Resilience to an acute covariate shock:

The Nepal earthquake of 2015 and offsetting NGO treatment effects

William M. Thompson, UGA

willt78@uga.edu

Sarah Janzen, Montana State

Nick Magnan, UGA

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The 2015 Nepal Earthquake and Offsetting NGO Treatment Effects

William M. Thompson[1]; Sarah Janzen, PhD[2]; Nicholas Magnan, PhD[1]

1. University of Georgia   2. Montana State University

ABSTRACT

In the spring of 2015 central Nepal was rocked by a catastrophic earthquake and a series of significant aftershocks. This event destroyed homes and infrastructure, killed livestock, interrupted access to water, disrupted preparations for the monsoon rice season, cut off access to markets for agricultural inputs and outputs, and generally disrupted the economics life of the vulnerable population in the affected area....

CONTACT

Will Thompson
Department of Agriculture and
Applied Economics
The University of Georgia
Email: willt78@uga.edu

Background

- The 2015 Nepal earthquake killed nearly 9000 people and injured around 22,000. The magnitude of the quake was 8.1 M with a modified Mercalli intensity of IX.
- Heifer International operates the Smallholders in Livestock Value Chain program in the affected area. The SLVC enhances physical capital (through a transfer of meat goats), human capital (through technical trainings), and social capital (through soft-skills training and by formation of self help groups).
- In addition to the standard benefits, a subset of SLVC beneficiaries in the most devastated areas received an additional zero-interest, 'revolving fund' (RF) loan of roughly ($150 USD), repayable after two years.
- We consider a household to be more resilient if they were able to weather the earthquake without resulting to costly coping strategies like selling productive assets, taking on additional debt, and cutting meals.

Objective

The objective of this study is to estimate the treatment effects of (i) belonging to a Heifer International self-help group in the earthquake affected areas and (ii) belonging to an HI group that received an additional zero-interest loan.

Data

We conducted surveys of HI and RF households approximately one year after the earthquake. The survey instrument included detailed information on income, assets, credit and savings, and specific coping strategies employed.

Outcomes presented here include binary variables that indicate selection of a coping strategy (sold livestock, cut meals, took out a loan), a binary variable that indicates the respondent has returned to permanent housing, the size of the respondent's goat herd, livestock income earned in the year after the quake, and total house income in the year after the quake.

The sample frame included 7 districts. Two of these, Nuwakot and Dhading, were severely affected (see map inset), two of which were moderately affected, and three of which were largely unaffected. We obtained localized measures of MMI (shaking intensity) from the USGS.

We also draw on the 2011 Nepal census for village level data that predates both the HI treatment and the earthquake.

Identification Strategy

There are three configurations of NGO treatment, each delivered at the village level:
I.   Heifer beneficiaries (HI)
II.   Heifer beneficiaries who received the RF (RF)
III.   Untreated control households

Treatment I was randomly assigned one year prior to the earthquake as described in Janzen et al. (2017); here we rely on the structure of the RCT. Treatment II was not randomly assigned, but consists of villages where the HI program antedates the earthquake and type I villages. Some controls were randomly assigned along with I, and other are located in untreated villages sampled after the 2015 earthquake. We include all untreated households in all regressions, and control for time-invariant observable factors that affect selection of a village into treatment. RF effects will also be estimated by PSM (results not shown on this draft).
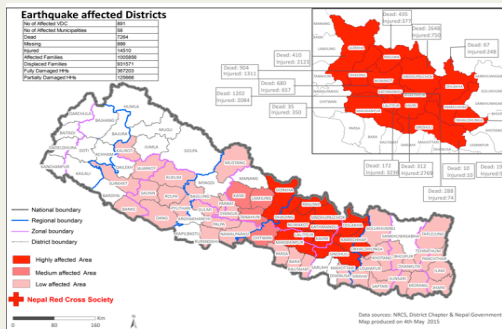
Empirical Specifications

For each specification we use OLS, where the treatment effects of interest are an earthquake effect, an NGO treatment effect, and an interaction effect.

The earthquake effect is the local MMI.

We control for observable covariates that affect selection of a village into treatment by HI, and that affect individual uptake of treatment. Where the outcome is binary we use an LPM.

We cluster standard errors at the village level.

Results: HI Effects*

	Control mean (SD)	HI	EQK	HI*EQK	N
Sold Livestock	0.124	-0.001	0.089	-0.075	1,335
	(0.330)	(0.025)	(0.023)***	(0.026)***	
Cut Meals	0.116	0.002	0.116	-0.096	1,335
	(0.321)	(0.015)	(0.035)***	(0.034)***	
Took Loan	0.203	-0.002	0.168	-0.089	1,335
	(0.403)	(0.032)	(0.035)***	(0.043)***	
Permanent Housing	0.300	0.099	-0.328	0.138	795
	(0.459)	(0.089)	(0.046)***	(0.045)***	
Goat Herd	3.611	3.238	0.292	-0.066	1,335
	(3.670)	(0.847)***	(0.381)	(0.571)	
Livestock Income	4.306	1.933	-0.109	-0.363	1,334
	(5.021)	(1.005)*	(0.505)	(0.654)	
Total Income	11.222	-0.316	-0.305	0.212	1,334
	(1.234)	(0.186)***	(0.097)***	(0.117)*	

OLS regressions, clustered (VDC) standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Results: RF Effects*

	Control mean (SD)	RF	EQK	RF*EQK	N
Sold Livestock	0.124	-0.136	0.112	0.045	1,472
	(0.330)	(0.153)	(0.048)**	(0.061)	
Cut Meals	0.116	0.429	0.091	-0.200	1,472
	(0.321)	(0.088)***	(0.040)**	(0.050)***	
Took Loan	0.203	0.081	0.143	-0.060	1,472
	(0.403)	(0.144)	(0.046)***	(0.064)	
Permanent Housing	0.300	-0.579	-0.238	0.312	1,152
	(0.459)	(0.132)***	(0.047)***	(0.055)***	
Goat Herd	3.611	1.196	-0.414	0.610	1,472
	(3.670)	(1.822)	(0.428)	(0.684)	
Livestock Income	4.306	-3.909	-0.174	2.392	1,471
	(5.021)	(1.745)**	(0.668)	(0.761)***	
Total Income	11.222	-0.763	-0.297	0.455	1,471
	(1.234)	(0.339)**	(0.104)***	(0.158)***	

OLS regressions, clustered (VDC) standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Discussion

- Probabilities of selling livestock, cutting meals, and taking loans are increasing in earthquake severity. Total income is decreasing in earthquake severity.
- HI beneficiaries experiencing a strong earthquake effect are less likely than controls to have sold livestock as a coping strategy, but RF recipients are less likely. This effect validated by a strong increase livestock income among RF beneficiaries. Goat herds are also larger among HI, but are no different from controls in RF.
- Earthquake-affected HI and RF are less likely than controls to have cut meals as a coping strategy.
- Earthquake-displaced HI and RF are more likely to be back in permanent housing.
- Earthquake affected HI and RF earned higher incomes than controls in the year after the earthquake.

*Results are preliminary. Do not cite.