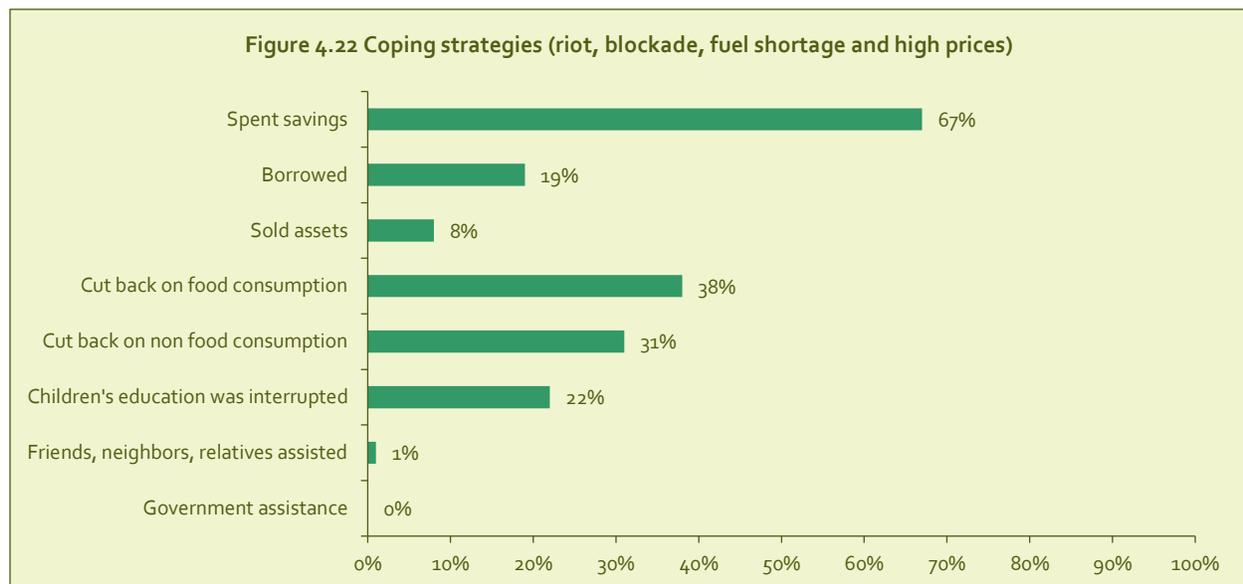
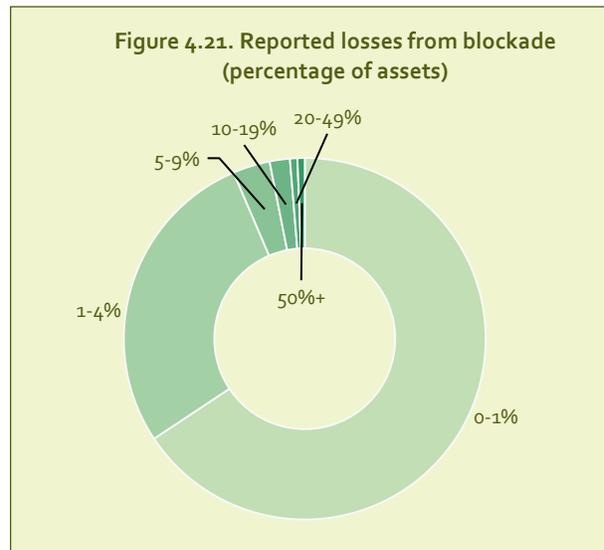
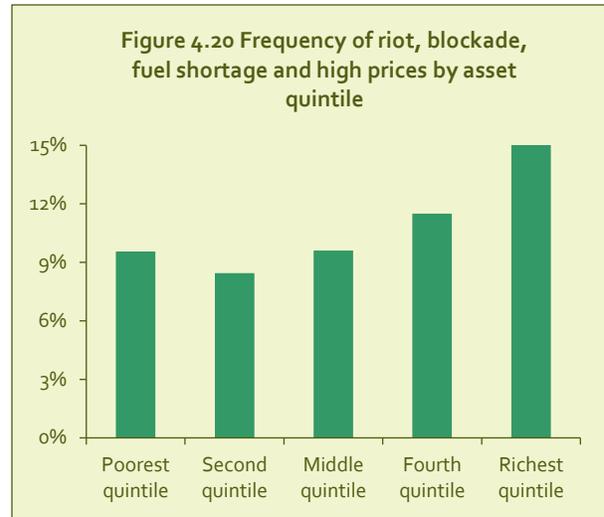
Riots, blockades, fuel shortages and high prices affected richer households slightly more than poorer ones (figure 4.20). We report only for ex post asset quintiles here, as for earthquake, as the shock was seen only in the first wave. Households owning farms and those in remote areas were less likely to report being affected (appendix table 6). This may be because farming households had access to home-grown food and were less dependent on fuels (whose prices rose during the period). The negative coefficient on remoteness may be due to the concentration of physical disruptions in the southern areas of the country, and also possibly because those in remote areas were ex ante more resilient to price shocks and supply disruptions.

Table 4.7. Frequency of riot, blockade, fuel shortage and high prices (percentage of households)

Region	2015	2016	2017	2018
Mountain	-	2.5	0.2	-
Far Western Hill	-	-	-	-
Mid Western Hill	-	11.0	0.2	-
Western Hill	1.5	51.7	-	-
Central Hill	-	3.2	0.6	-
Eastern Hill	0.7	39.3	0.2	-
Far Western Terai	-	62.2	-	-
Mid Western Terai	0.3	76.7	-	-
Western Terai	0.8	83.8	-	-
Central Terai	0.6	28.8	-	-
Eastern Terai	0.3	16.8	-	-
Nepal	0.5	32.5	0.1	-

Although riots, blockades, fuel shortages and high prices were widespread, reported losses of assets and income were generally small (figure 4.21). Two thirds of households reported losses of less than 1 percent of assets. A further 28 percent reported a loss of between 1 and 4 percent of their assets. However, while the shock may not have caused many households direct losses, the increase in prices and shortages of goods are likely to have had an additional impact on the standard of living.

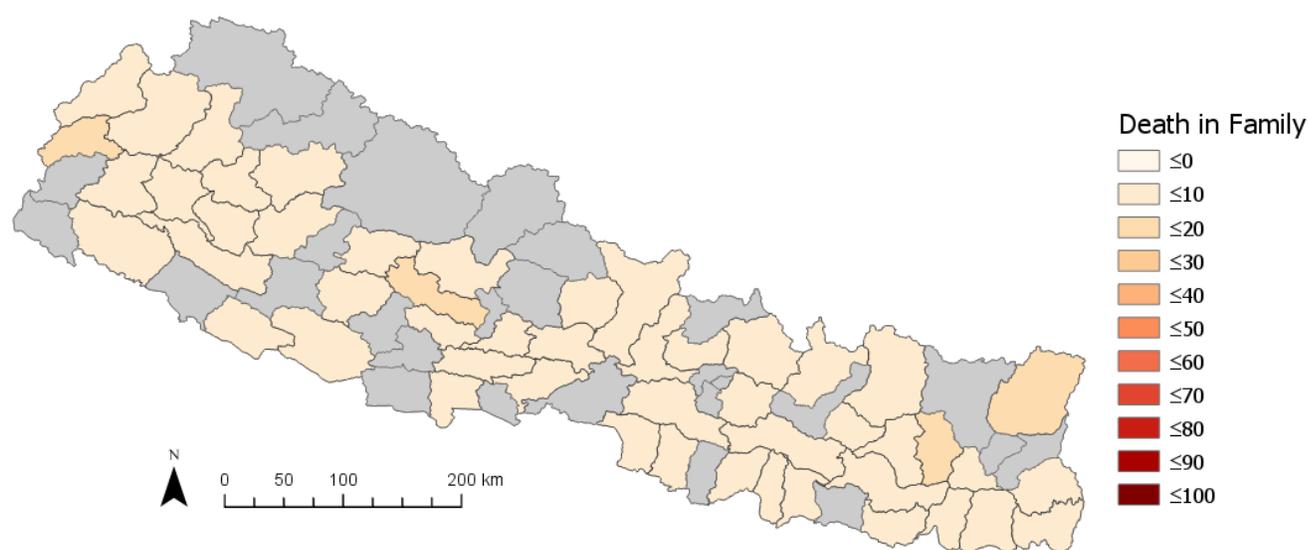
About two in three households relied on savings to cope (figure 4.22). Cutting back on food and non-food consumption was more commonly reported than observed for other shocks; this might reflect higher prices or shortages of products. Nearly two in 10 households reported borrowing, and 8 percent sold assets. As with the earthquake, interruptions to education were more common for this shock than the others. However, rather than individual households not sending children to school, the likely reason for absenteeism was the widespread closure of schools during the disturbances, since school interruptions were more frequently reported by the rich. There were very few reports of informal assistance, and none from government.



Death in the Family

The share of households that had a death in the family was relatively low throughout the study period, but increased gradually over the waves, possibly due to the ageing of the sample. In 2017-18, 2.3 percent of households reported a death shock. As might be expected, the proportions were very similar across the country (map 4.8) and the correlation of death shocks within PSUs was statistically insignificant. Reports were slightly higher in the mountain and hill regions than in the terai (table 4.8), likely due to a higher average number of elderly people in the household.

Map 4.8. Frequency of death in the family reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

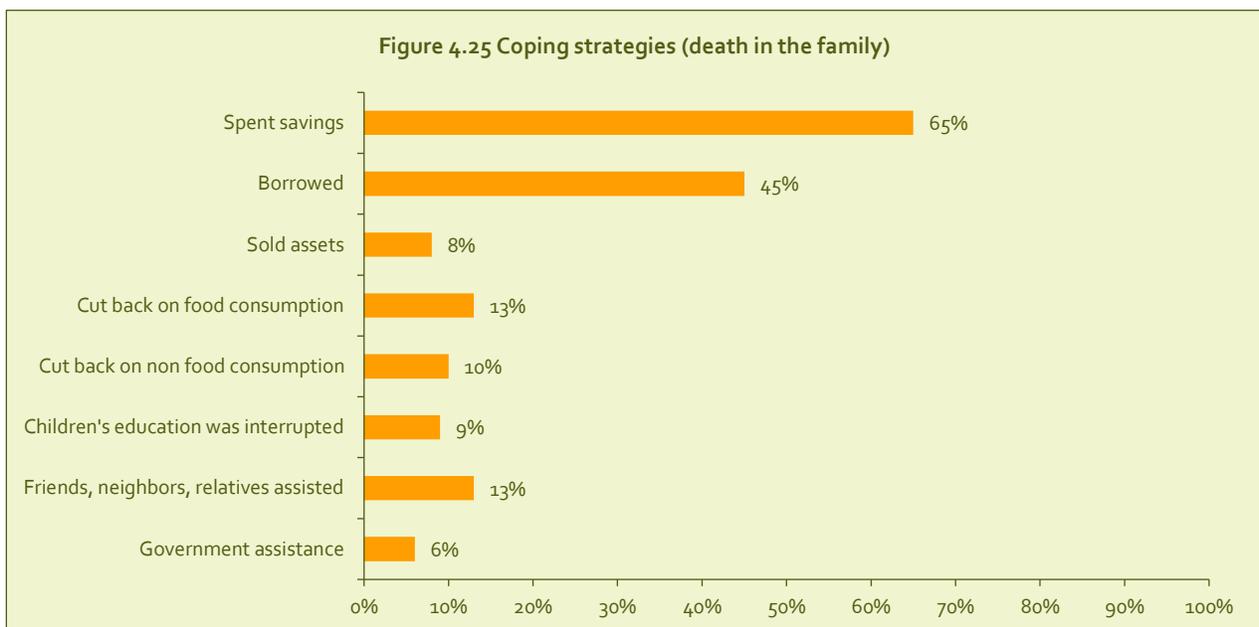
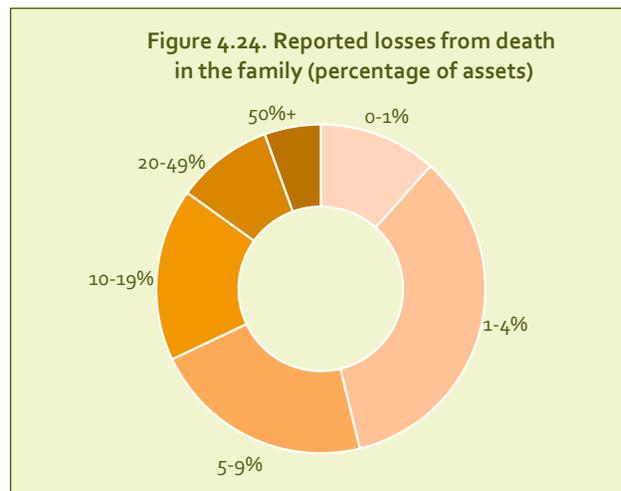
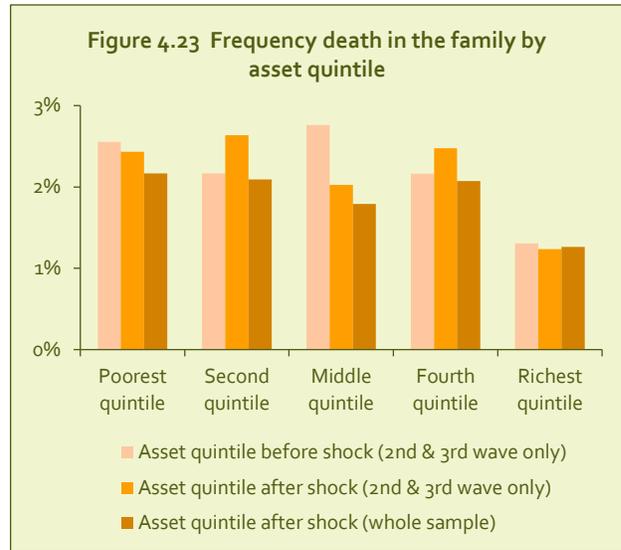
There was little correlation of death shock with household characteristics, except that reports were significantly higher among female-headed households (appendix table 6). This could be explained by reverse causation, if the household heads had recently become widows. Farm-owning households also less likely to report to be affected. Wealth also matters: the richest quintile was the least likely to have experienced a death in the family in the time period covered by the survey (figure 4.23). All other quintiles had roughly the same propensity, although there is again evidence that death led to wealth transitions for some households.

Table 4.8. Frequency of death in the family (percentage of households)

Region	2015	2016	2017	2018
Mountain	1.0	0.8	2.8	2.8
Far Western Hill	-	0.4	3.0	2.2
Mid Western Hill	0.4	0.8	2.7	3.1
Western Hill	1.0	1.8	2.6	3.0
Central Hill	1.4	1.5	2.2	2.2
Eastern Hill	0.2	1.9	2.7	2.2
Far Western Terai	0.4	1.1	1.5	0.7
Mid Western Terai	0.3	1.7	2.5	2.1
Western Terai	-	0.4	1.5	2.5
Central Terai	0.1	1.1	0.8	2.2
Eastern Terai	0.4	1.8	1.5	1.7
Nepal	0.5	1.3	2.0	2.3

A death in the family represents a substantial financial loss (figure 4.24), likely due to lost income as well as the ceremonial expenses. Slightly more than half of households reporting the shock said that the death of a family member resulted in a loss of more than 5 percent of assets. One third reported losing more than 10 percent of assets, and 6 percent reported a loss of 50 percent or more of their assets.

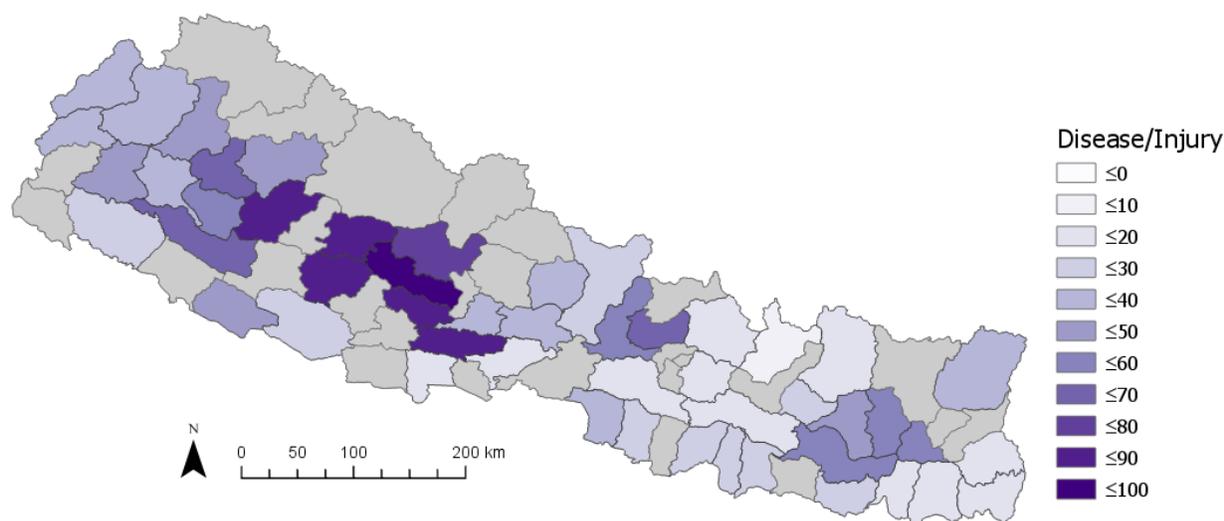
Two-thirds of households used savings to cope with the losses occurring due to the death of a family member, which commonly include large upfront ceremonial expenses (figure 4.25). Borrowing was much more common than for other shocks (45 percent of households). Assistance from friends, relatives and neighbors was mentioned by a larger share of households than for other shocks (13 percent), which makes sense given the necessary involvement of family and community in funeral rites. Cutting down on consumption and interruptions to children’s schooling were mentioned less often than for other shocks. Again, we saw few reports of government assistance, although this is less expected in the case of a very household-specific shock.



Disease and Injury

Disease and injury were commonly reported throughout the country during the four years covered in the survey. However, there was considerable variation temporally and spatially (map 4.9). For example, around 30 percent of households in the western hill region reported disease or injury in 2014-15 and 2016-17, and 69 percent in the mid western hill region in 2016-17. Meanwhile, reports fluctuated in the far western hill and mountain regions, from almost none in 2014-15 and 2015-16 to 25 percent in 2016-17 (table 4.9). The low overall frequency of reports suggests that households did not interpret 'disease' lightly, but the large and concentrated groups of reports of this shock indicate that there were either localized outbreaks of illness, or an uneven enumeration of this particular shock across PSUs.

Map 4.9. Frequency of disease and injury reports (2014-18)



Note: Map shows the percentage of households that reported at least one instance of the shock between 2014 and 2018. Grey indicates non-sample areas.

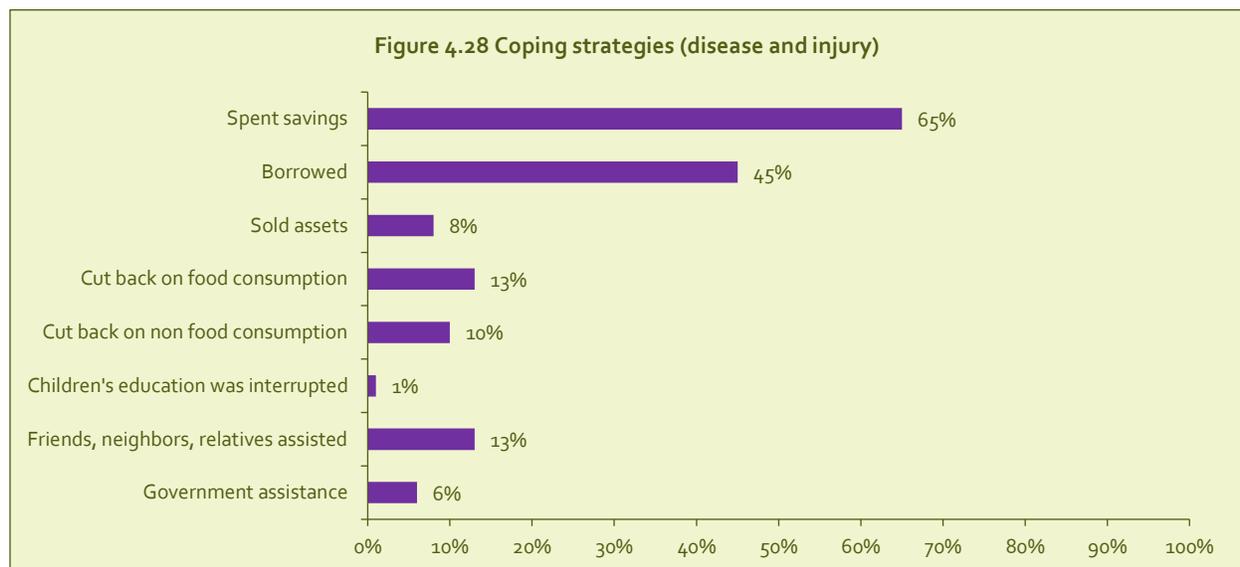
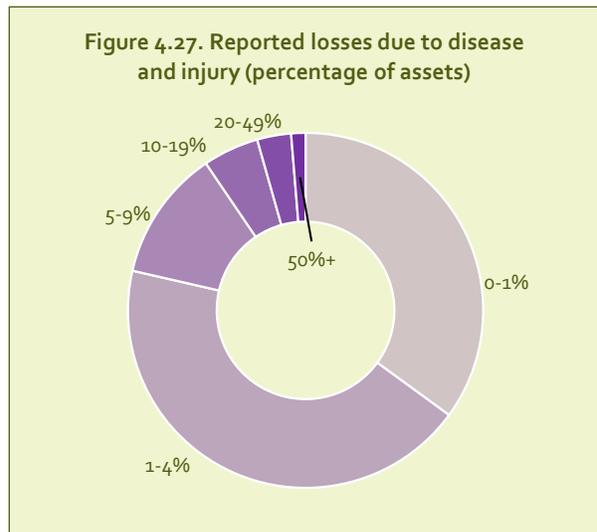
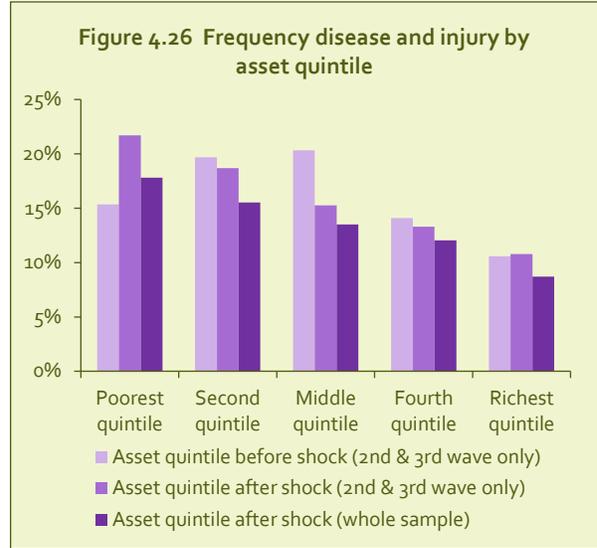
The share of households reporting disease and injury is lowest among the richest quintile (figure 4.26). Although the middle quintiles were ex ante more likely to report disease and injury, the impact of these shocks is seen in the fact that the frequency of reports is higher among the poorest ex post asset quintiles. In terms of other household characteristics, we found that disease and injury were more frequently reported by larger households and those with disabled members, and less frequently by female-headed households, richer households (appendix table 6).

Table 4.9. Frequency of disease and injury (percentage of households)

Region	2015	2016	2017	2018
Mountain	1.0	3.0	24.5	8.3
Far Western Hill	-	-	25.1	16.9
Mid Western Hill	0.8	20.6	69.4	14.4
Western Hill	28.8	16.5	38.0	5.5
Central Hill	1.0	1.8	25.6	9.0
Eastern Hill	4.1	16.8	12.5	21.0
Far Western Terai	1.1	7.8	14.8	9.5
Mid Western Terai	0.3	6.9	25.3	9.8
Western Terai	0.2	0.2	16.8	3.2
Central Terai	0.3	3.6	7.2	19.2
Eastern Terai	0.8	11.7	3.1	1.8
Nepal	4.6	8.6	21.6	10.3

Figure 4.27 shows that disease and injury generally led to modest welfare losses. One third of households lost up to 1 percent of assets. A further 44 percent of households reported a loss of between 1 to 4 percent of assets as a result of disease and injury. Fourteen percent of households lost between 5 to 9 percent of their assets, and about 9 percent of households suffering the shock lost more than 10 percent of their assets.

Households generally used savings or borrowed to cope with disease and injury (figure 4.28). The rate of borrowing for health events is similar to that for death, and twice as high as the rate we observed for other shocks. On the other hand, and perhaps as a result of the greater use of credit, the frequency of reports of households cutting back on consumption were much lower than for other shocks. Asset sales were uncommon (8 percent of households). Assistance from friends, relatives and neighbors, at 13 percent, was more common than for any of the other shocks we have considered (and the same as we saw following death in the family). Government assistance was reported by 6 percent of households, again the same as for death shocks. There were few reports of interruptions to schooling.



Summary

This chapter has provided an overview of the shocks experienced in Nepal between 2014 and 2018, and their impacts on household welfare and behavior based on the self-reported data from the survey. While the earthquake and blockade accounted for a disproportionate share of shock reports during the survey period, households reported a range of other shocks, some causing equally significant losses. These losses were self-reported by households, but were also visible in changes in assets measured through the survey.⁵ There was substantial geographic variation in reports of shocks, and in the characteristics of households reporting shocks. We also observed differences in the coping strategies employed by households for the various types of shock.

Although this analysis gives an initial overview of the nature of shocks and coping strategies, it is important to dig deeper into the data to understand exactly how households responded. First, given the data are self-reported, households may (deliberately or inadvertently) misstate losses and perceived impacts, for instance by focusing on the immediate costs and discounting longer-term impacts on livelihoods. Second, self-reported economic loss only captures the monetary impact of the shock, ignoring nonmonetary costs and effects on household decision making. This may understate the total impact of shocks. Third, the fact that some households were hit by various shocks simultaneously means one cannot disentangle specific shock effects through cross-tabulations. Finally, there may be a degree of endogeneity in the above analysis, given for example that households suffering shocks may be poorer precisely *because* they suffered a shock. To address these limitations, we now proceed with a more rigorous analysis of the impacts of shocks on coping strategies, borrowing and remittances in Chapter 5, and their impacts on household assets and welfare in Chapter 6.

⁵ It is common to look at per capita consumption when discussing welfare transitions. Although we saw similar changes in households' per capita consumption quintiles as the result of shocks, the effects were less apparent than for assets. We examine the impact of shocks on consumption further in Chapter 6.

Chapter 5. Coping Strategies

In the preceding chapter, we briefly examined households' self-reported coping strategies. We saw that many households used savings or borrowed to cover the losses from shocks. For major shocks, this was not enough, and some households were forced to cut their expenditure on food and other items. Only a small minority of households reported resorting to selling assets or sending children to work. But how did these behaviors vary across households? Do rich and poor respond differently to shocks? In this section, we examine determinants of self-reported coping strategies in terms of the type of shock and household characteristics. We find that behaviors in response to shocks do indeed depend on the initial conditions of the household. We also examine the use of borrowing and remittances to cope with shocks.

In Chapter 4 we examined the self-reported coping strategies separately for each shock. We now consider them jointly, for all shocks. Tables 5.1 and 5.2 show the percentage of households in each asset quintile reporting each coping strategy, by year and by size of shock respectively. Appendix table 7 summarizes the number of households reporting each coping strategy by year. As expected, a higher proportion of households reported borrowing and cutting expenditures for shocks causing major losses. Interestingly, the rates of dissaving and asset sales were similar regardless of shock size. Government and NGO support was more common for large shocks, again reflecting the earthquake response.⁶ The rate of school interruptions is highest among richer quintiles, and for small shocks. This again supports the conclusion that missing school was more often due to temporary closures, although the response of school attendance to idiosyncratic shocks points to affordability issues for a small share of poorer households.

To explore the determinants of coping strategies in more detail, we ran probit regressions of the probability of a household adopting each of these coping strategies, as a function of the type of shock experienced, household characteristics, and the presence or absence of other types of support (such as having a bank account, being a recipient of government or NGO assistance, and having migrants or alternative income sources). The results, presented in appendix table 8, confirm that there were significant differences in coping strategies by shock type and household characteristics. The characteristics used here to explain the coping strategies are contemporaneous (i.e. in the year of the shock), hence the few time-varying characteristics may be endogenous to the dependent variable. This limitation is difficult to avoid (since using lagged regressors means throwing out the many shock reports from 2015 and 2016), but should be kept in mind in interpreting the results. The reader should also keep in mind that both shock reports and coping strategies are subjective, and some of these 'coping strategies' may better be interpreted as 'consequences of not coping'.

We now consider each coping strategy in turn, discussing the results in tables 5.1, 5.2 and appendix table 8.

⁶ The figures are similar for small and large shocks excluding the earthquake.

Table 5.1. Frequency of Coping Strategies by Asset Quintile and Year (Percentage of shock-affected households)

	2015 (N = 2,642)					2016 (N = 3,192)				
	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile
Spent savings	37.8	45.2	44.5	40.3	24.1	46.3	51.5	60.1	68.8	67.9
Borrowed	31.5	28.9	23.1	15.4	5.0	31.4	24.1	19.2	16.7	7.7
Sold assets	7.5	6.1	6.6	3.3	1.1	9.7	8.0	8.3	4.3	1.9
Cut food expenditure	18.1	17.4	16.6	9.8	3.5	32.7	37.0	31.8	27.5	13.5
Cut non-food expenditure	15.8	16.9	16.0	10.5	4.0	30.3	26.6	26.6	22.5	12.4
Schooling interrupted	15.8	20.1	22.7	32.3	45.1	6.4	6.9	8.3	14.6	29.2
Relatives, friends assist	7.9	4.4	5.9	3.9	0.9	3.8	2.2	1.7	0.3	0.6
Government, NGO support	40.2	36.5	30.5	24.0	5.6	1.0	0.5	0.5	0.6	0.2
Other	8.8	9.5	9.3	6.0	3.3	9.9	8.0	9.5	8.6	3.2
	2017 (N = 2,017)					2018 (N = 1,343)				
	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile
Spent savings	59.3	70.2	74.3	79.5	80.7	52.7	53.7	54.7	60.9	66.5
Borrowed	35.9	34.4	27.9	22.1	15.5	28.0	22.5	22.0	20.0	17.9
Sold assets	2.8	3.7	4.2	1.9	3.5	3.8	3.1	3.0	4.1	1.2
Cut food expenditure	12.8	7.4	6.4	6.9	5.8	9.6	6.5	5.4	8.6	9.3
Cut non-food expenditure	7.3	7.7	5.0	4.9	5.8	5.2	3.4	2.5	2.9	2.8
Schooling interrupted	2.1	1.8	1.7	1.4	2.9	5.8	2.2	3.0	5.6	8.6
Relatives, friends assist	4.3	5.5	3.9	2.8	4.1	3.1	1.6	1.7	3.4	1.6
Government, NGO support	0.8	1.1	1.3	1.2	0.4	4.0	2.9	0.3	1.2	1.9
Other	8.8	6.2	3.9	3.0	2.1	8.0	7.4	4.3	6.6	4.2

Note: Figures are percentage of households affected by a shock in the given post-shock asset quintile, that reported using the respective coping strategy.

Table 5.2. Frequency of Coping Strategies by Asset Quintile and Size of Loss (Percentage of shock-affected households)

	Small loss					Large loss				
	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile	Poorest Quintile	Second Poorest	Middle Quintile	Second Richest	Richest Quintile
Spent savings	48.2	53.6	57.0	59.1	55.5	52.6	56.9	57.2	68.1	66.6
Borrowed	28.2	23.4	18.3	15.4	7.5	45.0	44.9	43.7	33.1	31.0
Sold assets	5.9	5.7	6.1	3.3	1.6	6.6	5.6	6.6	5.6	4.9
Cut food expenditure	18.1	20.1	18.6	16.1	8.6	23.2	17.0	17.7	14.8	14.8
Cut non-food expenditure	14.7	15.5	15.7	13.2	7.5	18.8	16.1	15.7	12.5	16.2
Schooling interrupted	6.0	8.8	11.0	17.9	29.5	11.2	9.3	8.6	9.7	12.6
Relatives, friends assist	3.4	2.3	2.3	1.3	0.9	9.2	8.4	9.1	9.4	6.8
Government, NGO support	3.9	3.4	3.9	4.5	1.4	32.7	45.3	40.3	33.9	12.1
Other	8.3	7.6	7.1	6.5	2.6	11.2	9.2	10.4	7.6	12.5

Note: Figures are percentage of households affected by a shock in the given post-shock asset quintile, that reported using the respective coping strategy. Large loss is defined as death in family or loss as % of asset is over 10%.

Use of savings: Except for the 2015 earthquake, a large proportion of households was able to draw on savings to cope with shocks. Table 5.2 indicates that dissaving was equally common for small and large shocks. However, after controlling for other factors in the probit regression, we find that dissaving was less common for shocks exceeding 20 percent of assets (appendix table 8). Having a bank account has a large and significant positive correlation with using savings, as would be expected. Households in the richest two asset quintiles were more likely to report dissaving in response to shocks. Migrant-sending households were also more likely to rely on savings, possibly accumulated from remittances. Finally, households in the most remote quintile and female-headed households were less likely to report dissaving, although these results were only marginally significant.⁷

Borrowing: Many households reported borrowing as a coping strategy, especially for larger shocks. Poorer households were more likely to borrow than rich ones, likely because the rich have more of a buffer of savings to rely on ex ante. Larger households were also more likely to report borrowing. Migrant-sending households and those with bank accounts were significantly less likely to report borrowing in response to a shock, converse to the results for savings. This is also consistent with the hypothesis that borrowing is a fallback option for households that have insufficient savings.

Asset sales are generally viewed as an 'adverse coping strategy', in the sense that selling assets under duress leads to losses due to their illiquidity. Asset sales were reported by only a minority of households. The frequency was higher in 2015 and 2016, reflecting the need to cope with the larger, covariate shocks in those years (table 5.1). Looking at the results in appendix table 8, we find that sale of assets was more common for larger shocks, and that the richest two quintiles were less likely to report selling assets than the poorer three quintiles.

Cutting expenditure: During the major shocks in 2015 and 2016, the proportion of households reporting cutting food and non-food expenditure was similar across all households except the richest

Box 5.1. Loans for Medical Expenses

Ganesh Magar worked as a jeep driver in Udayapur district. In late 2015, he suffered severe damage to his legs in a vehicle accident. He underwent surgery to repair the damage in a private hospital in Kathmandu. The long treatment, coupled with not being able to work, caused severe financial strain for Ganesh's family. They used up all their savings and had to start taking out loans for his treatments and other household expenses from friends and a vehicle drivers' association. Ganesh had been able to stay with family during his extended treatment in Kathmandu, lowering some of the costs. However, he mentioned that relying on friends and family for loans had been difficult. In the past he had given some loans to friends, but the informality of these arrangements meant that he could not get his money back even in times of need. At the time of the survey, Ganesh had started working again, but not at the same level as before the accident because of the pain in his legs. His wife had also started taking on some odd jobs. Ganesh's main concern was that they would not be able to send their young daughter to an English medium school as they had been forced to spend the money they had been saving for her education on his treatment.

⁷ The proportion of households with bank accounts declines gradually as remoteness increases, from 43 percent for those in areas within 1.5km of a paved road, to 24 percent for those more than 12km from a paved road.

quintile (table 5.1). In 2017 and 2018, when shocks were fewer and smaller, the frequency of expenditure cuts was lower, and the gradient between poorer and richer households more pronounced. Controlling for other factors, we find that cutting expenditure was generally more common for larger shocks. In the case of food expenditure, it was significantly higher for shocks of more than 50 percent of assets (confirming that it is considered a last resort by households). As might be expected, poorer households were more likely to cut food expenditure. Those in peri-urban areas were less likely to report cutting food expenditure, which might reflect lower impacts of shocks on prices in more urbanized areas. Those receiving private assistance were more likely to report cutting consumption, indicating that informal support offsets, but does not prevent, consumption losses as a result of a shock. We would expect cuts to food expenditure to be reflected in expenditure aggregates and other welfare measures (such as per capita consumption and food security). We explore this hypothesis further in Chapter 6.

Disruptions to school attendance were quite common in 2014-15 and 2015-16, affecting around 11 percent of households. This is likely explained by the temporary closure of schools following the earthquake and during the blockade. The rate of schooling interruptions is higher for richer households, larger households, and less remote households. This probably reflects a higher base rate of school attendance (among older, if not younger, children) rather than affordability issues. Female-headed households were more likely to report schooling interruptions than male-headed ones, while migrant-sending households and those receiving NGO assistance were less likely to report interruptions.

Assistance from friends and relatives: Few households reported receiving informal support, but smaller households more frequently reported receiving such support. Informal assistance was more commonly received by those suffering larger losses, reflecting their inability to cope using other mechanisms. Meanwhile, farm owners and migrant-sending households were less likely to report assistance from friends and relatives.

There were very few reports of **government or NGO assistance** in response to shocks, except in relation to the earthquake. This is reflected by the large negative coefficients on the year dummies (relative to the base year, 2014-15). We could not find any evidence that the poorest quintile was more likely to receive ad-hoc government or NGO assistance than richer households. However, the results reported in Chapter 3 (appendix table 5, columns 2 and 4) do indicate that households suffering non-earthquake shocks were very slightly more likely to be receiving cash transfers or participating in public works. Based on the estimates in appendix table 5, the marginal effect of a current-year shock on receipt of cash transfers is 2.2 percent. For participation in public works it is insignificant, since most of the public works programs were associated with the earthquake. These results tend to align with the self-reported statistics, indicating that a very small proportion of households received additional assistance following shocks other than the earthquake.

Earthquake damage compensation: Self-reports of government assistance in the shocks module were made in the year of the shock (and about 14 months after, in the case of the earthquake). However, following the earthquake the government launched a housing damage compensation program offering a total of NPR 300,000 in three tranches to households that registered and then completed specific stages of reconstruction of their dwellings. Many households received housing damage compensation payments between 2016 and 2018. To examine the distribution of this assistance, we identified the households in our sample who had registered and received at least one housing damage compensation

payment as of March 2019, using data provided by the National Reconstruction Authority. We regress this indicator variable on the characteristics in 2016 of households that reported being affected by the earthquake, to see if any patterns emerge.⁸ The results are presented in the last column of appendix table 8. We find that the probability of having received a housing reconstruction grant is weakly negatively correlated with household wealth in 2016.⁹ From this, we can conclude that even though it was untargeted, the program did not overly benefit richer households.¹⁰ There are few other significant coefficients in the regression, aside from a strongly positive coefficient on 'received NGO assistance'. NGO assistance may hypothetically have helped households rebuild and qualify for the grants, or it might simply be that households who lost their homes were more likely to receive NGO support as well.

In summary, this analysis illustrates that many rural Nepali households can cope with all except major covariate shocks through dissaving and borrowing, and without resorting to selling assets or cutting consumption. For a small minority—perhaps 10-15 percent of households—savings and borrowing are insufficient, and they are forced to adopt adverse coping strategies. Interruptions to children's schooling appear to be explained largely by school closures following the major covariate events (particularly the earthquake and blockade). For the most part, it does not seem to be attributable to affordability or child labor, since schooling interruptions were less common among

Box 5.2. Reconstruction in Sindhupalchok

Gunsakot is an area in Sindhupalchok district, one of fourteen districts severely affected by the 2015 earthquakes. Given how badly the area was affected, nearly all families were eligible to receive the National Reconstruction Authority's (NRA) housing grant. In 2017, during the second wave of the survey, the first tranche of the grant had gone out to most eligible households. Despite being eligible for the NRA grant, the living conditions of families in Gunsakot varied widely. Some families were still in temporary shelters while others had managed to build permanent structures. Most of the permanent structures were one-storey houses. The survey team was told that prior to the earthquake, most houses had two floors, and the housing grant given by the NRA would not be enough to fully rebuild their old houses. In most cases, those who had managed to rebuild had also been able to rely on remittances from family members working in other parts of Nepal or abroad. Those without ready access to a large amount of capital were still living in the tin shelters constructed in the months immediately following the earthquake.

⁸ This method of identifying potential recipients is not exact: 5.3 percent of households who did not report the earthquake in our 2016 survey were identified as receiving a housing reconstruction grant. The rate among those who did report was 23.9 percent. We restrict our sample to those who reported being affected by the earthquake.

⁹ To rule out a spurious result whereby those who had lost wealth through housing damage were more likely to need the assistance, we controlled for the reported loss due to the earthquake. Hence this negative correlation with wealth is over and above that effect. If we replace the wealth quintile in 2016 with wealth quintile in 2018, we find a similar result. Ideally, we would use wealth prior to the earthquake, but our baseline survey could not capture this.

¹⁰ This could have occurred implicitly through the program rules: the grants were not means-tested, but rather conditioned on households completing certain stages of reconstruction of their dwelling. The rich might be expected to achieve this milestone more easily than the poor, especially given there were minimum requirements for the new construction following the 'build back better' philosophy.

households with more limited means.¹¹ A relatively small share of households reported receiving assistance from friends, relatives or government, indicating that this channel of support is very limited in the Nepali context outside major events like the 2015 earthquake.

Borrowing

The survey collected information on each loan taken or held by respondent households during the previous year. We estimate linear regression models to examine the relationship between the log amount of loans outstanding, and interest rates charged, with household characteristics and shock reports. The results of this analysis are presented in appendix table 9. Controlling for other factors, we estimate that households reporting borrowing in response to a shock held 15 percent more debt than those that did not (column 2). The richest quintile borrowed 41 percent more per loan than the poorest quintile (column 1). Households experiencing covariate shocks held 7.5 percent less in loans than those that did not, while those affected by idiosyncratic shocks held 5.7 percent more (column 2). This could reflect limitations in the availability of credit following covariate shocks.

Table 5.3 shows that average annualized rates paid to moneylenders were about twice those on loans from commercial banks, and loans from friends and relatives carried interest rates more than 10 percentage points higher than commercial banks. After controlling for other household characteristics, this differential reduces (appendix table 9, column 4), but the relative rates of moneylenders and friends/relatives are still higher. Households reporting borrowing as a coping strategy paid 0.95 percentage points higher interest rates than other households, while the richest 20 percent of households reported paying on average 2.6 percentage points lower interest rates than the poorest 20 percent; this result persists even when we control for source of funds. Those in the most remote areas paid a premium of 4.7 percentage points relative to those in the least remote areas. There were also variations in average interest rate by ethnicity: Dalits and Muslims paid 2.5-3 percentage points more in

Table 5.3. Average annualized interest rates by source and region (percent)

Source of Loans	Region			Nepal
	Mountain	Hill	Terai	
Family or friends	23.8	26.1	23.6	25.2
Grameen Bank or cooperative	19.3	18.6	18.2	18.5
Moneylender	29.6	28.1	33.3	30.1
Landowner, employer or shopkeeper	17.2	16.6	27.7	19.7
Financial intermediaries	17.1	17.7	17.7	17.7
Commercial or agric. bank	15.3	15.4	14.3	14.9
Financial NGOs	13.6	17.9	23.9	18.7

¹¹ This is not to say there were no cases in which children's schooling suffered as a result of shocks. One of the less commonly reported coping strategies was 'sending children to work'. We observed 10 cases of this in 2016, 3 in 2017 and 1 in 2018. With such a small number of reports, we cannot explore the issue statistically here, and in any case the results might be biased if other households chose not to report doing so. A focused, qualitative study would be required to understand this phenomenon better.

interest than Brahmins and Chhetri. One might expect some of these results to be explained by credit risk and the use of collateral, but we see similar results when we control for the collateral the household reported using for the loan (column 5). It should also be noted that we report annual effective interest rates here, and shorter-term loans may carry nominal interest charges that seem inflated in annualized terms relative to longer-term loans from banks and other formal financial intermediaries.

The fact that interest rates on loans from friends and relatives are higher is somewhat surprising, since in other localities friends and relatives provide loans with interest-free or state-contingent terms (Udry 1990 in northern Nigeria, Townsend 1995 in Thailand, and Drèze et al. 1997 in northern India). However, anecdotes suggest some of the 'family and neighbors' lending money act more like informal moneylenders in rural areas of Nepal.

Remittances

It is well known that Nepal is a major migrant-sending country, and derives almost one third of its GDP from repatriated income of overseas workers. Among our rural sample, 40-50 percent of households reported having at least one migrant, and 32-38 percent reported receiving remittances. We saw earlier that having migrant family members reduces the likelihood of households borrowing and increases the likelihood of dissaving in response to shocks.

Could the explanation for this dissaving be that households withdraw funds remitted from their migrant relatives to bank accounts? To explore this further, we look at the variations in probability of receiving remittances and the (log) amount received. The results of this analysis are presented in appendix table 10. The first column shows the coefficient estimates from a probit regression of the receipt of remittances on each of the ten shocks, along with other household characteristics including asset quintile, remoteness, ethnicity, strata, and whether the household head is female. Remittances are not significantly correlated with wealth or remoteness, although we observed earlier that the destination of migrants (and hence their earnings potential) is correlated with wealth. We could find no evidence that people were more likely to receive remittances after experiencing shocks. The share of households receiving remittances was in fact *lower* among those reporting a death in the family, probably reflecting those whose migrants had deceased, and possibly also migrants returning home following death of another family member. The second and third columns report the results from a Heckman regression of the log amount of remittances received in the past year, with the selection equation for a household receiving remittances defined based on the aforementioned household characteristics. Controlling for other factors, we find that households affected by the 2015 earthquake received about 15.7 percent more in remittances in 2015-16 and 10.8 percent more in 2016-17. By 2017-18, earthquake-affected households' remittances were no different from those of other households.

Box 5.3. Assistance from Family Members

Farming in Nepal remains a labor-intensive activity, with household members heavily engaged in cultivating their land. When people suffer shocks and are unable to farm, it is possible that their land will go fallow, causing major losses. In several surveyed households, people experiencing shocks relied on extended family to maintain their farms. Sanu Kumar and his wife had moved to Dhading district as a young couple for jobs at the area school. During the planting season, they would take a ten-hour bus journey to their home district, Kaski, to farm their lands. Sanu Kumar's family was one of the families affected by the 2015 earthquake. Their house in Dhading was damaged by the earthquake. Since the earthquake, they had spent all their free time restoring their house and were unable to return to Kaski to look after their fields. In their absence, Sanu Kumar's brothers took care of his fields so that the land was not left fallow.

Summary

The evidence from the survey suggests that most households used dissaving to cope with shocks. Around one quarter of households reported cutting expenditure in response to shocks, while selling assets was less common. Interruptions to children's schooling were commonly reported for the 2015 earthquake and 2015-16 blockades, but not for other shocks. The rate of school interruptions due to the earthquake and blockade was higher among richer households, thus is likely explained by school closures rather than affordability issues. For other shocks, a small percentage of households reported taking children out of school, and in this case it appears more likely to be driven by affordability problems or family circumstances. Borrowing was a common coping strategy, albeit only for around one in five households. Loans taken to cope with shocks carried almost 1 percentage point higher interest rates on average than loans taken at other times. Poorer and more remote households reported significantly higher interest rates on their loans, partly because they borrow from more expensive sources, such as moneylenders, and are less likely to use collateral. However, the gap in interest rates remained even after controlling for these factors. Female-headed households also paid slightly higher interest rates on average.

Reports of receiving formal assistance to cope with shocks were uncommon, except following the 2015 earthquake when housing damage assistance and public works were widespread in affected areas. Local governments are supposed to have a limited pot of funds to assist households suffering from shocks. We found a few reports from households that these mechanisms were used, but less than might be expected. There is evidence that households were slightly more likely to enroll in static cash transfer programs if they suffered a shock in the past year, but the effect is small. We also expected to see households helping their neighbors with informal gifts and transfers, yet reports of such assistance were infrequent. Some of the borrowing 'from family and friends' might serve this function, although it is notable that on average this type of loan came at much higher effective interest rates than loans from formal sources.

Migrant-sending households have an additional source of informal assistance. We found that they are more likely to have a bank account, savings and access to cheaper credit. Remittances generally did not respond to shocks except in the case of the 2015 earthquake, when they increased by 11-16 percent over a two-year period. We conclude that migrants can serve as a limited source of informal insurance against major shocks, and may also help households to diversify income and build a buffer stock of savings for use in difficult times.

Chapter 6. Welfare Impacts of Shocks

Based on the analysis so far, we know that many households faced very large shocks during the recall period, and around a third of households reported reducing food consumption in order to cope. This implies that the shocks were only partially offset by risk management strategies such as drawing on savings, borrowing and informal insurance, and that household consumption, food security and assets were impacted. By diminishing the household's capital stock, these coping strategies imply potential negative long-term impacts on welfare. In order to more rigorously measure the impact of shocks, in this section we use regression techniques to control for the correlation between household characteristics and shock reports. We examine the impact of shocks on assets, per capita consumption and food security. We find that assets indeed fell, by 3-5 percent on average, in the year of a shock, and food insecurity rates rose by a similar amount. The main driver of this result is natural disasters, for which the effects are roughly double. Even two years after shocks, households affected by natural disasters had not fully recovered. For other shocks, the evidence on welfare impacts is more mixed.

Methodology

Our objective in this section is to estimate the impact of shocks on measures of household welfare. There is an extensive theoretical and empirical literature exploring this issue across a range of countries. Shocks can diminish assets either directly (as occurs in an earthquake, flood or fire), or indirectly (such as when households sell or consume assets to cope with a loss in income). Shocks can affect consumption through loss of income, rises in prices, or sudden and unexpected non-discretionary expenses (such as health care costs and the cost of replacing damaged assets). Economic theory and empirical research have established that while households prefer to smooth consumption over time, they may be incapable of doing so in the presence of credit constraints (and sometimes even in their absence), so that shocks may lead to short-term drops in consumption of necessities like food and shelter. The impacts of food shortages and disasters on children's health status and lifetime human capital can be especially pronounced, particularly if the shocks occur earlier in life or during gestation (Alderman, 2011). In some countries, especially in rural settings where assets like livestock are an important source of long-run income and consumption, households may choose to 'smooth assets', preferring to sacrifice short-term consumption rather than lose productive assets that safeguard longer-term welfare (Hoddinott, 2006).

Estimating the welfare effects of shocks is challenging. Although shocks are generally seen as unanticipated and 'random' events, the exposure of households to shocks and their propensity to report shocks are both correlated with household characteristics, as we established in Chapter 4. In this case, OLS estimates of shocks' true impacts on the welfare measures would be biased and inconsistent. However, under the assumption that these endogenous characteristics are fixed (at least in the short run), they can be eliminated either by first-differencing or by using a household fixed-effects model. Both models are essentially difference-in-difference estimators, treating the shock as the treatment variable. We estimate the change in the asset index and in log per capita expenditure using an OLS model of the form:

$$\Delta y_{it} = \Delta X_{it}\beta^{OLS} + \Delta Z_{it}\gamma^{OLS} + \varepsilon_{it}^{OLS} \quad (1)$$

where y_{it} is the welfare measure for household i in period t , X_{it} is the vector of contemporaneous and lagged shock dummies¹², and Z_{it} is a vector of time-varying household characteristics (the fixed characteristics having dropped out of the equation by differencing). We make an adjustment of the standard errors, ε_{it} , for clustering by PSU. We also estimate a household panel fixed effects model of the form:

$$y_{it} = X_{it}\beta^{FE} + Z_{it}\gamma^{FE} + v_i + \varepsilon_{it}^{FE} \quad (2)$$

where v_i captures household-specific unobservables.¹³ For the vector Z_{it} , we include the following time-variant household characteristics: household size, female head, disabled member in household, has bank account, has a farm owner, has a farm worker, has any worker in agriculture, wage employment or self-employment, has a migrant, and a year dummy (for the fixed-effects model only).¹⁴

As an alternative approach, we estimated the shock's average treatment effect on the treated (i.e., shocked households) using a propensity-score matching (PSM) estimator. The PSM estimator models the propensity of a household to experience each type of shock (or its lag) and matches each household to unshocked households in the sample with similar propensity.¹⁵ The detrended welfare metrics (asset index, log per capita consumption, and food insecurity) of shocked households are then compared to a set of comparator households.¹⁶ The PSM approach also has drawbacks: it relies on the completeness of the model used to explain shock reports. We therefore encourage the reader to consider all results jointly, given the limitations of each.

One challenge in examining the impacts of such varied events as earthquakes, blockades, illness and economic shocks is that each may have a very different mechanism of impact on the household. For instance, the earthquake was clearly a very rare and strongly covariate shock, which impacted assets, income, prices and daily activities. Meanwhile, the blockade was felt by some households in terms of impediments to daily activities, others simply through higher prices for fuel and food. These differential effects on assets, income and availability of food may be difficult to observe if we consider all shocks together, while a small number of observations of some shocks would make it difficult to estimate the coefficients on each separately. We therefore present combined results, and also results for four different categories of shock: natural disasters (the earthquake, floods, landslide, drought, fire, hail and lightning); agricultural shocks (pests, post-harvest loss and livestock loss); economic shocks (the blockade, price hikes, and personal economic shocks); and health shocks (disease, injury and death).

¹² We include the first and second lags of the shock in the regression. Including shocks and lags of shocks here might seem to introduce a problem of multicollinearity. However, the correlation between the 'any shock' indicator and its lag was -0.0002.

¹³ We also explored a random-effects specification, however a Hausman test strongly rejected the random-effects model in favor of the fixed-effects model.

¹⁴ These variables change for around 10 percent of households in a given year, for example due to changes in household composition, death of a head, or migration of a household member. The correlation of the shock dummies and their lags with the terms in Z_{it} is less than 0.12 in absolute value in all cases.

¹⁵ Our estimates were obtained using the `psmatch2` package in Stata (Leuven and Sianesi 2003).

¹⁶ Following Dehejia and Wahba (2002), we use radius matching with a caliper of 0.02, and measure the ATT for the detrended variables (residuals after regressing on year dummies) rather than the variables themselves, given observations from different years could be matched and there is a clear mean shift in all three variables from 2016 to 2018.

There is also the issue of external validity. Our estimates depend on the nature of the shocks observed during the study period, which may differ from those occurring in the future. They provide a summary of estimated impacts from a set of specific events, rather than a generalization of 'shocks' in a more abstract sense. We also cannot infer the impacts of shocks for urban households from this study, which sampled only rural areas.

Assets

We first consider the impact of shocks on assets. We focus on the asset index, which is based on the household's durables, farming assets, housing characteristics and human capital indicators. (For a more detailed description, refer to Chapter 3.) We use the asset index rather than reported assets, because it is a broader measure of household wealth; however, our findings were similar if we used log reported assets as the dependent variable. Table 6.1 reports the estimated impact of shocks (and their first and second lags) on the asset index using the OLS, fixed-effects panel regression and PSM estimators. Since the asset index is constructed as a prediction of log assets, these coefficients can be interpreted as the percentage change in assets in response to the shock.

Table 6.1. Estimated Effect of Shocks on Asset Index

	OLS		Fixed Effects		PSM		Number of shocks [^]
Any Shock							
Current year	-0.052***	(-0.014)	-0.040***	(-0.014)	-0.033***	(-0.012)	3,360
Previous year	0.009	(-0.015)	0.016	(-0.015)	-0.030*	(-0.016)	5,040
2 years ago	-0.007	(-0.012)	0.002	(-0.012)	0.013	(-0.013)	5,618
Natural Disaster							
Current year	-0.129***	(-0.023)	-0.120***	(-0.023)	-0.070***	(-0.016)	971
Previous year	-0.082***	(-0.020)	-0.072***	(-0.020)	-0.086***	(-0.012)	1,835
2 years ago	-0.041***	(-0.014)	-0.033**	(-0.013)	-0.035***	(-0.013)	3,546
Agricultural Shock							
Current year	0.011	(-0.020)	0.020	(-0.020)	-0.040**	(-0.019)	720
Previous year	0.053**	(-0.026)	0.049*	(-0.025)	-0.084***	(-0.019)	715
2 years ago	0.050*	(-0.027)	0.044*	(-0.027)	-0.031	(-0.025)	543
Economic Shock							
Current year	-0.098*	(-0.059)	-0.089	(-0.059)	0.079***	(-0.021)	57
Previous year	0.030	(-0.045)	0.028	(-0.045)	0.092***	(-0.016)	1,949
2 years ago	0.019	(-0.042)	0.021	(-0.043)	0.091***	(-0.019)	1,942
Health/Death Shock							
Current year	-0.010	(-0.016)	0.007	(-0.016)	-0.093***	(-0.013)	2,260
Previous year	0.052***	(-0.018)	0.068***	(-0.017)	-0.058***	(-0.014)	1,997
2 years ago	0.051***	(-0.017)	0.064***	(-0.017)	-0.029	(-0.022)	832
<i>HH characteristics</i>	Yes		Yes		Yes		
<i>Year dummies</i>	No		Yes		Yes [#]		
Observations	5,654		11,419		11,419		12,056
Households	5,654		5,835		5,835		6,244

Note: Dependent variable for regressions is asset index. PSM model estimates average treatment effect on the treated (shocked households) in terms of deviations of asset index from annual mean. Cluster-adjusted standard errors in parentheses; robust SE for PSM. *** implies significance at 1% level, ** at 5% level and * at 10% level. [^] Number of households experiencing the shock. Since 'any shock' includes households that suffered more than one shock in a year, the sum of the four shock types can exceed the 'any shock' total. [#] Asset index was detrended prior to PSM estimation.

All three models find a consistent but temporary drop in assets following a shock. Assets fall by 3-5 percent on average in the first year and recover to their counterfactual levels by the second year.

Looking at the shock types separately, we find that this result is mainly driven by natural disasters, as might be expected given their size. Assets fall by 7-12 percent in the year of a natural disaster, and recover gradually but remain about 3 percent lower than the counterfactual level two years later. At least over the study period, this implies that the assets of households hit by significant natural events did not recover to their pre-shock levels. It should be noted that only the second lag of the natural disaster shock includes the earthquake (since our sample is households in 2017 and 2018); the contemporaneous and first-lag effects are driven by other events including drought, floods and landslides. For the other shocks, the estimated impacts on assets are mixed, with a few significant negative coefficients for economic and health shocks in the PSM results and significant *increases* in assets in response to lagged agricultural and health shocks. In order to confirm that this result is not driven by an artifact of the asset index, we estimated the same models using log assets and found the same result. The same patterns were also present when we looked only at shocks associated with reported losses of assets or income. We conclude that the negative effects of shocks on assets predominantly derive from large covariate shocks like earthquake, flood/landslide and drought, and that households appear capable of managing other shocks without suffering significant asset losses.¹⁷

Consumption

We use a measure of consumption that includes all purchased, gifted and self-produced food and non-food expenditure, but excludes durables purchases, repairs and health expenses. Food and non-food components of the expenditure aggregate were adjusted by the regional CPI to obtain an aggregate that is comparable across rounds and geographies.¹⁸ We also constructed a Paasche index of spatially price-adjusted consumption using the implicit prices in the survey and following the method proposed by Deaton and Zaidi (2002). The results from both are relatively similar, so we present the basic CPI-adjusted consumption results.

The estimated impacts of shocks on consumption are presented in table 6.2, using the same models as for assets: the OLS difference-in-difference specification, a panel fixed-effects model with year dummies, and the PSM model. Consumption is significantly higher in the immediate aftermath of the shock, and lower in the second and third years. A plausible explanation for consumption rising initially might be that some shocks force households to spend more on certain things, such as health expenses, ceremonial expenses following deaths, temporary housing and rebuilding assets. These effects persist whether or not we control for price changes, and even if we consider only food expenditure. It is also possible the price effects of the shock are too localized to be reflected in the region-level CPI and district price indices. However, this positive impact is temporary. We find that per capita consumption is 6-7 percent lower in the year following the shock, and 3 percent lower two years later. This might reflect the cost of rebuilding assets, lost income, and the burden of loan repayments. In the PSM

¹⁷ Some of this coping includes taking on debt; our asset index is based mainly on durable assets and housing wealth, and does not directly measure loans outstanding.

¹⁸ We used food and non-food CPI measures for mountain, hill and terai regions separately, obtained from the Nepal Rastra Bank 11-month CME Tables (2018).

estimates, we see the same increase in the year of the shock, but do not observe lower consumption in the years following.

When we consider different types of shock separately, however, the results are less clear. The effect of natural disasters on consumption is generally positive and significant.¹⁹ We observe significant negative impacts of economic shocks (mainly the blockade) on lagged consumption in the PSM results, but this result is not replicated in the regression results. Meanwhile, the regressions found consistently strong, positive impacts of health shocks on consumption. We verified that this is not driven by death shocks (which could result in a fall in household size without any income loss, if the deceased is not an income earner), but rather by the 'disease and injury' shock.

Table 6.2. Estimated Effect of Shocks on Log Per Capita Consumption

	OLS		Fixed Effects		PSM		Number of shocks [^]
Any Shock							
Current year	0.108***	(0.020)	0.092***	(0.019)	0.062***	(0.007)	3,360
Previous year	-0.063***	(0.021)	-0.069***	(0.021)	-0.015	(0.010)	5,040
2 years ago	-0.025*	(0.015)	-0.031**	(0.014)	0.016*	(0.008)	5,618
Natural Disaster							
Current year	0.128***	(0.031)	0.127***	(0.031)	0.062***	(0.011)	971
Previous year	0.009	(0.027)	0.010	(0.027)	0.024***	(0.008)	1,835
2 years ago	-0.017	(0.017)	-0.019	(0.017)	0.021***	(0.009)	3,546
Agricultural Shock							
Current year	0.032	(0.030)	0.018	(0.029)	0.084***	(0.014)	720
Previous year	-0.066*	(0.040)	-0.067*	(0.038)	0.003	(0.015)	715
2 years ago	-0.041	(0.042)	-0.048	(0.041)	0.006	(0.020)	543
Economic Shock							
Current year	0.037	(0.071)	0.030	(0.071)	0.006	(0.011)	57
Previous year	0.045	(0.063)	0.038	(0.063)	-0.047***	(0.011)	1,949
2 years ago	0.064	(0.060)	0.057	(0.059)	-0.031***	(0.010)	1,942
Health/Death Shock							
Current year	0.182***	(0.024)	0.164***	(0.024)	0.065***	(0.010)	2,260
Previous year	0.073**	(0.028)	0.064**	(0.028)	-0.025	(0.010)	1,997
2 years ago	0.119***	(0.027)	0.109***	(0.027)	0.044***	(0.016)	832
<i>HH characteristics</i>	No		Yes		Yes		
<i>Year dummies</i>	No		Yes		Yes		
Observations	5,653		11,488		11,488		12,056
Households	5,653		5,835		5,835		6,244

Note: Dependent variable for regressions is log per capita consumption excluding health and durables. PSM model estimates average treatment effect on the treated (shocked households) in terms of deviations of log PCC from annual mean. Cluster-adjusted standard errors in parentheses; robust SE for PSM. *** implies significance at 1% level, ** at 5% level and * at 10% level. [^] Number of households experiencing the shock. Since 'any shock' includes households that suffered more than one shock in a year, the sum of the four shock types can exceed the 'any shock' total. [#] Log PCC was detrended prior to PSM estimation.

¹⁹ This finding is consistent with ongoing analysis by Baez et al. (2019) using pooled cross-sectional data from the Nepal Annual Household Survey, which finds a positive response of per capita consumption to the earthquake shock. It is possible that the humanitarian response pushed up short-term consumption following the earthquake, even though assets were negatively impacted.

As an alternative approach, we used rainfall data to measure the impact of monsoon shocks on the income and food consumption of households in paddy-farming areas. Monsoon rainfall (between June and September) is a key driver of economic life in rural Nepal as well as a major source of income variability. Agricultural production, especially of paddy, is highly dependent upon monsoon rainfall. In the Terai lowlands, all but about 5 percent of cropping area is devoted to paddy. By contrast, in the Hills and Mountains, paddy is less commonly cultivated than maize.

For parsimony, we will only briefly describe the details and results of the analysis here; a full description is provided in Jacoby and Walker (2019). To construct monsoon rainfall, we merged gridded monthly precipitation data from the global Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) to each household using their GPS coordinates. Because the mountain regions are so different in terms of the nature of rainfall and reliability of remote sensing data, we focus only on the terai and hill regions for this analysis. In order to estimate the impact of rainfall on household income and food expenditure, we estimate panel regressions of the form

$$\log y_{it} = \alpha \log R_{it} + \beta \log R_{it} \times P_{vdc} + \omega_t + \mu_i + \varepsilon_{it} \quad (3)$$

where y_{it} is log income for household i in year t , R_{it} is the wet season rainfall at that household's geospatial grid point in year t , P_{vdc} is the proportion of area planted to rice in the VDC, ω_t is a year (survey wave) dummy, μ_i is a household fixed effect, and ε_{it} is a random error term. This model allows the impact of monsoon rainfall on agricultural production to vary according to the local importance of paddy. In the case of food consumption expenditures c_{it} , we also consider

$$\log c_{it} = \gamma \log y_{it} + \xi_t + \nu_i + u_{it} \quad (4)$$

where ν_i are household fixed effects and ξ_t are time fixed effects. This specification allows us to estimate the elasticity of consumption with respect to income, γ , from which we can recover the impact of the rainfall shock (deviation of log rainfall from its mean) on consumption, through its impact on household income. We estimate equations (3) and (4) with Two-Stage Least Squares (2SLS), using $\log R_{it}$ and $\log R_{it} \times P_{vdc}$ as instrumental variables, because (i) there are measurement errors in income and (ii) there is simultaneity between consumption and income, such as preference shocks (e.g., an illness in the family) that both reduce household food expenditures and labor supply (and hence income).

The results of the model are reported in table 6.3. Focusing on the wet season, when virtually all agricultural households are cultivating, we see in column 1 of table 6.3 that higher precipitation leads to greater area cultivated. Specifically, a 10 percent increase in monsoon rainfall leads to a precisely estimated 3.2 percent increase in wet season area. As with cultivated area, there is weak evidence that wet season crop revenue responds more positively to rainfall in paddy-intensive VDCs (i.e. those in which P_{vdc} is higher). In the case of total revenue, however, the coefficient on the interaction term $\log R_{it} \times P_{vdc}$ is not only positive but very large and significant. A plausible explanation for this effect is as the result of aquifer recharge that allows groundwater irrigation in the dry season. In the paddy-dominated terai region, about 40 percent of land area is irrigated by wells as compared to a negligible fraction in the hills (and mountains, which are excluded from the sample for this analysis). Thus, in VDCs growing mainly paddy, which are concentrated in the terai, the impact of improved groundwater recharge on dry season crop revenue is necessarily stronger.

We use the estimates from the model to predict that a positive shock equivalent to a one standard deviation increase in log monsoon rainfall will increase agricultural incomes in the average VDC by 3.8 percent. As the area cultivated rises in response to higher monsoon rainfall, so does agricultural income. For households in VDCs for which paddy makes up less than 20 percent of land cultivated, the impact is essentially zero, while in VDCs where half of land area cultivated, this figure rises to 7.0 percent, and for VDCs where the share is over 60 percent, it is 8.9 percent. Furthermore, we find that the total incomes of households in paddy dominant areas are even more sensitive to monsoon rainfall than are their agricultural incomes. Specifically, a one standard deviation increase in log monsoon rainfall has almost no effect on total income for households in VDCs which plant less than 20 percent of land with paddy, but increases total income by 8.7 percent in those with more than 50 percent paddy cultivation, and by 11.5 percent for those with more than 60 percent of land cultivated for paddy. The mechanism for this appears to be non-farm income: a good monsoon greatly enhances off-farm employment opportunities in paddy-intensive areas. Thus, there appear to be significant sectoral spillovers in the rural economy between agricultural and non-agricultural productivity.

Table 6.3. Estimated impacts of monsoon rainfall on cultivated area, income and food consumption

Dependent variable:	Cultivated area in wet season		Cultivated area in wet and dry seasons		Total agricultural income		Total food consumption (reduced form)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log monsoon rainfall	0.24* (0.13)	0.24* (0.13)	0.029 (0.11)	0.029 (0.11)	-0.14 (0.17)	-0.14 (0.17)	-0.12 (0.10)	-0.12 (0.10)
Log rainfall X P_{vdc}	0.24 (0.27)	0.20 (0.27)	0.29 (0.26)	0.26 (0.26)	1.00** (0.40)	0.94** (0.40)	0.49** (0.22)	0.37* (0.22)
Log rainfall (marginal effect)	0.32*** (0.058)	0.30*** (0.058)	0.13** (0.053)	0.12** (0.053)	0.20** (0.080)	0.18** (0.080)	0.041 (0.048)	0.004 (0.048)
Log household size		0.15*** (0.037)		0.12*** (0.035)		0.24*** (0.049)		0.44*** (0.028)
HH fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,546	12,546	12,577	12,577	12,853	12,853	12,852	12,852
R-squared	0.824	0.825	0.830	0.830	0.709	0.710	0.615	0.634
Number of clusters	1,058	1,058	1,058	1,058	1,058	1,058	1,058	1,058

Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ adjusted for two-way clustering on household and vdc-year. Rainfall is total precipitation from June to September; P_{vdc} is the proportion of cultivated land in VDC devoted to paddy from 2016 to 2018. See Jacoby and Walker (2019) for further details and results.

In parallel to the results for income, we find that higher monsoon rainfall leads to significantly higher total food consumption in more rice intensive areas, but the average marginal effect of log rainfall is only weakly positive (column 7) and almost zero once household size is controlled for (column 8). These results are largely consistent with the patterns observed for income in columns 5 and 6. The column 7 estimates imply that a one standard deviation increase in log monsoon rainfall will increase total food consumption by roughly zero for households in VDCs with paddy cultivated area less than 20 percent, by 2.3 percent in VDCs where the paddy cultivated area is 50 percent, and by 3.3 percent in VDCs where the paddy cultivated area is over 60 percent. However, once we control for household size the average marginal effect of rainfall shocks on *per capita* food consumption is small and not statistically significant. This result implies (and the paper goes into more detail to show) that household size adjusts endogenously, increasing and decreasing with monsoon rainfall, to serve as a sort of coping mechanism. This corresponds to an increase in land area cultivated during a greater than average monsoon: more household members work on the farm, and total food consumption increases, but per capita food consumption is unchanged. In periods of low rainfall, household members migrate elsewhere to work, and household income and food consumption both fall. Although we found earlier

that remittance-sending does not increase in response to negative shocks, it appears that farming households use internal migration as a mechanism to soften the impact of negative rainfall shocks.

Food Insecurity

We now examine the results of the survey's module on food insecurity, in which households were asked a range of questions about their food consumption patterns over the past year. The questionnaire was developed based on the USAID's Household Food Insecurity Access Scale questionnaire (Coates et al. 2007); details are presented in box 6.1. Following the guidance provided by Coates et al. (2007), two formulas can be used to evaluate the responses to these questions. The first is to assign 0, 1, 2, or 3 points to each response in the four categories noted at the end of box 6.1, in order to arrive at a score out of 27. This is referred to as the Household Food Insecurity Access Scale (HFIAS). The second formula, called the Household Food Insecurity Access Prevalence (HFIAP) Status indicator, gives a higher weight to the later questions (which imply a more severe degree of food insecurity), and classifies households into one of four categories: food secure; mildly food insecure; moderately food insecure; and severely food insecure. The two measures are summarized by quintile for our sample in table 6.4. Although there is some variation in the HFIAS, the values tend to be low for rich and poor households alike. There was also no clear way to categorize households in terms of severity of food insecurity using this score, so for these reasons we use the HFIAP indicator in our analysis.

Table 6.4 illustrates that while chronic food insecurity is predominantly felt by the poor, food insecurity was notably higher among rich and poor households alike in 2015-16. Almost 20 percent of households in the second and third asset quintiles, and even 2 percent of the top quintile, were classified as moderately or severely food insecure. These patterns are similar if we look at quintiles of per capita consumption. Shock-affected households were more likely to be food insecure than non-shock affected households, but even among the latter, around 13 percent were food insecure. Food insecurity fell sharply for all groups in the years that followed, from 21.8 percent in 2015-16, to 11.5 percent in 2016-17, and only 4 percent in 2017-18. By the last wave of the survey, only 1.9 percent of rural Nepalis were moderately or severely food insecure. Most of the fall in food insecurity between 2015-16 and 2016-17 can be explained by improved food security among non-shock-affected households, while food insecurity rates fell only slightly for shock-affected households. In 2017-18, even those households reporting shocks had lower levels of food insecurity.

Box 6.1. Construction of the Food Security Measure

The questionnaire included a module (based on Coates et al. 2007) that asked questions about the household's food consumption patterns over the preceding year. If in any month during the past year the head worried that the family might not have enough food to eat, the following questions were asked regarding that month:

- Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
- Did you or any household member have to eat a limited variety of foods due to a lack of resources?
- Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
- Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
- Did you or any household member have to eat fewer meals in a day because there was not enough food?
- Was there ever no food to eat of any kind in your household because of a lack of resources to get food?
- Did you or any household member go to sleep at night hungry because there was not enough food?
- Did you or any household member go a whole day and night without eating anything because there was not enough food?

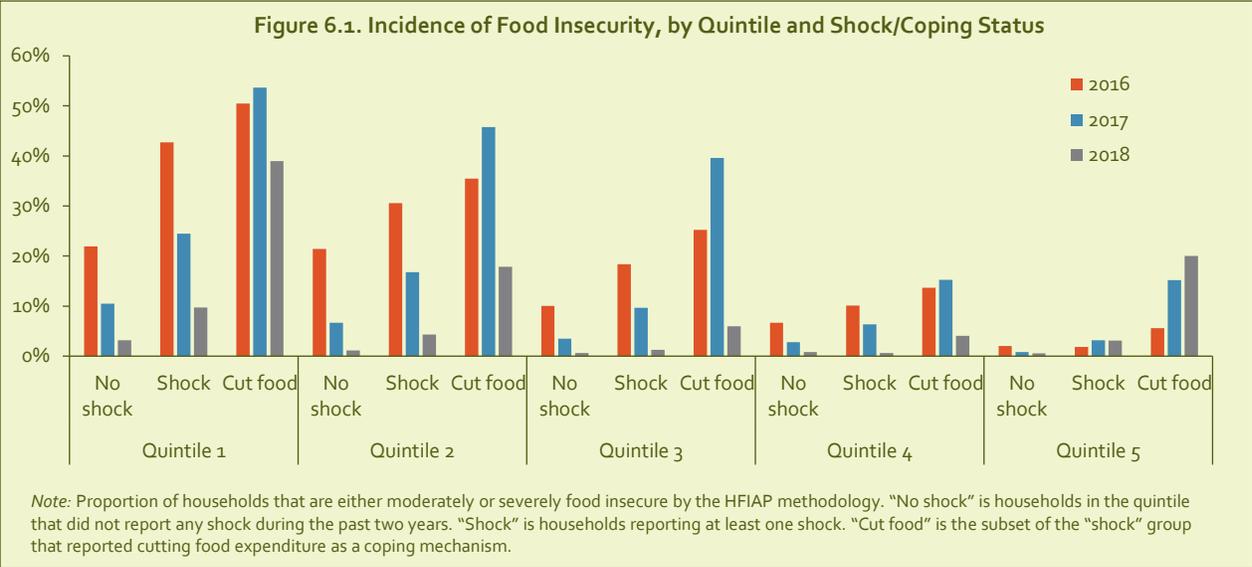
For each question, the possible responses were Never, Rarely (once or twice in the past four weeks), Sometimes (three to ten times in the past four weeks), or Often (more than ten times in the past four weeks).

Table 6.4. Food Insecurity Scores by Asset Quintile

	Asset Quintile					Shock affected	Non-shock affected	All households
	Poorest	Second Poorest	Middle	Second Richest	Richest			
2015-16								
HFIAS	2.9	2.2	1.3	0.8	0.2	1.7	1.2	1.5
<u>HFIAP</u>								
Food secure (%)	59.6	68.1	78.9	87.2	97.0	73.8	83.2	78.2
Mildly food insecure (%)	8.3	6.0	6.5	4.2	1.1	6.6	3.7	5.2
Moderately food insecure (%)	16.2	15.0	8.7	5.3	0.9	11.5	6.6	9.2
Severely food insecure (%)	15.9	10.9	5.8	3.3	1.0	8.2	6.5	7.4
2016-17								
HFIAS	2.0	1.1	0.6	0.4	0.1	1.7	0.5	0.8
<u>HFIAP</u>								
Food secure (%)	76.3	84.1	90.2	93.8	98.2	78.0	93.2	88.5
Mildly food insecure (%)	6.1	5.6	4.6	2.7	0.5	7.0	2.6	3.9
Moderately food insecure (%)	10.2	7.8	3.6	2.7	1.1	10.8	2.6	5.1
Severely food insecure (%)	7.4	2.4	1.6	0.9	0.2	4.2	1.7	2.5
2017-18								
HFIAS	0.7	0.3	0.1	0.1	0.1	0.5	0.2	0.3
<u>HFIAP</u>								
Food secure (%)	90.6	94.7	97.8	97.8	98.9	92.9	96.8	96.0
Mildly food insecure (%)	4.5	3.3	1.4	1.4	0.3	2.9	2.0	2.2
Moderately food insecure (%)	2.4	1.2	0.6	0.2	0.4	2.2	0.6	1.0
Severely food insecure (%)	2.5	0.8	0.2	0.6	0.5	2.0	0.6	0.9

Figure 6.1 plots the proportion of food insecure households by asset quintile, whether or not the household was affected by any shock during the two-year period (labeled 'shock' and 'no shock', respectively). A significantly higher proportion of shock-affected households are food insecure, and this holds across all asset quintiles. The differences are even more striking for those households reporting cutting food consumption as a coping strategy (labeled 'cut food' in the graph). For instance, in 2015-16, while 22 percent of non-shock-affected households in the poorest quintile were moderately or severely food insecure, 43 percent of shock-affected households scored in this category, and 50 percent of those that reported cutting consumption. Households from the second and third quintiles that cut food consumption in response to a shock also reported rates of food insecurity above 25 percent. In other words, it seems that the food security of many nonpoor households, normally taken as given, comes under threat if the household is faced by a shock severe enough to force cuts to food spending. The results are similar, albeit less pronounced, if we look only at severe food insecurity. Consistent with the nationwide decline in food insecurity in 2016-17 and 2017-18, we also see food insecurity rates fall among those affected by shocks. However, even in 2017-18, 39 percent of households in the poorest quintile forced to cut food spending were food insecure, and 20 percent of those in the richest quintile.

To measure the impact of shocks on food insecurity, we estimate a fixed-effects probit model of the likelihood of a household being food insecure, as a function of the current and lagged covariate and idiosyncratic shock dummies, and the same time-varying household characteristics used as controls in the regressions of consumption and assets. Unfortunately we cannot estimate the fixed-effects model well in this case, as it can only use the 1,028 household units for which food insecurity status changes at least once in 2016-17 and 2017-18.



The estimated marginal effects of shocks on the likelihood of food insecurity are reported in Table 6.5. Shocks in the past year increase the propensity of food insecurity by around 6 percentage points on average, regardless of the shock size, and in the case of natural disaster shocks these effects persist (albeit slightly attenuated) in the following year. The effects disappear by the second year following the shock. The PSM estimates are similar in sign and significance, albeit smaller in magnitude. Households suffering losses are 3.4 percent more likely to be food insecure in the year of the shock.

Table 6.5. Estimated effect of shocks on food insecurity

	Probit		PSM		Number of shocks [^]
Any Shock					
Current year	0.064***	(0.006)	0.056***	(0.005)	3,360
Previous year	0.014***	(0.005)	0.005	(0.005)	5,040
2 years ago	-0.023***	(0.006)	-0.015***	(0.005)	5,618
Natural Disaster					
Current year	0.050***	(0.008)	0.038***	(0.008)	971
Previous year	0.020***	(0.006)	0.014**	(0.005)	1,835
2 years ago	-0.010*	(0.005)	-0.017***	(0.006)	3,546
Agricultural Shock					
Current year	0.016	(0.010)	0.013	(0.010)	720
Previous year	-0.044***	(0.011)	-0.039***	(0.011)	715
2 years ago	0.002	(0.010)	0.014	(0.009)	543
Economic Shock					
Current year	0.048**	(0.023)	0.042*	(0.023)	57
Previous year	0.015**	(0.007)	-0.004	(0.007)	1,949
2 years ago	-0.028***	(0.008)	0.005	(0.008)	1,942
Health/Death Shock					
Current year	0.055***	(0.005)	0.045***	(0.005)	2,260
Previous year	-0.006	(0.006)	0.003	(0.006)	1,997
2 years ago	-0.008	(0.009)	0.005	(0.009)	832
<i>Household characteristics</i>	Yes		Yes		Yes
<i>Year dummies</i>	No		Yes		Yes [#]
Observations	1,028		1,028		17,854
Households	514		514		6,248

Note: Dependent variable for regressions is food insecurity dummy. Probit results are marginal effects. PSM model estimates average treatment effect on the treated (shocked households) in terms of the marginal effect of the probit model. Cluster-adjusted standard errors in parentheses; robust SE for PSM. *** implies significance at 1% level, ** at 5% level and * at 10% level. [^] Number of households experiencing the shock. Since 'any shock' includes households that suffered more than one shock in a year, the sum of the four shock types can exceed the 'any shock' total.

[#] Year-specific effect removed from marginal effect for PSM calculation.

Again, by the third year we see food insecurity at similar levels for shock-affected and non-shock-affected households. Looking at the different types of shock separately, we find again a measurable impact of natural disaster shocks on the likelihood of food insecurity – 4-5 percent in the year of the shock, sustained but smaller in the second year and almost insignificant by the third year. There are also significant contemporaneous effects from economic shocks and health shocks; however, we see a number of significant negative coefficients as well, especially in the PSM estimates. This may indicate that the PSM model is not working well in smaller sample sizes associated with these shocks.

Summary

The analysis of shocks and coping mechanisms in Chapters 4 and 5 illustrated that the shocks observed in Nepal during the survey period were at times substantial in terms of the proportion of population affected and the losses experienced. While only a minority of households resorted to adverse coping strategies such as cutting consumption and selling assets, we nevertheless observed a high degree of vulnerability to shocks. In this chapter we examined the impact of shocks on assets, per capita consumption and food security. Estimating these impacts is not straightforward, therefore we used a range of econometric techniques to triangulate reliable estimates from the data. For the purposes of our analysis, we classified the ten shock types into four categories: natural disasters; agricultural shocks; economic shocks; and health shocks.

We found significant impacts of shocks on household assets and food insecurity. We estimate that shocks reduced assets by 3-5 percent on average, and caused a similar rise in moderate to severe food insecurity. The main driver of this result was the 'natural disasters' group of shocks. We found that assets of households affected by natural disasters were lower than those of comparable, unimpacted households even two years after the shock. There was some evidence that food insecurity rates remained higher as well. There was less evidence of adverse welfare impacts from agricultural, economic and health shocks, and the impact of such shocks does not seem to have persisted beyond the year of the shock.

The impact of shocks on per capita consumption is less straightforward. In general, in the year of the shock we observed a *rise* in per capita consumption among shock-affected households, which seems paradoxical if per capita consumption is seen as a proxy for household welfare. However, it could make sense if it reflects shock-related expenses that are not welfare-enhancing. There was also some evidence that consumption was lower in the years following the shock. Using rainfall as an instrument for shocks to paddy farming incomes, we found strong impacts of rainfall variations on total income and food consumption, but interestingly it appears that households use migration to respond to rainfall variations, increasing household size and planted area when rainfall is good, and reducing both when rainfall is poor. This way, households can smooth out shocks to income and supplement farm incomes with income from other sources. We also found evidence that non-farm income comoves with agricultural income.

In summary, we can conclude that households in Nepal are equipped to recover relatively quickly from a wide range of unanticipated shocks. However, near-poor households remain vulnerable to significant and sustained welfare losses as the result of major covariate shocks. At present, self-insurance, formal and informal coping mechanisms are not adequate to offset these impacts. This illustrates the need for mechanisms to extend temporary assistance in the event of major national shocks, to a broader set of households than those targeted by social assistance programs.

Chapter 7. Conclusions and Policy Recommendations

This study set out to address critical gaps in the understanding of shocks faced by Nepali households and how they cope with a range of shocks. The analysis drew from a sample of 6,000 households in nonmetropolitan areas, excluding households in the Kathmandu valley (Kathmandu, Lalitpur, and Bhaktapur districts), interviewed each year between 2016 and 2018.

Almost 90 percent of households reported experiencing at least one shock during the study period. The survey recorded many shocks over the period 2014-2018, some with severe impacts on the well-being of affected households. The most common shocks reported by respondents were the 2015 earthquake and the riots and blockades of late 2015 and early 2016. Droughts and localized floods and landslides were the next most common shocks. In 2017 and 2018, shocks were fewer and less widespread. There were reports of floods, landslides and agricultural shocks with similar frequency, and a spate of illness reports in 2017.

Each year, households lost an average of 1.5 percent of their assets to shocks, and the average loss among households experiencing a shock was 6.5 percent of assets. All households are at risk of shocks, but poorer households tend to be more exposed, less able to cope, and therefore more severely affected. Although many households used savings and borrowing to cope with shocks, a minority reported resorting to negative coping strategies such as cutting food consumption and selling assets. Cuts to food consumption were reported by around 20 percent of shock-affected households, slightly more among the poorer quintiles. If this is linked to lower caloric intake, it could imply negative long-term consequences of shocks on human capital, especially for the young. Interruptions to children's schooling were uncommon except for major covariate shocks, where school closures are likely the explanation. However, the fact that even 5 percent of households were forced to take their children out of school following idiosyncratic shocks makes this result worthy of further policy attention.

Debt plays a major role in helping households cope with shocks, while remittances did not increase in response to most shocks. We found that around one in five households reported borrowing in response to a shock, and on average paid higher interest rates if they did so. Poorer, remote and female-headed households all paid significantly higher interest rates. We found that remittances did not increase in response to shocks other than the earthquake, although migrant-sending households were in general less likely to be forced to adopt adverse coping strategies.

There is limited public assistance available to households suffering shocks. Nepal's social assistance programs are categorical, and provide unconditional monthly transfers based on fixed characteristics rather than economic need. These benefits do not reach all of those who qualify for them, and are not sufficient to offset unexpected losses of income or assets. There were very few reports of shock-affected households receiving ad hoc public assistance. The only shock for which a significant proportion of affected households reported receiving public assistance was the 2015 earthquake. With support from development partners, NGOs, and CSOs, the government was able to mobilize an extensive response, and around one-third of earthquake-affected households in this study reported receiving some assistance. We found that the distribution of earthquake housing reconstruction grants is relatively uncorrelated with household characteristics.

Shocks were found to have reduced assets and consumption by 3-5 percent on average, and caused a similar rise in moderate to severe food insecurity. Using regression and propensity-score matching

techniques, we found statistical evidence that shocks negatively impact household assets and food insecurity. Assets of households affected by natural disasters fell even more sharply and remained lower than those of comparable, unimpacted households even two years after the shock. There was some evidence that food insecurity rates remained higher as well. There was less evidence of adverse welfare impacts from agricultural, economic and health shocks, and the impact of such shocks does not seem to have persisted beyond the year of the shock. While the impact of shocks on per capita consumption was less clear, we found that negative rainfall shocks were associated with a 3.3 percent fall in food consumption in the year of the shock among households in paddy-intensive areas. However, there was no measurable impact on per capita consumption.

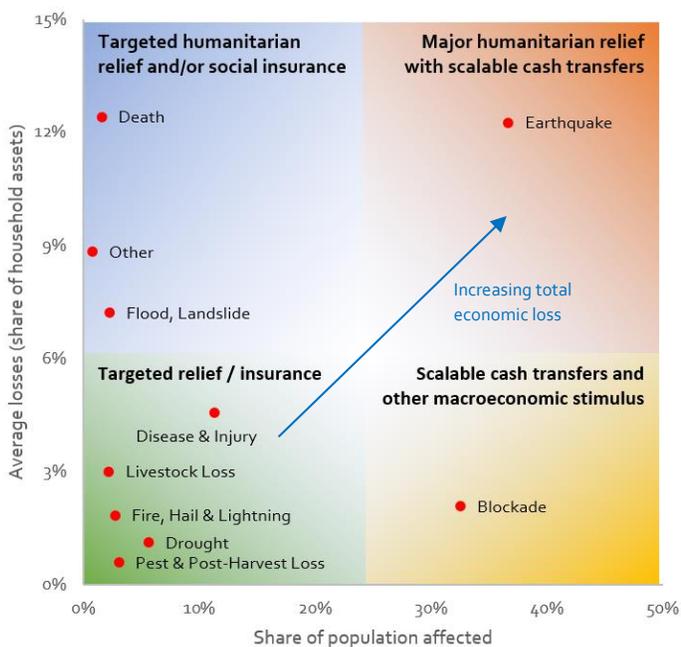
Policy Recommendations

These results indicate that improvements in Nepal’s safety net could better protect households from welfare losses in the event of shocks. Nepal’s existing welfare programs are static and do not aim to address vulnerability to shocks ex ante or respond to shocks ex post. Policy makers tend to use the term ‘vulnerable’ to refer to specific groups (such as the elderly and the disabled) that are subject to lifecycle vulnerabilities and socioeconomic exclusion and are therefore in need of long-term assistance. Consequently, the main cash transfer programs are targeted to certain demographics or geographies deemed to be chronically vulnerable. This does not take into account the *economic* vulnerability of a much larger population, especially the rural poor. These people need occasional assistance to prevent unanticipated shocks from causing long-term damage to their assets, health and livelihoods.

Shocks and their impacts are diverse, and call for different policy responses.

Shocks may be idiosyncratic, affecting few households in a geographic area, or covariate, affecting almost all households. They may be rapid-onset (like a flood or earthquake), or slow-onset (like drought). We saw that many shocks have specific geographic patterns and affect specific subsets of the population. One way to characterize the policy responses warranted by these different types of shock is to classify shocks in terms of the average loss and share of population affected. The product of these two numbers is proportional to the total economic loss. Figure 7.1 plots average losses against share of population affected for all ten shock types. The earthquake is unsurprisingly an outlier, affecting 37 percent of our sample and causing an average loss of 12.6 percent of assets. Such massive and widespread disasters are rare, and demand a major coordinated humanitarian response. Governments will typically rely on external financing (whether drawn from humanitarian aid, contingent financing or reinsurance contracts) to cover the cost of such events. Scalable safety nets can be useful in delivering

Figure 7.1. Size and impact of shocks, and recommended policy responses



relief rapidly to a large part of the most vulnerable population. For widespread events with smaller losses, such as the blockade (bottom right box of figure 7.1), scalable cash transfers on a smaller scale, along with other macroeconomic stimulus programs, can help offset the impact. Government may be in a position to self-finance this relief from its contingency budget. At the top left of figure 7.1, we see shocks that hit more concentrated groups of the population but still have major impacts, such as death, flood/landslide, and other economic shocks. These shocks demand some form of assistance targeted to that group, which can come in the form of humanitarian relief (for example, in the case of flood) or in the form of social insurance (for death, job loss, etc.). Finally, at bottom left we see smaller shocks affecting smaller groups. Households can be protected against these shocks through targeted event- or industry-specific relief.

In order to be able to assist households to cope with shocks, Nepal's social protection programs need to be *adaptive*. There are two aspects to an adaptive safety net: (i) static programs that support all those who are chronically poor; and (ii) a mechanism to scale up assistance temporarily to help vulnerable households cope with shocks. Nepal needs to work on both aspects: expand the coverage of regular cash transfer programs, and develop a scalable safety net.

- **First, regular cash transfers to the chronically poor can help them build their resilience against shocks.** It is essential that all individuals who are eligible to receive static assistance (such as the old age pension) are enrolled and receiving it regularly. Nepal should also explore how to expand basic social assistance to chronically poor households who do not fall into the existing five target categories. The new Social Security Act (2018), which expands the target groups of the Social Security Allowances to include *economically poor*, provides the basis for this approach. To achieve this objective, a more nuanced targeting methodology will be needed to determine the broader set of economically poor and vulnerable households.
- **Second, scalable safety nets help both poor and nonpoor households cope with shocks.** In the aftermath of large covariate shocks, a scalable safety net can temporarily increase benefit amounts for existing beneficiaries (vertical expansion), and expand coverage to non-beneficiaries whose economic situation deteriorates beyond a given threshold (horizontal expansion). This requires policy makers to establish a capacity to identify and register applicants for assistance and assess their need, ideally through a social registry that is secure and accessible by the various government agencies involved in disaster response.

Mechanisms for coordination between local government, welfare and disaster management agencies should be established ahead of the shock. Social protection systems can provide a channel for delivering rapid cash and in-kind assistance, provided the response is well planned and coordinated. By investing in early warning systems such as flood and drought forecasting, government can better preposition cash and relief packages in disaster-prone areas and identify in advance which households are likely to be most vulnerable. The analysis in Chapters 4 and 5 can be adapted to identify such at-risk groups.

In addition to developing a scalable safety net, Nepal would benefit from developing and testing specific programs that can mitigate shocks and their impacts:

- Programs that help farmers **adapt to a changing climate** can reduce their exposure to losses from agricultural shocks. For instance, our findings regarding the impact of monsoon rainfall on

paddy farming incomes imply that better water management techniques may help protect households from losses in the dry season following negative monsoon rainfall shocks.

- **Risk management instruments** can cover losses from agricultural shocks specific to a particular crop or region (for instance, insurance against drought in the Karnali region).
- **Public works schemes**, such as the Prime Minister's Employment Programme, could be of benefit to farmers suffering from agricultural shocks, and others whose income patterns are seasonal and unpredictable.
- The **child grant program**, one of the Social Security Allowances, appears to be well-targeted and can help households better manage shocks without interrupting their children's education. This program could be a platform for vertical expansion in the event of a major covariate shock. At present it is limited to children under five in 13 of the poorest districts, and to all Dalit children, but the government plans to scale it up gradually to other parts of the country.
- Finally, given the evidence that borrowing is a major but costly coping strategy, households could benefit from initiatives to improve **access to affordable credit**, especially for poorer households and those in remote areas.

Investing in adaptive social protection not only protects households and promotes social inclusion, but also contributes to long-term economic growth. First, it can safeguard human and physical capital by ensuring households do not need to resort to negative coping strategies. Second, since there is evidence that households mitigate risk by restricting themselves to income-generating activities with lower and less volatile returns, the protection afforded by a reliable safety net can encourage households to take on higher-return and riskier activities (Lustig 2000). This can further support productive inclusion and economic growth.

Appendix

Table A.1. List of Wards (primary sampling units)

District Code	District	VDC Code	VDC Name	Ward No.
01	Taplejung	013	Khejenim	7
		029	Phakumba	8
		037	Sanwa	7
03	Ilam	004	Chameta	6
		007	Danabari	3
		012	Gajurmukhi	6
		019	Jogmai	7
		025	Mahamai	2
		030	NayaBazar	2
		034	PhikalBazar	3
		040	Samalbung	6
		047	Soyang	1
		04	Jhapa	001
002	Arjundhara			9
008	Budhabare			4
011	Charpane			1
016	Duwagadhi			4
019	Gauriganj			6
024	Jalthal			8
029	Khudunabari			8
034	Mahabhara			3
040	Pathariya			8
043	Sanischare			7
045	Shantinagar			4
048	Surunga			6
05	Morang	001	Amahibariyati	8
		006	Baijanathpur	5
		010	Belbari	3
		016	Dainiya	1
		019	Drabesh	7
		023	Hasandaha	7
		027	Itahara	3
		032	Katahari	2
		035	Keroun	4
		038	Madhumalla	9
		045	Pathari	1
		050	Rangeli	4
		053	Sijuwa	9
059	Takuwa	6		
064	Urlabari	1		
06	Sunsari	001	Aekamba	8
		007	Barahachhetra	3
		011	Bharaul	6
		019	Dhuskee	1
		023	Hanshposha	2
		029	Kaptanganj	9
		035	Madhyeharsahi	7
		038	Pakali	8

District Code	District	VDC Code	VDC Name	Ward No.
		043	RamganjBelgachhi	2
		049	Singiya	9
15	Saptari	005	Bakdhauwa	2
		017	Belhichapena	3
		027	Chhinnamasta	5
		039	Fatepur	3
		050	ItahariBishnupur	7
		061	Kanchanpur	7
		073	Madhawapur	1
		084	Mohanpur	2
		095	Portaha	5
		107	SimrahaSigiyoun	6
		07	Dhankuta	005
012	Chungwang			1
022	Kurule			5
029	Murtidhunga			7
036	Vedetar			9
10	Bhojpur	010	Bhulke	6
		020	Dewantar	4
		029	Jarayotar	5
		040	ManeBhanjyang	9
		051	SanoDumma	1
		063	Yangpang	7
13	Khotang	001	Ainselukharka	2
		012	BijayaKharka	1
		023	Dhitung	8
		032	Haunchur	9
		045	Lamidada	9
		058	Phedi	3
14	Udayapur	071	Sungdel	2
		006	Bashaha	1
		009	Chaudandi	8
		016	Jogidaha	8
		020	Laphagau	3
		028	Pokhari	8
		035	Sirise	7
		041	Thoksila	2
		044	Valayadanda	3
		11	Solukhumbu	002
014	Juming			1
025	NechaBatase			3
12	Okhaldhunga	033	Taptung	5
		011	Chyanam	8
		022	Ketuke	7
		033	Okhaldhunga	7
20	Sindhuli	045	Salleri	5
		003	Bahuntipung	3
		013	Dadiguranshe	2

District Code	District	VDC Code	VDC Name	Ward No.
		018	Hatpate	9
		024	Kalpabrishykhya	8
		031	Ladabhir(Mahendra)	3
		038	Nipane	3
		044	Ratnawati	4
		052	Tinkanya	1
22	Dolakha	012	Chilankha	1
		021	Japhe	5
		028	Katakuti	6
		037	Mali	5
17	Dhanusa	046	Sailungeswor	3
		008	BalahaKathal	5
		018	Bharatpur	2
		027	DeuriParbaha	2
		034	DubarikotHathalek	5
		043	Hariharpur	1
		055	Khariyani	5
		066	Makhanaha	5
		077	Patanuka	1
		084	SakhuwaMahendranagar	4
18	Mahottari	093	Suganikash	5
		102	Yagyabhumi	5
		008	Banouta	8
		015	Bijayalpura	8
		022	Ekarahiya	3
		029	Gonarpura	7
		038	Khuttapiparadhi	7
		045	Maisthan	5
19	Sarlahi	053	ParsaDewadh	7
		063	Sahasaula	3
		071	Sisawakataiya	4
		002	Arnaha	2
		010	Barahathawa	7
		020	Brahmapuri	1
		028	Ghurkauli	5
		036	Hajariya	6
		041	Hathiyon	2
		046	JanakiNagar	8
		056	Lalbandi	1
33	Bara	065	Manpur	9
		075	Parsa	7
		084	Raniganj	5
		094	Sisotiya	7
		004	Avab	9
		018	Banauli	3
		030	Dahiyar	7
		039	Haraiya	1
		047	JitpurBhawanipur	3
		059	Lipanimal	8
34	Parsa	068	Nijgadh	7
		077	Piparpati Parchrouta	3
		088	Ratanpuri	6
002	Amarpatti	3		

District Code	District	VDC Code	VDC Name	Ward No.		
		013	BeriyaBirta(Wa.Pu)	4		
		025	Dhaubini	9		
		041	Lahawarthakari	2		
		054	Mudali	8		
		067	SakhuwaPrasauni	4		
		080	Thori	3		
		23	Sindhupalchok*	002	Badegau	9
				010	Bhotasipa	5
017	Fatakshila			2		
026	Gunsakot			2		
035	Kadambas			3		
044	Mahankal			1		
051	Pagretar			2		
059	Sanusiruwari			8		
068	Tatopani			6		
077	ThuloSirubari			8		
24	Kavrepalanchok	005	BanakhuChor	8		
		017	ChyasingKharka	5		
		027	FalateBhulmu	9		
		036	JyamdiMandan	7		
		044	Kharelthok	8		
		052	Mahadevsthan Mandan	8		
		061	Nagre Gagarche	5		
		066	Panchkhal	8		
31	Makwanpur	076	SankhupatiChour	5		
		086	SipaliChilaune	5		
		003	Bajrabarahi	5		
		007	BhartaPundyadevi	1		
		012	Daman	1		
		016	Faparbari	5		
		019	Hatiya	2		
		024	Kankada	7		
		029	Manahari	3		
		034	PadamPokhari	1		
28	Nuwakot	037	Raksirang	2		
		040	ShreepurChhatiwan	7		
		004	Belkot	5		
		013	Chaughada	3		
		020	Ganeshthhan	4		
		027	Kakani	3		
		033	KholegaunKhanigau	7		
		040	Manakamana	3		
30	Dhading	047	Salme	8		
		057	Taruka	3		
		001	Aginchok	9		
		005	Bhumesthan	4		
		009	Darkha	7		
		014	Goganpani	3		
		019	Jyamrung	3		
		023	Khalte	5		
		028	Mahadevsthan	3		
		033	Nalang	2		
035	Nilkantha	5				

District Code	District	VDC Code	VDC Name	Ward No.
		037	Pida	6
		042	Sangkosh	4
		048	Thakre	3
36	Gorkha	008	Bhirkot	5
		017	Darbhung	8
		026	Ghyachok	8
		047	Palumtar	7
		059	Tarkukot	7
37	Lamjung	004	Balungpani	1
		012	Bhote Odar	4
		021	Dhodeni	9
		036	Khudi	2
38	Tanahu	054	Sundarbazar	1
		001	Anbukhaireni	6
		007	Bhanu	2
		012	Chhang	9
		020	Dulegaunda	3
39	Syangja	024	Jamune	7
		030	Kotdarbar	8
		037	Ramjakot	1
		045	Tanahunsur	2
		008	Bhatkhola	7
		019	DarsingDahathum	1
43	Myagdi	026	Kaulmabarahachaur	6
		036	Nibuwakharka	6
		046	Rapakot	9
45	Baglung	055	Taksar	8
		002	Arthunge	4
		016	HisthanMandali	4
		032	RakhuBhagawati	8
		002	Amalachaur	5
46	Gulmi	012	Boharagaun	6
		019	Darling	2
		027	Hatiya	3
		038	Narayansthan	8
		049	Resh	2
47	Palpa	002	Aaglung	9
		012	Bajhketeria	8
		023	Darling	4
		035	Gaidakot	2
		047	IsmaRajasthal	2
		059	Musikot	1
		071	Shantipur	1
		076	ThuloLumpek	9
48	Nawalparasi	43	Hastichour	5
		009	Birkot	7
		020	Dobhan	1
		029	Hungi	7
		041	Khyaha	6
		053	Rampur	1
		064	Timure	6
		003	Amraut	9
		009	Bhujhawa	7

District Code	District	VDC Code	VDC Name	Ward No.
		014	Deurali	5
		019	Dibyapuri	7
		021	Gaidakot	4
		024	Guthisuryapura	8
		031	Kawaswoti	1
		035	Kumarwanti	1
		038	Makar	4
		043	Narayani	2
		046	Pakalihawa	8
		051	Pragatinagar	1
		054	Rakachuli	8
		062	Rupauliya	3
		065	Shivmandir	6
		068	Sunwal	4
49	Rupandehi	070	Tamasariya	5
		001	Aama	6
		005	Bagaha	5
		011	Bisunpura	4
		018	DayaNagar	2
		019	Devadaha	9
		022	Dudharakchhe	9
		027	Gonaha	6
		032	Kamahariya	9
		035	Kerani	3
		039	Madhbaliya	5
		043	Makrahar	9
		049	Padsari	1
		052	Parroha	5
53	Rolpa	057	Rudrapur	2
		059	Saljhundi	9
		062	ShankarNagar	7
		067	SourahaPharsatika	5
		071	Tikuligadh	5
		007	Dubidanda	5
		015	Gumchal	3
54	Rukum	024	Jungar	3
		031	Liwang	6
		037	Pang	1
		045	Talabang	3
		001	Aathbisdandagaun	5
		006	Bijayaswori (Chaurjahari)	8
61	Jajarkot	013	Ghetma	7
		021	Kol	8
		027	Khalanga	4
		034	Rangsi	6
		042	Syalapakha	2
		005	Dandagaun	2
56	Dang	010	Jhapra	3
		015	Kortrang	7
		021	Punama	5
		029	Talegaun	7
		004	Chaulahi	1
		006	Dharna	6

District Code	District	VDC Code	VDC Name	Ward No.
		09	Gadhawa	6
		013	Halwar	1
		016	Hekuli	3
		019	Lalmatiya	9
		022	Manpur	8
		025	Pawan Nagar	5
		028	Rajpur	6
		031	Satbariya	6
		035	Sisahaniya	1
		038	Tarigaun	1
57	Banke	001	Bageswari	9
		005	Bejapur	2
		011	Chisapani	1
		016	Indrapur	7
		022	Khajurakhurda	2
		025	Kohalpur	3
		027	Mahadevpuri	6
		031	Naubasta	3
		035	Piprahawa	2
		039	Rajhena	5
043	Sitapur	5		
047	Udayapur	8		
71	Kailali	001	Baliya	7
		003	Beladevipur	3
		005	Boniya	9
		007	Chaumala	4
		009	Darakh	5
		012	Durgauli	3
		014	Geta	6
		016	Hasuliya	9
		019	Khailad	5
		023	Malakheti	1
		024	Masuriya	4
		027	Narayanpur	6
		031	Pathariya	4
		033	Phulwari	7
		035	Ramsikhar Jhala	7
037	Sadepani	9		
040	Sugarkhal	2		
044	Urma	3		
59	Surkhet	006	Bidyapur	6
		012	Dandakhali	9
		020	Gumi	5
		025	Kalyan	9
		030	Latikoili	8
		034	Maintara	3
		038	Neta	9
		046	Sahare	5
050	Tatopani	9		
60	Dailekh	004	Badalamji	4
		012	Chamunda	5
		020	Jambukandh	4
		028	Lakandra	2

District Code	District	VDC Code	VDC Name	Ward No.
		036	Naule Katuwal	1
		045	Rakam Karnali	6
		053	Sinhasain	7
64	Kalikot	001	Badalkot	5
		011	Lalutantikot	4
		019	Odanaku	1
		029	Sukatiya	1
63	Jumla	008	Dillichaur	6
		020	Mahat	7
67	Bajura	006	Bramhatola	7
		015	Jugada	7
		023	Martadi	1
70	Doti	007	Chhapali	2
		018	Ganjari	8
		029	Khirsain	2
		037	Mudabhara	7
		048	Tikhatar	9
69	Achham	008	Bhagyaswori	4
		020	Devasthan	3
		031	Jalapadevi	5
		043	Kushkot	3
		052	Nandegada	8
		063	Santada	1
74	Baitadi	073	Turmakhad	4
		007	Bisalpur	2
		018	Durgasthan	4
		029	Kotila	8
		040	Nagarjun	2
		050	Sarmali	1
68	Bajhang	060	Sreekot	1
		003	Bhamchaur	1
		012	Deulekh	1
		022	Khiratadi	4
		033	Maulali	4
75	Darchula	042	Sainpasela	9
		007	Dattu	9
		019	Hunainath	2
		029	Pipalchauri	2
041	Uku	6		

Table A.2. Contents of Household Questionnaire

Cover Page, Informed Consent Protocol

Section 1: Household Roster

Head and member in the household, relation to HH head, sex, age, citizenship, district of birth, marital status, caste/ethnicity. Information was also collected about economically connected but non-resident migrants.

Section 2: Education

Attended, School/Institution Type, Grade Completed, Scholarship, Spending On Education

Section 3: Health

Disability, Illness, Mode of Treatment, Expenses, Diarrhoea And ORS

Section 4. Housing and Access to Facilities

Occupation, rooms, construction materials, plot type, occupancy status, drinking water, toilet, type, energy, fuel for cooking, telephone, TV, etc.

Market, nearest bank, nearest paved road,

Section 5: Food Expenses and Home Production

Food Consumption, Spending on Food, Purchase and Home Production

Section 6: Non-food Expenditures and Inventory of Durable Goods

Part A: Frequent non-food expenditures

Part B: Infrequent non-food expenditures

Part C: Durable goods

Section 7: Jobs and Time Use

Wage employment and self-employment

Section 8: Wage Jobs

For those working in agriculture or non-agriculture sectors on wage or salary basis

Monthly or annual salaried job (Agriculture Sector)

Monthly or annual salaried job (Non-Agriculture Sector)

Section 9: Farming and Livestock

Land holding status, number of plots, type of land, price of land, use of land and type of irrigation (season-wise)

Production and uses of crops, use of improved variety of seeds, fertilizers, insecticides and pesticides (season-wise), farm cost in dry and wet seasons, income from and expenditure on agriculture,

Livestock owned and sold, income from and expenditure on livestock, farming assets and extension utilities

Section 10: Non-agriculture Enterprises/Activities

Non agriculture enterprises owned by the household, people involved in, expenses and income

Section 11: Migration

Migration status of people ages 10 years and older in the household; gender, education of migrants; destinations, reasons of migration, works/jobs involved; earnings and remittance; use of remittance money;

Section 12: Credit, Savings and Financial Assets

Lending or borrowing and outstanding loans of the household, amount, lender/borrower, purpose, terms of the loans, etc.

Financial assets, i.e. bank deposit or cash, the household owns,

Section 13: Private Assistance

Gifts and transfer income sent and received, the sender or receiver, reason or use of transfer

Gifts and transfers from I/NGOs, Community organizations

Section 14: Public Assistance

Cash assistance: frequency, amount, mode of transfer, satisfaction/grievances

In-kind assistance: frequency, cash value, grievance

Public works: participation, earning, grievances

Section 15: Shocks

Occurrence of any shocks during past 24 months, loss and monetary value, coping strategies,

Psychosocial support

Section 16: Anthropometrics (for children less than 5 years)

Birth certification, age, measurement of weight, height and arm.

Section 17: Perception on Respondent Intent and Attention

Table A.3. Contents of Community Questionnaire

Section 1. Respondent details

Age, sex, level of education, positions held in the community, and years of residence in the community

Section 2. Community characteristics

Major castes and ethnicities represented in the community, migration trends, condition of roads, types of transport available, distance to the nearest urban centre, VDC and DDC offices

Section 3. Access to facilities

Distance to the facilities available to the community such as schools, health posts, hospitals, birthing centre, bank and cooperative

Section 4. Educational facilities

Details on government schools serving the community, including qualifications of principal and teachers, teacher-student ratio, presence of school feeding programme, and access to drinking water and toilet facilities

Section 5. Community shocks, household shocks

Information on major shocks such as earthquake, flood, fire, landslide and drought, experienced by the community or households in the past 10 years; frequency of such shocks; and support (formal and informal) provided to the victims

Section 6. Market price

Prices per unit of 67 major commodities (where available in community)

Table A.4. Baseline Summary Statistics, Wave 1 (2016)

	Mountain	Hill	Terai	National	NLSS (National*)
Household Size	5.1	4.8	4.9	4.8	5
Age of Household Head					
15–24	3.3	3.1	1.7	2.3	3.4
25–34	15.2	14.7	14.6	14.5	17.5
35–44	25.0	21.0	24.2	23.0	25.0
45–54	24.3	23.7	26.4	25.2	22.6
55–64	22.2	20.3	20.3	20.6	18.4
65+	10.0	17.3	12.8	14.4	12.9
Female-headed household	16.2	21.6	18.4	19.4	26.5
Education of Household Head					
None or Preschool	48.0	42.1	43.2	43.1	54.7
Class 1–3	9.0	10.7	7.9	9.1	10.3
Class 4–6	14.7	17.4	16.6	16.7	13.4
Class 7–9	11.2	11.9	13.4	12.6	9.8
Class 10 to Intermediate	13.3	16.0	16.9	16.3	10.7
Bachelors or Higher	3.8	2.0	2.1	2.2	1.0
Language					
Nepali	65.4	72.2	34.9	51.9	55.7
Maithili	0.0	0.0	25.6	15.4	13.4
Tharu	0.0	0.4	15.5	6.8	4.7
Tamang	11.3	8.2	1.0	4.4	5.4
Bhojpuri	0.0	0.0	11.9	6.3	7.7
Magar	0.5	6.0	2.4	3.7	2.1
Newar	2.5	1.4	0.7	1.2	1.8
Others	20.3	11.8	8.1	10.4	9.3
Religion					
Hindu	72.6	84.3	90.7	86.7	84.4
Buddhist	18.5	9.7	3.7	7.2	8.0
Islam	0.0	0.2	4.3	2.5	3.1
Kirant	5.7	2.1	0.5	1.6	2.9
Others	3.2	3.7	0.9	2.1	1.7
Caste/Ethnicity					
Brahmin/Chhetri	48.8	43.4	23.8	33.9	31.8
Dalit	11.1	11.6	11.7	11.6	13.6
Newar	3.5	3.6	1.4	2.5	4.2
Muslim	0.0	0.2	4.9	2.6	3.4
Adibasi/Janjati	33.3	37.5	29.0	32.8	32.0
Other/None/Refused to Answer	3.2	3.7	29.2	16.6	15.0
Households with a migrant	37.5	47.5	37.6	41.8	55.0

*Note: Staff calculations based on NLSS-III rural sample (Government of Nepal 2011) shown for comparison purposes. Results may differ due to comparison of different time periods, as well as from sampling error and survey design differences.

Table A.5. Correlates of Household Participation in Public Assistance Programs

	Cash transfers		Public works	
	(1)	(2)	(1)	(2)
Any shock in past year		0.089*** (0.034)		0.107 (0.094)
Earthquake affected		0.383*** (0.049)		0.282* (0.165)
Quintile (poorest omitted)				
Second poorest	-0.153*** (0.042)	-0.175*** (0.043)	0.014 (0.131)	0.022 (0.131)
Middle quintile	-0.264*** (0.051)	-0.292*** (0.050)	-0.105 (0.160)	-0.107 (0.161)
Second richest	-0.386*** (0.055)	-0.405*** (0.054)	-0.461*** (0.171)	-0.464*** (0.173)
Richest quintile	-0.659*** (0.062)	-0.649*** (0.062)	-0.757*** (0.183)	-0.757*** (0.185)
Household size	0.089*** (0.010)	0.100*** (0.010)	0.041* (0.022)	0.045** (0.019)
Female head	0.784*** (0.044)	0.836*** (0.043)	0.149 (0.094)	0.150* (0.089)
Disabled member	0.432*** (0.067)	0.452*** (0.067)	0.208* (0.112)	0.223** (0.107)
Child in household	-0.292*** (0.035)	-0.294*** (0.037)	0.014 (0.089)	0.022 (0.085)
Elderly (65+) in household	1.987*** (0.046)	2.013*** (0.047)	-0.029 (0.093)	-0.036 (0.090)
Agric. wage worker in household	-0.146*** (0.049)	-0.126** (0.052)	0.156 (0.095)	0.159* (0.096)
Agric. self-employed worker in hh	0.076* (0.041)	0.061 (0.042)	0.227* (0.119)	0.222* (0.118)
Wage worker in household	0.034 (0.032)	0.037 (0.033)	0.217** (0.091)	0.228** (0.092)
Migrant sending	-0.167*** (0.032)	-0.168*** (0.033)	-0.036 (0.074)	-0.050 (0.074)
Has bank account	0.121*** (0.035)	0.090*** (0.032)	-0.227** (0.113)	-0.268** (0.107)
Year dummies	Yes	Yes	Yes	Yes
No. of observations	18,056	17,531	18,056	17,531
Pseudo R ²	0.2754	0.2913	0.1551	0.1625

Note: Results from probit regression; dependent variable is binary variable indicating whether the household received public cash transfers (first two columns) or participated in public works (third and fourth columns). Standard errors in parentheses, adjusted for clustering within PSU. ***, ** and * denote significance at 1%, 5% and 10% level respectively.

Table A.6. Correlates of Shock Reports

	Earth- quake (2015 only)	Flood/ Landslide	Drought	Riot/ Blockade	Fire/Hail/ Lightning	Pest/ Harvest Loss	Livestock Loss	Death	Illness/ Injury	Other Shocks
Female head	-0.085 (0.065)	-0.020 (0.078)	0.078 (0.053)	0.020 (0.056)	-0.112* (0.055)	-0.153** (0.056)	-0.105 (0.056)	0.379*** (0.061)	0.013 (0.036)	0.057 (0.091)
Disabled member in households	-0.086 (0.094)	-0.007 (0.113)	0.042 (0.080)	0.146 (0.089)	-0.164 (0.096)	0.056 (0.084)	-0.017 (0.100)	0.112 (0.101)	0.183** (0.062)	0.248 (0.136)
Household size	-0.035** (0.013)	0.032* (0.013)	0.037*** (0.010)	0.012 (0.012)	0.047*** (0.010)	0.003 (0.010)	0.005 (0.011)	-0.015 (0.014)	0.028*** (0.007)	-0.045* (0.019)
Wage job worker in household	-0.116* (0.056)	-0.080 (0.056)	0.054 (0.040)	0.211*** (0.048)	-0.167*** (0.046)	-0.009 (0.043)	-0.030 (0.047)	-0.019 (0.053)	0.030 (0.028)	0.105 (0.073)
Self-job worker in household	-0.252*** (0.076)	0.032 (0.076)	0.013 (0.056)	0.425*** (0.067)	-0.060 (0.063)	-0.047 (0.059)	0.046 (0.061)	0.047 (0.067)	0.070 (0.037)	0.193* (0.086)
Farm owner in household	-0.131 (0.070)	0.446*** (0.098)	0.992*** (0.089)	-0.155** (0.056)	0.415*** (0.100)	0.762*** (0.106)	0.449*** (0.102)	-0.136* (0.068)	0.076 (0.042)	0.077 (0.091)
Farm worker in household	-0.069 (0.096)	0.057 (0.093)	0.054 (0.081)	0.076 (0.078)	0.127 (0.088)	0.175* (0.078)	0.014 (0.086)	-0.222* (0.101)	0.002 (0.050)	-0.103 (0.136)
Head grade (None or Preschool omitted)										
Class1-3	0.083 (0.075)	0.209* (0.087)	0.038 (0.067)	0.089 (0.070)	-0.029 (0.074)	-0.038 (0.067)	-0.058 (0.068)	-0.108 (0.085)	0.015 (0.048)	0.108 (0.111)
Class4-6	0.066 (0.063)	-0.016 (0.084)	0.019 (0.055)	0.084 (0.060)	-0.001 (0.063)	-0.108 (0.062)	-0.089 (0.063)	-0.116 (0.074)	0.049 (0.040)	-0.004 (0.112)
Class7-9	0.087 (0.078)	0.042 (0.093)	-0.092 (0.066)	0.029 (0.069)	0.126 (0.069)	0.019 (0.069)	-0.120 (0.075)	-0.066 (0.083)	0.001 (0.048)	0.074 (0.112)
Class10, SLC	0.097 (0.091)	0.127 (0.094)	0.029 (0.064)	-0.036 (0.070)	0.127 (0.071)	0.037 (0.066)	-0.108 (0.073)	0.028 (0.084)	0.037 (0.046)	0.052 (0.118)
Bachelor or higher	-0.130 (0.153)	0.306 (0.177)	0.113 (0.127)	-0.093 (0.139)	0.339** (0.121)	0.235 (0.128)	-0.457* (0.206)	0.091 (0.166)	0.194* (0.092)	0.171 (0.217)
Head age (15-24 Omitted)										
25-34	0.160 (0.149)	-0.205 (0.180)	-0.028 (0.122)	0.007 (0.139)	0.400* (0.156)	0.089 (0.162)	0.035 (0.153)	-0.223 (0.148)	0.082 (0.096)	0.156 (0.272)
35-44	0.205 (0.152)	-0.204 (0.176)	-0.019 (0.122)	-0.066 (0.137)	0.294 (0.157)	0.155 (0.158)	0.070 (0.152)	-0.122 (0.144)	0.179 (0.095)	0.185 (0.267)
45-54	0.087 (0.155)	-0.119 (0.176)	0.022 (0.123)	-0.109 (0.138)	0.368* (0.159)	0.261 (0.159)	0.101 (0.153)	-0.079 (0.146)	0.183 (0.096)	0.137 (0.271)
55-64	0.217 (0.152)	-0.163 (0.181)	-0.023 (0.127)	-0.017 (0.140)	0.434** (0.160)	0.199 (0.162)	0.096 (0.158)	-0.020 (0.151)	0.299** (0.098)	0.200 (0.274)
65+	0.112 (0.170)	-0.262 (0.191)	0.032 (0.130)	-0.129 (0.145)	0.279 (0.167)	0.194 (0.167)	-0.140 (0.164)	-0.099 (0.160)	0.353*** (0.100)	0.121 (0.287)
Asset quintile (omitted poorest)										
Quintile 2	0.021 (0.082)	-0.154* (0.077)	-0.188** (0.058)	-0.265*** (0.073)	-0.219*** (0.055)	-0.013 (0.063)	-0.090 (0.058)	-0.013 (0.069)	-0.206*** (0.040)	-0.024 (0.108)
Quintile 3	0.103 (0.093)	-0.069 (0.082)	-0.200*** (0.060)	-0.207** (0.070)	-0.246*** (0.063)	0.053 (0.064)	-0.112 (0.063)	-0.097 (0.073)	-0.272*** (0.043)	-0.037 (0.111)

Quintile 4	0.135 (0.108)	-0.295** (0.095)	-0.214** (0.067)	-0.226** (0.072)	-0.158* (0.075)	0.138* (0.069)	-0.174* (0.076)	-0.040 (0.078)	-0.234*** (0.047)	0.056 (0.118)
Richest	0.111 (0.131)	-0.502*** (0.119)	-0.356*** (0.085)	-0.172* (0.081)	-0.330** (0.106)	0.001 (0.087)	-0.266** (0.103)	-0.221* (0.103)	-0.297*** (0.057)	-0.148 (0.139)
Ethnic group (omitted Brahmin/Chhetri)										
Dalit	0.352** (0.126)	-0.102 (0.093)	-0.208** (0.065)	-0.082 (0.075)	0.011 (0.060)	-0.141* (0.071)	-0.101 (0.071)	0.014 (0.081)	0.035 (0.045)	-0.008 (0.117)
Newar	0.737** (0.236)	-0.793* (0.373)	-0.329* (0.164)	-0.452** (0.156)	-0.140 (0.171)	-0.050 (0.110)	0.147 (0.107)	0.071 (0.142)	-0.033 (0.086)	0.096 (0.178)
Muslim	0.317 (0.266)	-0.067 (0.175)	-0.093 (0.179)	0.363** (0.134)		-0.225 (0.234)	-0.398 (0.357)	-0.208 (0.227)	-0.013 (0.099)	0.141 (0.222)
Adivasi/Janjati	0.281*** (0.084)	-0.117 (0.067)	-0.398*** (0.048)	-0.026 (0.050)	-0.175*** (0.051)	0.008 (0.047)	-0.056 (0.051)	0.067 (0.056)	-0.130*** (0.034)	-0.050 (0.086)
Other/None/Refused	0.333** (0.116)	-0.168 (0.093)	-0.170* (0.077)	-0.173* (0.073)	0.003 (0.089)	-0.127 (0.086)	-0.125 (0.100)	0.031 (0.093)	0.048 (0.050)	-0.168 (0.128)
Remoteness quintile to district center (omitted least remote)										
Quintile 2	-0.025 (0.127)	0.149 (0.083)	-0.131 (0.068)	0.157** (0.060)	0.324*** (0.097)	0.042 (0.074)	0.255** (0.094)	0.096 (0.076)	0.053 (0.043)	-0.122 (0.098)
Quintile 3	0.081 (0.137)	0.131 (0.092)	-0.096 (0.070)	0.208** (0.064)	0.325*** (0.093)	0.216** (0.070)	0.271** (0.090)	0.018 (0.078)	-0.042 (0.045)	-0.001 (0.098)
Quintile 4	-0.000 (0.157)	0.035 (0.105)	-0.027 (0.071)	-0.022 (0.066)	0.239* (0.096)	0.263*** (0.071)	0.269** (0.092)	-0.043 (0.081)	-0.001 (0.047)	-0.226* (0.115)
Most remote	-0.461* (0.192)	0.318** (0.117)	0.009 (0.080)	-0.362*** (0.102)	0.543*** (0.098)	0.439*** (0.078)	0.336*** (0.098)	0.071 (0.087)	0.022 (0.053)	-0.294 (0.156)
Municipality	0.057 (0.105)	-0.148 (0.076)	-0.193*** (0.053)	-0.162** (0.051)	0.169** (0.054)	0.130** (0.050)	-0.057 (0.060)	0.001 (0.058)	-0.030 (0.036)	-0.051 (0.085)
Strata (Omitted Mountain)										
Far Western Hill		-1.103*** (0.271)	0.240** (0.087)		0.252*** (0.073)	0.350** (0.135)	0.219* (0.098)	-0.095 (0.130)	-0.011 (0.074)	-0.451 (0.328)
Mid Western Hill	-2.190*** (0.265)	0.254* (0.107)	0.599*** (0.070)	0.671*** (0.147)	0.444*** (0.060)	0.957*** (0.106)	0.267*** (0.080)	0.011 (0.101)	0.934*** (0.057)	-0.148 (0.168)
Western Hill	0.197 (0.232)	0.185 (0.118)	-0.246** (0.080)	1.842*** (0.182)	-0.142 (0.074)	1.221*** (0.105)	0.040 (0.087)	0.080 (0.096)	0.494*** (0.058)	-0.052 (0.151)
Central Hill	0.875*** (0.247)	-0.461** (0.143)	-0.738*** (0.104)	0.0791 (0.162)	-0.696*** (0.097)	0.515*** (0.113)	0.171* (0.080)	-0.008 (0.095)	0.133* (0.061)	-0.485* (0.207)
Eastern Hill	-0.820*** (0.244)	-0.325* (0.144)	-0.342*** (0.086)	1.498*** (0.176)	-0.512*** (0.090)	0.567*** (0.114)	0.205* (0.085)	0.069 (0.099)	0.368*** (0.062)	0.105 (0.144)
Far Western Terai		0.069 (0.196)	-0.031 (0.105)	1.973*** (0.199)	-0.160 (0.115)	0.640*** (0.137)	-0.187 (0.144)	-0.211 (0.152)	0.132 (0.089)	0.357* (0.171)
Mid Western Terai	-2.064*** (0.277)	0.827*** (0.140)	0.404*** (0.097)	2.328*** (0.219)	-0.168 (0.110)	0.743*** (0.132)	0.082 (0.116)	0.027 (0.120)	0.261*** (0.078)	0.140 (0.171)
Western Terai	-0.399 (0.242)	0.504*** (0.141)	-0.023 (0.102)	2.672*** (0.240)	-0.870*** (0.154)	0.528*** (0.133)	-0.138 (0.127)	-0.021 (0.125)	-0.201* (0.078)	-0.245 (0.218)
Central Terai	-0.504* (0.256)	0.583*** (0.113)	-0.566*** (0.113)	1.133*** (0.161)	-1.171*** (0.181)	0.372** (0.133)	-1.257*** (0.306)	-0.087 (0.120)	0.001 (0.072)	-0.117 (0.190)
Eastern Terai	-1.062***	0.075	-1.139***	0.650***	-0.807***	0.353**	-0.390**	-0.0436	-0.286***	0.161

Year (2015-2016 omitted)	(0.253)	(0.140)	(0.135)	(0.146)	(0.133)	(0.130)	(0.127)	(0.108)	(0.073)	(0.154)
2016-2017		-0.404*** (0.062)	-1.032*** (0.048)	-3.184*** (0.307)	0.297*** (0.048)	-0.306*** (0.048)	0.138** (0.048)	0.195** (0.060)	0.697*** (0.032)	-0.360*** (0.084)
2017-2018		-0.245*** (0.059)	-1.536*** (0.065)		-0.242*** (0.057)	-0.068 (0.044)	-0.125* (0.053)	0.227*** (0.060)	0.124*** (0.034)	-0.550*** (0.090)
No. of obs.	5,377	17,854	17,854	11,335	17,512	17,854	17,854	17,854	17,854	17,854

Note: Results from probit regression (first column) and random-effects probit regression (the other columns). Robust standard errors in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level respectively.

Table A.7. Coping strategies reported by year

Coping strategy	2015		2016		2017		2018	
	No. hh	%						
Spent savings	1,099	38.9	1,884	59.5	1,400	69.9	759	56.5
Borrowed	597	21.0	615	19.3	604	29.8	312	22.8
Sold assets	131	5.0	217	6.2	62	3.2	45	3.2
Other financial coping mechanisms	6	0.2	21	0.6	16	0.7	12	1.1
Cut back on food consumption	357	13.2	831	28.0	183	8.8	90	7.7
Cut back on non food consumption	336	12.8	706	23.3	135	6.5	44	3.5
Withdrew/postponed admission/transferred to public school	157	6.8	18	0.7	7	0.3	16	1.6
Children's education was interrupted	535	21.7	417	13.0	35	1.7	40	3.3
Shifted to cheaper school supplies/reduced allowance	40	1.6	63	2.2	17	0.8	8	0.6
Assistance from relatives	56	2.1	42	1.3	63	3.2	25	1.9
Assistance from friends/neighbors	90	3.2	22	0.7	32	1.6	11	0.8
Assistance from government	859	26.2	9	0.3	9	0.5	8	0.6
Assistance from others (including church/NGO)	581	17.4	13	0.4	10	0.5	20	1.6
Worked more	133	5.4	137	4.4	79	3.7	40	3.1
Additional members started working	73	2.9	117	3.7	29	1.4	30	2.7
Children went to work	4	0.1	7	0.2	3	0.2	1	0.1
Other employment	5	0.1	7	0.2	4	0.2	2	0.2
Moved in with relatives	35	1.5	33	1.1	6	0.3	6	0.5
Relatives moved in	78	3.3	52	1.8	3	0.2	2	0.1
Relatives moved away in search of work	17	0.7	34	1.1	10	0.5	21	1.9
Other including postponed childbearing	9	0.3	6	0.2	3	0.2	6	0.4
Households reporting any shock	2,640		3,192		2,017		1,343	
Households reporting any shock with loss	1,573		1,453		1,260		843	

Notes: Figures reported are unweighted number of households (first column), and population-weighted percentage of households reporting the shock (second column). In the analysis above, we combine some of the above strategies. 'Cut school' includes 'Withdrew/postponed admission...', 'Children's education was interrupted', 'Shifted to cheaper school supplies...' and 'Children went to work'; 'Relatives/friends support' includes 'Assistance from relatives' and 'Assistance from friends/neighbors'; and 'Government, NGO support' includes 'Assistance from government' and 'Assistance from others (including church/NGO)'. 'Other' includes 'other financial coping', plus those from 'worked more' onwards.

Table A.8. Correlates of Coping Strategies

	Spent savings	Borrowed	Sold assets	Cut food exp.	Cut non-food exp.	Cut school	Relatives, friends support	Gov, NGO support	Housing grant
Loss as proportion of asset (omitted 0-1%)									
1-5%	0.257*** (0.039)	0.756*** (0.048)	0.0617 (0.071)	0.211*** (0.049)	0.240*** (0.053)	0.118 (0.072)	0.266* (0.115)	0.178 (0.212)	0.132*** (0.035)
5-10%	0.263*** (0.062)	1.091*** (0.070)	0.405*** (0.104)	0.174* (0.081)	0.333*** (0.086)	0.240 (0.124)	0.782*** (0.138)	0.497 (0.366)	0.257*** (0.043)
10-20%	0.277*** (0.081)	1.237*** (0.086)	0.469*** (0.131)	0.214* (0.099)	0.448*** (0.103)	0.786*** (0.144)	1.103*** (0.157)	0.778 (0.498)	0.256*** (0.047)
20-50%	0.204* (0.098)	1.421*** (0.101)	0.420** (0.161)	0.283* (0.124)	0.489*** (0.128)	0.561** (0.187)	0.578** (0.203)	0.850 (0.517)	0.365*** (0.051)
50%-	0.0400 (0.154)	1.275*** (0.154)	0.614* (0.269)	0.580** (0.178)	0.409* (0.189)	0.122 (0.287)	1.422*** (0.228)	0.961 (0.547)	0.327*** (0.052)
Asset Quintile (omitted poorest)									
Second	0.012 (0.051)	-0.076 (0.055)	-0.081 (0.088)	-0.230*** (0.066)	-0.194** (0.070)	-0.143 (0.112)	0.082 (0.116)	-0.122 (0.195)	0.012 (0.026)
Middle	0.033 (0.055)	-0.172** (0.061)	-0.093 (0.091)	-0.402*** (0.070)	-0.323*** (0.072)	-0.047 (0.112)	-0.012 (0.134)	-0.213 (0.248)	-0.021 (0.027)
Fourth	0.208*** (0.061)	-0.099 (0.068)	-0.262* (0.115)	-0.448*** (0.078)	-0.445*** (0.082)	0.113 (0.116)	-0.099 (0.153)	-0.130 (0.218)	-0.044 (0.033)
Richest	0.257*** (0.072)	-0.260** (0.084)	-0.302* (0.142)	-0.759*** (0.102)	-0.684*** (0.105)	0.265* (0.121)	0.066 (0.185)	-0.220 (0.301)	-0.089*** (0.034)
Ethnic group (omitted Brahmin/Chhetri)									
Dalit	-0.074 (0.054)	-0.012 (0.061)	-0.030 (0.103)	0.037 (0.065)	-0.077 (0.074)	0.078 (0.101)	0.208 (0.143)	0.191 (0.209)	-0.052* (0.031)
Newar	0.255* (0.118)	-0.226 (0.148)	-0.109 (0.204)	-0.399* (0.176)	-0.312 (0.172)	0.167 (0.251)	0.173 (0.238)	-0.419 (0.429)	0.028 (0.038)
Muslim	-0.058 (0.122)	-0.300 (0.154)	-0.020 (0.285)	-0.206 (0.146)	0.097 (0.148)	-0.255 (0.191)	-0.029 (0.353)	0.285 (0.468)	-0.146** (0.065)
Adivasi/Janjati	0.114** (0.041)	-0.093* (0.047)	-0.081 (0.074)	-0.179*** (0.051)	-0.105 (0.054)	0.017 (0.074)	0.257* (0.104)	0.071 (0.144)	-0.025 (0.024)
Other/None/ Refused	-0.053 (0.065)	-0.094 (0.076)	0.079 (0.129)	-0.123 (0.081)	-0.174* (0.087)	0.143 (0.098)	0.408* (0.160)	0.097 (0.242)	-0.065** (0.028)
Remoteness quintile (omitted least remote)									
Quintile 2	0.063 (0.058)	-0.070 (0.067)	-0.027 (0.115)	0.017 (0.070)	0.069 (0.072)	-0.062 (0.082)	-0.057 (0.132)	0.105 (0.165)	-0.005 (0.038)
Quintile 3	-0.010 (0.059)	-0.034 (0.067)	-0.030 (0.111)	0.036 (0.070)	0.045 (0.074)	-0.191* (0.091)	-0.252 (0.143)	0.113 (0.187)	0.027 (0.036)
Quintile 4	-0.010 (0.060)	0.015 (0.070)	0.177 (0.110)	0.050 (0.077)	-0.048 (0.081)	-0.488*** (0.108)	-0.195 (0.145)	0.101 (0.195)	-0.009 (0.040)
Remotest	-0.172** (0.066)	-0.048 (0.078)	0.122 (0.130)	0.026 (0.088)	0.026 (0.096)	-0.179 (0.149)	-0.359* (0.165)	-0.127 (0.226)	-0.052 (0.047)
Municipality	0.036 (0.044)	0.037 (0.052)	-0.059 (0.086)	-0.179** (0.059)	-0.021 (0.061)	-0.129 (0.073)	-0.047 (0.112)	0.147 (0.172)	-0.015 (0.029)
Household size	0.003 (0.009)	0.035*** (0.010)	-0.033 (0.018)	0.026* (0.011)	0.023 (0.012)	0.078*** (0.015)	-0.090*** (0.026)	-0.057 (0.042)	-0.013*** (0.005)
Female head	-0.097* (0.044)	0.086 (0.048)	-0.021 (0.080)	-0.067 (0.054)	0.014 (0.057)	0.345*** (0.076)	0.181 (0.099)	-0.255 (0.192)	0.026 (0.022)
Farm owner in household	-0.025 (0.055)	0.006 (0.063)	0.281** (0.109)	-0.115 (0.064)	-0.177** (0.066)	-0.035 (0.081)	-0.289* (0.123)	0.315 (0.252)	0.003 (0.023)
Farm worker in household	-0.044 (0.067)	0.142 (0.076)	0.028 (0.118)	0.014 (0.080)	0.119 (0.087)	0.241* (0.104)	-0.0111 (0.152)	0.072 (0.205)	0.018 (0.035)
More than one income	0.063 (0.069)	-0.002 (0.077)	0.060 (0.119)	0.135 (0.091)	0.014 (0.092)	0.342* (0.172)	-0.198 (0.141)	-0.090 (0.222)	0.042 (0.036)
Migrant-sending household	0.170*** (0.035)	-0.153*** (0.040)	-0.136* (0.064)	-0.059 (0.044)	-0.054 (0.047)	-0.165** (0.061)	-0.359*** (0.091)	-0.037 (0.117)	0.002 (0.017)
Has bank account	0.437*** (0.040)	-0.167*** (0.045)	0.131 (0.072)	0.125* (0.049)	0.248*** (0.051)	0.036 (0.065)	-0.055 (0.097)	-0.007 (0.132)	0.010 (0.020)
Received public assistance	0.029 (0.038)	0.008 (0.044)	0.028 (0.069)	0.068 (0.048)	0.070 (0.051)	-0.096 (0.071)	0.107 (0.088)	-0.051 (0.130)	0.012 (0.018)
Received private assistance	0.174 (0.117)	0.219 (0.120)	-0.240 (0.203)	0.463*** (0.119)	0.516*** (0.130)	-0.052 (0.221)	1.226*** (0.159)	0.479 (0.313)	0.016 (0.055)
Received NGO assistance	0.012 (0.094)	-0.243* (0.111)	-0.279 (0.173)	-0.095 (0.110)	-0.142 (0.116)	-0.525* (0.246)	0.303 (0.173)	1.591 (0.885)	0.171*** (0.024)
Year (2015-2016 omitted)									
2016-2017	0.382*** (0.043)	0.252*** (0.048)	-0.402*** (0.083)	-0.748*** (0.070)	-0.700*** (0.072)	-0.850*** (0.105)	0.465*** (0.111)	0.424 (0.279)	
2017-2018	-0.039 (0.046)	-0.027 (0.051)	-0.497*** (0.090)	-1.036*** (0.082)	-1.175*** (0.095)	-0.550*** (0.096)	-0.047 (0.117)	0.594 (0.351)	
No. of obs.	6,492	6,492	6,492	6,492	6,492	6,492	6,492	6,492	2,206

Note: Table reports the results from random-effect probit regressions of probability of coping strategy (in each column). Regressors are contemporaneous with shock reports. Robust estimator of variance is used. Standard errors in parentheses Sample for housing grant regression (final column) is households who reported earthquake in 2016, and uses 2016 characteristics. Dependent variable takes the value one if household received any housing grant payment from the government as of March 2019, and zero otherwise. Regressions include strata controls (not shown). ***, ** and * denote significance at 1%, 5% and 10% level respectively.

Table A.9. Correlates of Loans, Amount Borrowed and Interest Rate

	Log loan amount (per loan) (1)	Log total borrowing (per hh) (2)	Interest rate (maximum % rate paid, per hh)		
			(3)	(4)	(5)
Log loan amount			1.637*** (0.154)	1.604*** (0.149)	1.610*** (0.148)
Borrowed as coping strategy		0.148*** (0.023)		0.954*** (0.200)	0.950*** (0.201)
Source ('Comm./agric bank' omitted)					
Relatives/friends				1.882*** (0.184)	1.719*** (0.204)
NGOs/charity organizations				3.026*** (0.436)	2.869*** (0.450)
Landowner/employer/shop				0.771* (0.390)	0.604 (0.399)
Money lender				2.919*** (0.237)	2.746*** (0.256)
Grameen bank/co-op/ROSCA				1.071*** (0.168)	0.913*** (0.174)
Other source				0.762 (0.637)	0.632 (0.641)
Shocks					
Covariate shock in previous year	-0.041 (0.023)	-0.075** (0.025)	-0.0543 (0.229)	-0.198 (0.232)	-0.195 (0.233)
Idiosyncratic shock in previous year	0.109*** (0.016)	0.057** (0.018)	0.348* (0.148)	-0.030 (0.173)	-0.029 (0.173)
Asset quintile ('Poorest' omitted)					
Second poorest	0.058** (0.021)	0.090*** (0.022)	-0.189 (0.215)	-0.185 (0.213)	-0.186 (0.213)
Middle	0.091*** (0.026)	0.147*** (0.025)	-0.749** (0.240)	-0.752** (0.236)	-0.748** (0.237)
Second richest	0.194*** (0.031)	0.307*** (0.030)	-1.448*** (0.330)	-1.438*** (0.322)	-1.436*** (0.322)
Richest	0.409*** (0.048)	0.586*** (0.045)	-2.736*** (0.421)	-2.644*** (0.412)	-2.638*** (0.412)
Household Characteristics					
Household Size	0.013 (0.010)	0.031*** (0.008)	0.218** (0.079)	0.212** (0.076)	0.211** (0.076)
Female head	0.018 (0.038)	-0.065 (0.034)	0.656 (0.351)	0.537 (0.337)	0.539 (0.337)
HH has migrants	0.170*** (0.026)	0.245*** (0.023)	0.224 (0.238)	0.247 (0.232)	0.252 (0.232)
Has bank account	0.038* (0.018)	0.073*** (0.016)	-0.291 (0.154)	-0.295 (0.151)	-0.289 (0.151)
Ethnic group ('Brahmin' omitted)					
Dalit	-0.455*** (0.063)	-0.449*** (0.050)	3.102*** (0.560)	3.020*** (0.555)	3.011*** (0.554)
Newar	-0.102 (0.139)	-0.108 (0.123)	-0.683 (1.009)	-0.591 (1.006)	-0.594 (1.008)
Muslim	-0.390*** (0.112)	-0.364** (0.123)	2.953** (1.075)	2.674** (1.021)	2.634** (1.019)
Adivasi/Janajati	-0.332*** (0.052)	-0.317*** (0.041)	1.424** (0.451)	1.304** (0.445)	1.301** (0.444)
Other/Refused to answer	-0.384*** (0.061)	-0.358*** (0.051)	2.648*** (0.500)	2.520*** (0.494)	2.514*** (0.492)
New municipality	0.196** (0.068)	0.183*** (0.046)	-1.411* (0.586)	-1.190* (0.562)	-1.184* (0.561)
Remoteness Quintile ('Least remote' omitted)					
Quintile 2	-0.189** (0.072)	-0.180** (0.057)	-0.178 (0.765)	-0.187 (0.732)	-0.185 (0.732)
Quintile 3	-0.220** (0.074)	-0.207*** (0.057)	-0.191 (0.750)	-0.237 (0.721)	-0.235 (0.720)

Quintile 4	-0.222** (0.080)	-0.201*** (0.059)	1.049 (0.800)	0.985 (0.772)	0.980 (0.770)
Most remote	-0.394*** (0.105)	-0.366*** (0.0694)	4.924*** (0.949)	4.668*** (0.922)	4.661*** (0.922)
Collateral ('No collateral' omitted)					
Land					-0.529** (0.202)
Buildings/property					-0.017 (0.194)
Gold/silver					0.140 (0.416)
Personal guarantee/other					0.168 (0.134)
Year (2015-16 omitted)					
2016-17	0.185*** (0.019)	0.160*** (0.020)	0.938*** (0.224)	0.986*** (0.223)	0.985*** (0.224)
2017-18	0.469*** (0.023)	0.416*** (0.021)	1.383*** (0.226)	1.489*** (0.230)	1.487*** (0.231)
No. of observations	17,864	10,866	17,854	17,853	17,852

Note: First two columns are the results from random-effect regression. Cluster standard errors in parentheses. Third to fifth columns show the result of and random-effect probit regression; Robust estimator of variance is used and standard errors in parentheses. Regressions include strata controls (not shown). ***, ** and * denote significance at 1%, 5% and 10% level respectively.

Table A.10. Correlates of Remittance Receipt and Average Amount

	Random-effects probit	Heckman regression	
	(Received remittance)	Selection equation (Received remittance)	Log remittance received
Shock			
Earthquake in the past 2 years	0.107 (0.083)		0.157** (0.053)
Earthquake in the past 3 years	0.044 (0.085)		0.108* (0.053)
Earthquake in the past 4 years	0.049 (0.082)		0.015 (0.045)
Flood or Landslide	-0.139 (0.131)		-0.043 (0.101)
Drought	-0.005 (0.075)		-0.114* (0.058)
Fire, Hail or Lightning	0.095 (0.092)		-0.063 (0.075)
Pests, Plant Diseases and Post-Harvest Loss	-0.157 (0.091)		0.045 (0.072)
Livestock Loss	0.053 (0.098)		0.025 (0.080)
Riots/Blockade/Fuel Shortage/High Prices	0.037 (0.064)		-0.075 (0.053)
Death in the Family	-0.531*** (0.140)		-0.234* (0.096)
Disease or Injury in the Family	-0.055 (0.052)		0.001 (0.040)
Personal Economic Shocks	-0.221 (0.214)		-0.037 (0.167)
Household characteristics			
Female head	1.712*** (0.071)	0.905*** (0.024)	0.148* (0.066)
Farm owner in household	0.154* (0.060)	0.137*** (0.031)	0.047 (0.041)
Farm worker in household	-0.094 (0.066)	-0.041 (0.039)	-0.154** (0.050)
Household size	-0.098*** (0.015)	0.001 (0.005)	0.013 (0.007)
Asset quintile ('Poorest' omitted)			
Second poorest	0.058 (0.058)	0.066* (0.033)	0.123** (0.045)
Middle	0.120 (0.063)	0.173*** (0.033)	0.329*** (0.047)
Second richest	0.018 (0.070)	0.145*** (0.035)	0.527*** (0.049)
Richest	0.038 (0.085)	0.175*** (0.037)	0.666*** (0.054)
Ethnic group ('Brahmin' omitted)			
Dalit	0.180* (0.091)	0.181*** (0.035)	-0.105* (0.044)
Newar	0.229 (0.190)	0.098 (0.064)	0.143 (0.081)
Muslim	-0.137	0.010	-0.149

	(0.219)	(0.080)	(0.106)
Adivasi/Janjati	0.081	0.044	0.139***
	(0.070)	(0.025)	(0.033)
Other/Refused to answer	-0.023	0.042	-0.090
	(0.098)	(0.035)	(0.051)
Remoteness Quintile ('Least remote' omitted)			
Quintile 2	0.068	0.067*	-0.030
	(0.092)	(0.033)	(0.041)
Quintile 3	0.060	0.009	-0.051
	(0.095)	(0.034)	(0.044)
Quintile 4	0.216*	0.073*	-0.072
	(0.098)	(0.034)	(0.045)
Most remote	0.040	-0.101**	-0.265***
	(0.112)	(0.038)	(0.056)
Year (2015-16 omitted)			
2016-17	-0.090	-0.041	-0.077
	(0.048)	(0.026)	(0.049)
2017-18	0.637***	0.313***	0.147**
	(0.057)	(0.025)	(0.051)
No. of observations	17,865	17,865	17,865

Note: Robust estimator of variance is used for random-effect probit regression. Standard errors in parentheses. Regressions include strata controls (not shown). ***, ** and * denote significance at 1%, 5% and 10% level respectively.

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