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Ostromian Lessons For Post-disaster Resilience: Evidence from the 2015 earthquake in Nepal

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OSTROMIAN LESSONS FOR POST-DISASTER RESILIENCE: EVIDENCE FROM THE 2015 EARTHQUAKE IN NEPAL

BY

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DISSERTATION

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DEDICATION

To the lives that were lost and families that were affected by the 2015 earthquake in Nepal.

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ABSTRACT

The dissertation is organized in six chapters. The **first chapter** provides a synopsis of the four research articles that are comprised in this manuscript. It outlines the goals of each article and connects them to specific Ostromian insights to shed light on the empirical findings. Chapters 2, 3, and 5 are based on a field study that I conducted in Sindhupalchowk, Nepal following the devastating earthquake in 2015. Chapter 4 uses case studies from Chicago, New Orleans, Nepal, and Indonesia. The **final chapter** summarizes major lessons from the four papers.

The **second chapter** investigates household-level coping responses to the 7.8 magnitude earthquake in Nepal and their role in post-disaster recovery. I measure post-disaster recovery using composite resilience-indices that capture both economic and psychosocial

aspects of post-disaster recovery. Because household responses are potentially endogenous, I use a full-information multi-equation regression framework that allows for contemporaneous correlation across equations to account for the processes that determine households' choices. I find strong evidence to suggest that increasing financial access and labor adjustment choices has positive and significant impact on post-disaster economic resilience. On the other hand, while the adoption of financial coping strategies enhances psychosocial resilience, I find that labor adjustment choices can disturb family and social dynamics, thereby negatively impacting psychosocial resilience. My secondary findings indicate that government assistance can have unintended detrimental impacts on economic resilience, hinting at the subpar quality of political institutions in Nepal. These results underscore the importance of mobilizing and expanding market and non-market alternatives in post-disaster recovery and reconstruction efforts.

The **third chapter** delves into post-disaster collective action. First-generation theories of collective action suggest that self-utility maximizing individuals in a setting characterized by high degrees of non-excludability and non-rivalry prefer the dominant strategy to evade cooperative choices and instead opt to free-ride. However, an overwhelming number of successful and unsuccessful collective action efforts documented worldwide in the aftermath of natural disasters contradicts this notion. This paper argues that second-generation theories of collective action forwarded by Elinor Ostrom and others bridge this theoretical-empirical divide. I posit that a social norm-based model of human behavior, not confined within a purely atomistic, material payoff maximizing mindset, provides a more consistent analytical framework to explain post-disaster collective

activities. Using primary data from Sindhupalchowk, Nepal, I empirically demonstrate that bonding social capital fosters mutual trust, which in turn creates a milieu conducive to collective action efforts. Besides this mediated effect, I find that both bonding and bridging/linking social capital also have direct effects on post-disaster collective action. This paper presents social capital as the key determinant of self-governance and resilience in post-disaster situations that require concerted efforts from citizens, the private sector, and public institutions towards overcoming the common challenges of rehabilitation and reconstruction.

The **fourth chapter** makes a case for the dynamic nature of post-disaster goods and services. A post-disaster situation can be characterized as one filled with turmoil of all scales. The standard approach to post-disaster policymaking and academic thinking, particularly concerning post-disaster foreign aid in developing countries, tends to lump all aspects of relief, reconstruction, rehabilitation, and recovery as a single mega-project, — one that can be efficiently operationalized only under a *Gargantua* central planning body that is able to control all aspects of post-disaster recovery. This paper refutes such convenient assumptions as myopic and inconsistent with reality. Using insights from Ostroms' analyses of the nature of goods and public choice, I unpack the elements of *post-disaster package* and analyze how institutional changes following a disaster can lead to changes in the nature of each element. To that end, I present four cases from Chicago, New Orleans, Nepal, and Indonesia to discuss the dynamic nature of post-disaster goods and services and the shuffling of goods-classification based on their shifting natures. The goal of this exercise is to highlight the diversity, heterogeneity, and fluidity of goods and

services that are needed in any post-disaster scenario. This approach to reconceptualizing post-disaster aid is particularly relevant in developing countries that have poor-quality public institutions and are often mired in political corruption and bureaucratic inefficiencies.

The **fifth chapter** examines the role of social entrepreneurs in post-disaster contexts. I argue that social entrepreneurship has a distinct role to play within the non-profit or third-sector. That is, its role is in no way residual, accidental, or tertiary – that of a temporary filler until the private sector and public institutions step in. This is especially true in the context of a post-disaster scenario where both the private and public enterprises have confined roles to play in the provision of private or public goods. It is the sector that lies within this 'third' domain that can contribute towards civic engagement, maintain the social fabric, and promote solidarity. Moreover, in post-disaster scenarios where infrastructures and institutions facilitating operations of markets and functioning of public institutions are hindered, social entrepreneurs often engage in the provision of goods and services whose production and provision are typically done by the private and/or public sectors. Their role, however, transcends the mere provision of goods, – private or public – and includes the promotion of active citizenship through co-production processes. Using a quasi-experimental set up from the case of Dhurmus Suntali Foundation's Namuna village project in Nepal following the 2015 earthquake, I empirically demonstrate this critical role of the third sector in post-disaster contexts. My findings show that social entrepreneurs' involvement increases citizens' participation in volunteering activities, community engagement, and post-disaster reconstruction efforts.

Table of Contents

List of Tables

List of Figures

CHAPTER 1
Introduction

The dissertation comprises of four research articles that apply theories from Public Choice and New Institutional Economics to understand household and community responses to natural disaster shocks. I draw heavily on Elinor Ostrom's and the Bloomington School's insights on Institutional Analysis and Development (IAD), public goods and public choice, resilience, co-production, and polycentricity to disentangle complexities related to post-disaster recovery. Papers 1, 2, and 4 are based on a field study that I conducted in Sindhupalchowk, Nepal following the 7.8 magnitude earthquake in 2015 that claimed over 9000 lives. Paper 3 draws on case studies from different manmade and natural disasters in Chicago, New Orleans, Nepal, and Indonesia.

The **first paper** investigates the role that households' choice of coping strategies plays in their post-disaster recovery. I find strong evidence to suggest that increasing financial access and labor adjustment choices has positive impact on post-disaster economic resilience. On the other hand, while the adoption of financial coping strategies enhances psychosocial resilience, I find that labor adjustment choices can disturb family and social dynamics, thereby negatively impacting psychosocial resilience. My findings highlight the critical tradeoff between economic and psychosocial aspects of wellbeing and the challenges surrounding policies that aim at addressing one or more of such aspects. The paper presents arguments for the adoption of resilience thinking in post-disaster management that shifts focus away from *one-maximization-problem-one-equilibrium-*

approach to a polycentric framework that accommodates multiple agents, multiple institutions, multiple problems, multiple approaches, and multiple solutions.

The **second paper** explores the determinants of collective action in post-disaster contexts in an attempt to answer why individuals choose to cooperate for collective activities when there are abundant opportunities to free-ride on the efforts of others. Using insights from the second-generation collective action theories forwarded by Elinor Ostrom and the scholars of the New Institutionalist tradition, I empirically demonstrate that communities can mobilize their social capital to build mutual trust that can help overcome free-riding problems. The paper sheds light into the social dimension of human behavior that frequently interacts with, and occasionally even dominates, the strictly economic pay-off maximizing behavior. I provide further evidence to support the Ostromian thesis that a configural approach, which allows for multiple non-contradictory, situational theories of human behavior and social organization to co-exist, is more consistent with cooperative, collective behavior in post-disaster contexts.

The **third paper** uses the typology of goods as an "analytical entry-point" to make a case for the dynamic nature of post-disaster goods and services. I highlight the institutional contingency of categories of goods (private, public, club, or common pool) and argue that post-disaster institutional changes can lead to changes in the specific typology of each good. To that end, I present four case studies from different manmade and natural disasters in Chicago, New Orleans, Nepal, and Indonesia, where institutional changes led to shuffling of the classification of goods and services. By highlighting the diversity,

heterogeneity, and fluidity of goods and services that are needed in any post-disaster scenario, I show that the *Gargantua* approach, – one that treats post-disaster relief, rehabilitation, reconstruction, and recovery as one mega-project – that is pervasive in many developing countries, is incentive-incompatible and lacks theoretical and empirical basis.

The **final paper** exploits a quasi-experimental set up from the case of Dhurmus Suntali Foundation's Giranchaur Namuna village project in Nepal following the 2015 earthquake to examine the distinctly *neither-market-nor-state* role of social entrepreneurs in a post-disaster setting. The chapter delves into the foundation's role in fostering active citizenship and community engagement to argue that, although social entrepreneurs often engage in the provision of goods and services whose production and provision are typically done by the private and/or public sectors, their roles transcend the mere provision of such goods/services and include the promotion of active citizenship through co-production processes. This paper uses Ostromian insights on co-production and institutional diversity to situate social entrepreneurship within the neither-market-nor-state domain where its role is not secondary or temporary until the private or public sector steps in.

The four papers expand the scope of Bloomington School's theoretical insights, which has so far been limited to the analysis of local economies and common pool resource management, into the study of post-disaster recovery. In her decades of investigation of community forests and irrigation systems in Nepal, Elinor Ostrom never failed to account

for the complexity, richness, and heterogeneity of Nepali communities. Somehow, post-disaster studies following the 2015 earthquake in Nepal have managed to ignore most of the valuable insights from the Bloomington School. Among the central goals of this dissertation is to remedy that.

CHAPTER 2
Natural Disasters, ex-post coping strategies, and post-disaster resilience: Evidence from the 2015 earthquake in Nepal

Introduction

The past few decades have witnessed unprecedented number of natural disasters, both in terms of frequency of occurrences and their impacts on human lives. Between 1994 and 2013, 6873 natural disasters have been reported worldwide that impacted 218 million people on average per year and have cumulatively claimed 1.3 million lives. Along with the frequency of natural disasters, disaster-related death rates have also been rising steadily. The paper centers around the single worst natural disaster since 1900 in Nepal, one of the poorest countries in the world. The devastating 7.8 magnitude quake on April 25, 2015 and dozens of aftershocks that followed, including one of 7.3 magnitude on 12th May, caused destruction to a scale comparable to that of the decade long Maoist insurgency –in terms of lives lost, population affected, and economic costs (CRED, 2015a; Joshi, 2014). The event claimed over 9,000 lives, affected another 8 million, and resulted in estimated direct and indirect economic losses amounting to 10 billion USD (ibid.). Unlike that of neighboring China, where the government-led response to the 2008 earthquake was reported as being "rapid and massive," Nepali government's response was slow and ineffective, and often hindered multi-agency recovery and relief efforts through bureaucratic hurdles (Rayamajhee and Bohara, 2018b; Shi et al., 2013). As Rayamajhee and Bohara (2018b) note, the post-disaster situation in Nepal can be described as one embroiled in political instability, poor institutional quality, and inadequate governmental response to remedy disaster losses.

As is often the trend with most low-frequency high-impact disasters, earthquakes in Nepal garnered overwhelming initial attention that gradually faded away as priorities shifted to other issues. Any residual discussions surrounding the earthquake centers around appraisal or critique of public policies and interventions in the aftermath of the shocks. While such evaluation and critical analyses at the upper echelons of policy-making may help prevent bureaucratic blunders in future shocks, the fact remains that geophysical shocks can neither be predicted nor prevented. In that regard, we deem that a sensible alternative is to refocus our attention to enhancing disaster preparedness and mitigation strategies at the local level. This sentiment mirrors that of the United Nations' Sendai Framework whose key priorities include "enhancing disaster preparedness for effective response and to build back better in recovery, rehabilitation and reconstruction."[1] To that end, we shift our emphasis from disaster responses at high-level institutions to understanding how agrarian households respond *ex-post* to such covariate shocks and how those responses influence their paths to [household] recovery, particularly in developing economies with weak political institutions.

We postulate that, in absence of reliable public institutions, the post-disaster recovery of households largely hinges on their own post-disaster coping strategy choices and localized efforts to tackle post-disaster challenges. To examine such mechanisms, we use the resilience framework that social scientists have borrowed from ecologists (Barrett and Constas, 2014). As noted by many, social science adaptations of resilience are often too vague and its applications too discordant and unsystematic to render them meaningful

[1] Sendai Framework for Disaster Risk Reduction 2015–203. United Nations (UNISDR, 2015: 21).

(Klein et al., 2003; Rose, 2007). We address that concern by providing a systematic, quantifiable definition of household resilience that captures both economic and psychosocial dimensions of post-disaster recovery. We retain its original ecology interpretation (Gunderson et al., 2012; Holling, 1973; Walker and Salt, 2012) but adapt it to a disaster context to reflect household perspective. We define disaster resilience as following:

> In the face of an exogenous shock and the consequential loss in wellbeing, resilience is the ability of a household to bounce back to the original level of wellbeing (or better) relative to the intensity of the initial impact of shocks.

As such, a household that has suffered a disaster and rebounded from that disaster is a household that, on our definition, has exhibited resilience. This treatment of resilience as an exhibited characteristic rather than a latent property allows for an unambiguous interpretation of our empirical findings, since the 'bouncing back' process is an observable and measurable feature relative to the abstract resilience stock.[2]

This paper makes two important contribution to the literature of disaster resilience and recovery as well as the literature on the ability of households in the poorest communities to overcome negative shocks.[3] First, we provide the first household-survey based

[2] Although not applicable to our case, this treatment of resilience implies that a household that has not undergone a disaster shock cannot be included in our analysis. In other words, households that may otherwise be deemed resilient based on observable disaster-preparedness measures and other unobservable characteristics cannot be deemed resilient for our analysis. This can be viewed as a shortcoming of our treatment. Nonetheless, this shortcoming is a reasonable tradeoff as it allows for an unambiguous analysis based on the variation in household recovery across multiple dimensions of well-being.

[3] Notable recent contributions to the literature on this topic include (Aldrich, 2012; Chamlee-Wright and Storr, 2009; N. M. Storr et al., 2015; V. H. Storr and Haeffele-Balch, 2012).

quantitative analysis of the impact of the 2015 earthquake on agrarian households in rural Nepal, and track their responses to cope with post-disaster challenges.[4] Secondly, using retrospective questions about post-disaster recovery, we evaluate the role of ex-post coping responses in their post-disaster economic and psychosocial resilience. Unlike previous studies that view resilience exclusively as a collective, community-level feature, this microeconomic treatment allows us to exploit household level variation in recovery measures to identify factors that lead to post-disaster resilience.

Our descriptive results show that reduction in household consumption of food and non-food items, short-term loans, and mutual assistance are the most common strategies adopted. Although 86% and 68% of households we interviewed report receiving assistance from governmental and non-governmental sources, such assistance remained nominal. In our subsequent analysis, we categorize all household responses into three broader bins: financial coping strategies, labor adjustment choices, and seeking external assistance. Our empirical findings indicate that both financial and labor adjustment coping methods significantly contribute to higher economic resilience. However, when juxtaposing their relative magnitudes, we find that financial coping is relatively more effective. We find strong evidence to suggest that adoption of a financial coping strategy also enhances psychosocial wellbeing of households. On the other hand, labor adjustment, while lucrative from an economic standpoint, severely disturbs family and social dynamics, thereby negatively affecting psychosocial resilience outcomes. Our

[4] Using a mixed methods approach, Epstein et al. (2018) provide an analysis of post-disaster impacts and adaptation among smallholder communities in Dolakha, Nepal. The study employs *disaster resilience of place* (DROP) framework to assess community resilience (Cutter et al., 2008).

secondary findings are somewhat bleak: government assistance has statistically significant and negative impact on economic resilience. Moreover, the pervasive network of non-governmental organizations that has proliferated across the country seems to have no significant impact on either economic or psychosocial resilience. This may point to the lack of accountability, and institutionalized corruption that have long penetrated public and quasi-public sectors in Nepal.[5]

The remainder of this paper is organized as follows. In section 2, we provide a brief survey of literature, section 3 discusses data and provides descriptive analysis, section 4 presents empirical analysis, section 5 discusses results and implications, and section 6 concludes.

Previous Studies on Disaster Resilience

A comprehensive investigation of shocks, natural or manmade, requires consideration of all static and dynamic elements. The traditional cost-benefit approach, while important, does not fully incorporate all moving parts. Moreover, momentary but consequential nature of disaster shocks as well as the pervasiveness of non-monetary and intangible yet crucial factors associated with recovery from such shocks have led social scientists to seek out for a broader, dynamic conceptual framework to account for complex feedback-loops and multidimensional nature of human wellbeing. This need for understanding the complexity and multidimensionality of disaster impact and recovery processes has led to a widespread embrace of the concept of 'resilience'(Rose, 2007). Even though no consensus exists on

[5] Transparency International consistently ranks Nepal among the most corrupt countries in the world. 2017 TI data gives Nepal a score of 31 (0=highly corrupt, 100=clean) ranking it 122/180 (Transparency International, 2018). Truex (2011) points out that behaviors such as "petty corruption," "gift-giving," and "favoritism" are deemed acceptable in situations when seeking access to *deserved* services.

the theory of development resilience, the use of the concept of "resilience" to discuss policy objectives is getting increasingly popular (Barrett and Constas, 2014). While this has allowed for a flexible, contextual adaptation of the concept, its divergent use in both academic and policy circles has engendered substantial ambiguity and inhibited consistent interpretation.

Extant studies on disaster resilience focus overwhelmingly at the meso- or macro-levels, with an emphasis on cross- community, regional and national differences (Briguglio et al., 2009; Cannon, 2008; Marto et al., 2018; Rose, 2004). Although micro-level variables such as household income and assets, livelihood strategy, private and public transfers and credit access all play important roles in post-disaster recovery (Bruneau et al., 2003; Davies et al., 2013; Sawada, 2007), resilience is often treated as a community feature. A seminal study by Cutter et al. (2008) advances the Disaster Resilience of Place (DROP) model to assess disaster resilience. The study uses thirty-six indicators for measuring and monitoring social, economic, institutional, infrastructure, and community capital, which are then used to quantify resilience. The tacit assumption that motivates this approach is that household-level differences, although they can explain micro-level variation, are less important than *community level forces* that determine post-disaster resilience. While this view can provide important post-disaster policy guidelines in homogeneous communities with well-functioning public institutions, we contend that heterogenous communities in developing countries with weak public institutions require a more granular approach to understanding disaster resilience. This is especially relevant in the context of post-earthquake Nepal characterized by ethnic/caste-based, religious, economic, cultural, and political cleavages (Rayamajhee and Bohara, 2018a). Moreover, even a covariate shock

(of the same magnitude) affects each household differently and poses unique challenges to each household, which a community-level analysis fails to account for (Rayamajhee and Bohara, 2018b).

Rose (2004) proposes a three-tier analytical framework for disaster resilience and highlights the need to conduct studies at all three levels: the micro-level (individuals, households or firms), the meso/mid-level (groups and sectors), and the macro-level (regions, nations). This paper takes the micro-approach and focuses exclusively at the household-level. This approach has a unique advantage in that it provides us detailed insights into households' post-disaster responses, the factors that influence those responses, and the results of specific coping strategies adopted. An extensive body of literature exists that evaluate disaster impacts at the household-level (Gignoux and Menéndez 2016; Halliday, 2006; Halliday, 2012; Park and Wang, 2017). Another strand of microeconomic literature exists that focus on specific coping strategies employed to tackle post-disaster challenges (Del Ninno et al., 2003; Mozumder et al., 2009; Novella and Zanuso, 2018; Rayamajhee and Bohara, 2018b; Sawada and Shimizutani, 2008). An adjacent line of research on the poverty trap in development economics shares strong parallels with the notion of disaster resilience (Barrett and Constas, 2014; Carter and Barrett, 2006). Nonetheless, very few microeconomic studies on natural disasters use the resilience framework explicitly to evaluate household dynamics (Arouri et al., 2015). Furthermore, empirical studies that combine these three themes – that is, microeconomic studies at the household level that evaluate ex-post coping strategies and their role in post-disaster recovery using the resilience framework – are virtually non-existent. This paper fills that gap in the literature by using primary survey data from post-earthquake

Nepal. The survey asked retrospective questions to gather detailed information on ex-post coping strategies and multi-dimensional resilience measures.

Utilizing resilience thinking to frame discussions on disaster recovery serves two distinct purposes. First, it helps reorient discussions on post-disaster policies away from "highly optimized" solutions to adaptability, diversity, and entrepreneurship (Tarko, 2017). Rather than pursuing panacea solutions that are optimized to known sources of danger, resilience thinking allows us to look broadly into complex interconnectivities and multi-dimensionality and empowers individuals and communities to adopt flexible strategies that are robust against side effects and unknown sources of danger. Second, it fosters discussions about a multi-tiered, polycentric approach to post-disaster policies that allows for experimentation by multiple actors who can employ competitive and/or cooperative strategies to meet multi-dimensional, intertwined goals (Ostrom, 2010). The solutions that emerge from such discourse are diverse, and adaptable to account for interconnected problems and multiple potential outcomes (Smith et al., 2017). In other words, a solution that is deemed 'optimal' based on an evaluation of economic outcomes is not resilient if it increases fragility in psychosocial or other dimensions. For empirical applications to disaster recovery, resilience thinking entails not only evaluating 'bouncing back' processes in terms of multiple-causes-multiple-outcomes framework, but also devising "participatory approach" to institutional design with "multiplicity of institutional arrangements and practices" (Mustafa, 2003; Ostrom, 1976). In other words, simply cloaking the usual suspect variables using resilience merely as a rhetorical device to reframe old discussions only serves as a distraction.

This paper contributes to the extant literature in three ways. First, we provide a systematic,

empirically tractable treatment of household disaster resilience. Second, the study adds to the thin body of literature on the microeconomic treatment of disaster resilience. Third, it takes a multidimensional approach to quantifying disaster resilience that accounts for both economic and psychosocial dimensions of post-disaster recovery.

Conceptual Framework

The links that our study examines comes from Sawada and Takasaki (2017), who provide a comprehensive framework for microeconomic analysis of the disaster-poverty nexus.[6] The framework highlights the centrality of time-frame and duration in situating discussions of policies and strategies to address disaster issues. As such, disaster preparedness and ex-ante risk management (pre-disaster policies) need to be distinguished from impact assessment, disaster aid and relief (short-run policies), and from reconstruction and rebuilding policies (long-run policies). The poor tend to underinvest in ex-ante measures; and, public institutions in developing countries tend to be underprioritize ex-ante risk management (p. 9). Moreover, because developing economies also face dire short-term problems, long-run planning generally remains confined within the pages of policy reports and vision statements. What all this means is that any disaster-related policies in such vulnerable countries inevitably overemphasize immediate/short-run challenges. Our best hope is to expand the policy purview ever so slightly to include some elements of long-term preparedness through an expansion of market and non-market institutions. While disaster-specific components may still receive

[6] For a detailed diagrammatic depiction of the conceptual framework, please refer to Figure 4 of the paper (Sawada and Takasaki, 2017: 8).

limited attention, expansion of general components that overlap with disaster-specific ones may increase our chances of addressing some of the bigger challenges.

Among the five disaster-specific components that Sawada and Takasaki (2017) describe, – i.e. disaster damage, aggregate impacts, recovery, pre-disaster management, and disaster aid – studies conducted in developing countries focus overwhelming on disaster aid (Morris and Wodon, 2003; Takasaki, 2011a, 2011b). On the other hand, systematic studies that focus on how these disaster-specific components interact with private coping decisions and their outcomes are scarce (ibid.). In the case of Nepal, such studies are non-existent. This gap in the empirical literature is alarming considering the critical role that private coping decisions play in household-recovery, particularly in Nepal where public institutions have generally failed to provide basic post-disaster public goods and services. This paper's central contribution lies in filling that gap in the empirical literature. The focus on [relatively short-term] ex-post coping strategies, and specifically on private ones, is grounded on the political reality of Nepal, where grand teleological visions [of society and politics] have only led to destabilization and polarization.

The conceptual framework that we employ for empirical analysis is represented in Figure 1. A household's private coping decisions after a disaster are similar in many ways to those after any non-disaster shocks (Sawada & Takasaki, 2017). However, there are additional factors such as asset damages, injuries and death from a disaster can influence the range of choices within the household's feasibility set (Rayamajhee and Bohara, 2018b). Chamlee-Wright and Storr (2010) find that community members adopted self-reliant recovery strategies when people did not believe that government could help them.

Other influencers include household characteristics and pre-disaster asset levels (particularly financial assets). Subsequently, the choice of private coping strategy is a major determinant of their post-disaster resilience. Where we slightly deviate from Sawada and Takasaki (2017) framework is that we do not restrict our empirical analysis to economic outcomes. Because there are trade-offs associated with choices of different strategies, an overinvestment in one strategy aimed at a specific outcome inevitably may lead to underinvestment in another strategy. On the other hand, it may be the case that an investment in one strategy with specific aims may also facilitate in the other aim. The precise direction of effects is an empirical question that requires contextual interpretation.

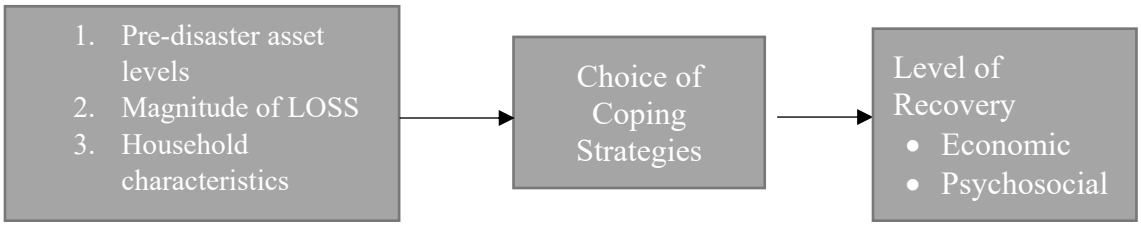

Figure 1: Conceptual Framework adapted from Sawada and Takasaki (2017)

Nepal Earthquake and The Data

Nepal consistently ranks among the 20 most disaster-prone countries in the world. To date, disasters have killed more people in Nepal than in any other South Asian countries (Shakya, 2016). The 2015 earthquake in Nepal is the single worst natural disaster since 1900, and Sindhupalchowk is the worst affected district. Shakya (2016) reports that the earthquake claimed 3440 lives in Sindhupalchowk alone, and almost all of the houses in major towns were decimated. The choice of Basbari as the study location was motivated

by the fact that many village wards in Basbari have little to no government presence and that post-disaster national reconstruction and rehabilitation initiatives are somewhat of a fairy tale for Basbari residents. International donors and non-governmental organizations also paid very little attention to Basbari as some of the wards (particularly 3, 8, and 9) are among the remotest in the entire administrative district. Apart from basic relief goods and nominal funds to rebuild their homes (USD 500 to 1000), no household has, up to this point, received any substantive external assistance from any private or public agencies. In many informal conversations with local health workers and some village elders, we heard many tales about the cobweb of bureaucratic hurdles that villagers had to go through even to acquire the limited funds that was already assured to them. This is not surprising considering the post-earthquake situation described as one "embroiled in political turmoil, instability, poor institutional quality, and inadequate government response," and filled with "political wrangling" over leadership of reconstruction agencies (Mishra, 2016; Rayamajhee and Bohara, 2018b).

The quantitative analyses presented in this paper are based on the data collected by the lead author in May-July 2017, with logistical support from the [institution name omitted for peer review purposes] and [institution name omitted].[7] The field study was conducted across all nine wards in Basbari, exactly two years after the 2015 earthquake. Over 500 households were selected based on stratified randomized sampling procedure, and extensive face-to-face interviews were conducted. As reported by another study in

[7] This study was conducted to assess the short-run impacts of the 2015 earthquake on rural households in Sindhupalchowk, Nepal, as well as to track their recovery processes. The field survey study also gathered information on food security and health measures.

Sindhupalchowk, public infrastructures in rural villages, even two years after the earthquake, are still in shambles (Rayamajhee and Bohara, 2018b). During the time of the study, we observed that rural health clinics were forced to operate in dilapidated buildings with no doors and windows; primary schools conducted their classes in nearby *chautaris*.[8]

Table 2 (last section) reports demographic information. Most Basbari households (68%) rely on agricultural production for sustenance, with maize and rice as their major staple foods. Basbari is a predominantly Hindu (71%) constituency with Buddhism being the second most dominant religion (27%). 40% of the population identify as *Janajatis* (indigenous groups); 12% belong to Dalit-caste (lowest category in the Hindu caste hierarchy). 55% of our respondents are female, and the average household size is 5.6. Compared to regular (extreme weather-related) shocks that Basbari residents face, the 2015 earthquake caused exceptionally high levels of house, property, and health damages. The collected information includes data on self-reported damages caused by the earthquake, household coping strategies after the earthquake, and their recovery status on various wellbeing measures relative to the damage each household suffered.

Earthquake Impacts and Recovery

Bishnu Pokharel [name altered for anonymity reasons], a Basbari resident, notes, "Before the earthquake, many of us were poor and a few were rich, but God does not

[8] *Chautaris* refers to peepal-tree shade. They are common meeting places for public discussions in rural Nepal.

discriminate…. Whatever differences we may have had in the past, the earthquake evened them all." The earthquake did not spare any households. 89.41% households reported that the earthquake partially to fully damaged their homes. 81% of all homes were completely affected, i.e. they were unlivable without (or even with) major repairs. More than 92% reported having lost physical assets. Although 83% did not face direct bodily harm, results show that 70% lost their earning potential and 94% were emotionally distressed that hampered their economic lives. 34% and 44% households reported that the earthquake hindered access to food and water. The earthquake also impacted social dimensions of wellbeing. 18% households noted an increase in domestic violence attributable to the earthquake; 43% households felt that the earthquake affected their community engagement roles.

Two years after the earthquake, we found that access to water had not improved significantly. Villagers in many remote wards had to commute daily up to several hours to Sindhukhola and Indrawati rivers to fetch water. While the purpose of this paper is not to appropriately test the full consumption insurance hypothesis, we have enough observational evidence to suggest that most Basbari households have been unable to markedly smooth their food and non-food consumption patterns. Figure 1-5 illustrates recovery trends.[9] The vertical line at time $t=24$ represents the cut-off point when the data collection took place: towards the left-side of the line are real (stated) recovery rates, whereas towards the right are expected recovery rates. Information on real recovery rates

[9] The estimates presented in figure 1-5 are based on Kaplan-Meier Survival Analysis. For interpretational purposes, survival analysis plots are inverted and presented as failure function graphs – that is, fail to *not* recover. However, to avoid confusion, we avoid the use of the term 'failure' to discuss recovery rates.

are gathered using retrospective questions. At *t=24*, only 25% had recovered their pre-disaster level incomes. Asset recovery rates at *t=24* is even lower at just 12%. For those households that had not recovered by the time of the study, we asked questions about their expected recovery rates on various wellbeing measures. Figure 1 shows that recovery rates at each time period (including *t>24*) is higher for income than assets, which indicates that asset shocks tend to have more persistent effects than income shocks for rural, agrarian households. 30.41% and 27% households report that they will not be able to recover their pre-disaster level incomes by 2027. On the other hand, Figure 2 shows that 70% of those who suffered physical injuries from the earthquake (excluding those who died) have fully recovered, and almost all households report that they will recover from physical injuries by 2027.

[Insert Figure 1]

[Insert Figure 2]

Coping strategy choices

Table 1 reports various coping strategies that Basbari households adopted in the aftermath of the earthquake to overcome post-disaster challenges. The use of the word "choice" warrants further qualification. As reported before, one of the most common household coping responses is to reduce consumption of food and non-food items. However, such responses cannot be justifiably called 'choices' in that households do not *choose* to consume less food or other household goods. We deem that it is more appropriate to view such responses as outcomes rather than choices. Moreover, public and quasi-public transfers are not necessarily "choices" as agrarian households in rural Nepal do not have much influence over public programs. That is why, for the empirical

estimation in the succeeding section, we treat them as being exogenous from the households' perspective. Among the responses that reasonably qualify as coping strategies, borrowing is the most common response adopted by 57% of all households, followed by mutual assistance (43%), use of savings (35%), and child labor (18%); 14% households resorted to sale of liquid assets; 14% used advance labor, and 7% households reported having to send more members in labor force because of the earthquake. About 8% households were able to mobilize remittance revenue to cope with disasters. 86% households received government assistance, and 68% received some help from non-governmental organizations. Almost all households adopted one or many forms of coping strategies (including help).

[Insert Table 1]

Descriptive Results

For descriptive analysis (and subsequent econometric analysis), we categorize coping responses into financial and labor adjustment strategies. Financial coping strategies include use of savings, borrowing, and sale of assets, whereas labor adjustment involves advance labor (working in advance with an assurance of a later payment), sending more family members in labor force, and out-migrating for work. Although we consider external assistance from governmental and non-governmental agencies, we do not classify them as coping strategies. In Figures 3 and 4, we divide the sample based on different coping strategies adopted. Figure 3 shows differences in income and asset recovery rates between households that adopted financial coping strategies and those that did not. Results show that those who adopted at least one financial coping strategy attained their pre-disaster level incomes at a faster pace than those who did not. Among

those who have not yet been able to do so, we find that those who adopted financial strategies have higher expectations of faster recovery rates. We find similar trends for asset recovery rates, however the differences are not statistically significant at $t<24$.

[Insert Figure 3]

Figure 4 presents survival analysis results for income and asset recovery rates by labor adjustment strategy. We observe similar trends as that of financial coping strategies. Households that adopted at least one labor adjustment coping strategy have higher income and asset recovery rates (both real and expected). Although the real differences in observed recovery rates is not as pronounced, we find that those who are able to use labor adjustment strategies have higher expectations about income and asset recovery. These differences diverge dramatically after $t=60$.

[Insert Figure 4]

Survival analysis estimates based on government help reveals interesting results. In terms of income recovery, we observe that there is no consistent difference between households that received government assistance and those that did not. However, we see that at t=36, the trends diverge. This indicates that households that received any form of government assistance are more optimistic about their prospects of being able to recover their assets after a year or so. On the other hand, the trend for asset recovery by government assistance reveals interesting results. Households that received government assistance report consistently lower recovery rates compared to those that did not receive any aid. This difference is especially more pronounced from periods $12<t<84$. The trend reverses at $t>84$. One possible explanation of this reversal could be that there is still hope among

Basbari residents that enough government aid will reach to rural Basbari in the next five years or so.

[Insert Figure 5]

The Econometric Model

The conceptual framework employed in the empirical analysis is represented using a multi-equation system in a recursive modeling set up, where we allow for contemporaneous correlation across equations. The equations employed for empirical evaluation are:

Outcome Equation:

$$Resi_{hh} = \beta_0 + \beta_1 CopingStr_{hh} + \beta_2 HELP_{hh} + \beta_3 X_{hh} + u_{hh} \qquad (1)$$

Decision Equation(s):

$$CopingStr_{hh} = \gamma_0 + +\gamma_1 Access_{hh} + \gamma_2 Damage_{hh} + \gamma_3 X_{hh} + V_{hh} \qquad (2)$$

In the first equation, $Resi_{hh}$ represents *Economic Resilience* (ER_{hh}) and *Psychosocial Resilience* (PR_{hh}) of a household. Both *ER* and *PR* are continuous variables ranging from 0 to 20 with higher value representing higher ability to bounce back to the pre-disaster level of economic well-being. $Resi_{hh}$ is determined by a vector of endogenously determined coping strategies ($CopingStr_{hh}$), along with exogenous variables including external assistance ($HELP_{hh}$) and other control variables (X_{hh}) such as initial disaster impact[10], household characteristics, etc. The coping strategy decision equation in (2) can

[10] We suspect that initial disaster impact is likely to also affect resilience. However, we do not find statistically significant results for house and property damage. Only injury/death seems to hurt recovery,

be thought of as two separate equations for financial coping ($FinCoping_{hh}$)and labor adjustment ($LaborCoping_{hh}$) strategies. The choice(s) of these coping strategies are determined by disaster damage ($Damage_{hh}$), access to market ($Access_{hh}$[11]), and the same set of household characteristics from equation (1). $Damage_{hh}$ is a matrix of variables representing house, property, and health damages by the earthquake. Vector $Access_{hh}$ includes two variables: distance to the nearest market, and membership in local finance groups. Note that including the vector $Access_{hh}$ makes the multi-equation system identified. V_{hh}=[v_{hh}, w_{hh}] are error terms for $FinCoping_{hh}$ and $LaborCoping_{hh}$ equations (referred below as equations 2 and 3). βs, γs, and δs are parameters that are to be estimated. The empirical framework employed for this analysis allows for contemporaneous correlation across equations, although we suspect that equations (2) and (3) may not have strong correlations relative to equations (1) and (2) or (1) and (3). These two categories of coping strategies do not contemporaneously covary.[12] Moreover, estimating equations 1-3 jointly versus separately (that is, equations 1 and 2, and equations 1 and 3) does not meaningfully alter our results. This validates our assumption that these coping strategy choices are independently determined (albeit by some overlapping covariates), thereby justifying our use of the term *decision*. As the processes

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but it is not clear from our analysis if there is a direct channel other than through coping strategy choices. Because we have already controlled for household assets/wealth and other characteristics, they at least partly account for house/property damage. That is, the more assets/property a household owns, the higher the earthquake damage. Our results in the subsequent section are robust to inclusion or exclusion of initial disaster impact in equation (1). We report results without it based on model fitness comparison.

[11] It is assumed (and statistically verified) that $Access_{hh}$ is correlated with $CopingStr_{hh}$ and uncorrelated with $Resi_{hh}$. F-test validates the strength of these variables. Also, rank and order conditions are satisfied for identification.

[12] Fisher's z-transformed correlation parameter value for equations 2 and 3 (inverse hyperbolic tangent of rho, ρ_{23}) is not statistically significant. We reject the null hypothesis that $\rho_{23}=0$. Although not reported in the paper, full-parameter estimates for all models (tables 3-8) can be made available in the online appendix.

represented in these equations occur concurrently, we simultaneously estimate all three equations, assuming error terms follow a multivariate normal distribution such that:

$$\in = [u_{hh}, V_{hh}] = [u_{hh}, v_{hh}, w_{hh}] \sim N(0, \Sigma) \text{ where, } \Sigma = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{21} & 1 & \sigma_{23} \\ \sigma_{31} & \sigma_{32} & 1 \end{bmatrix} \quad (4)$$

Results

Table 2 provides descriptive statistics of variables employed for econometric analysis in this section. We define economic resilience as a composite score based on four indicators of economic recovery: income recovery, asset recovery, rebuilt houses, and regained pre-earthquake consumption levels. Psychosocial resilience variable is constructed similarly using four indicators: recovery from emotional distress, recovery from EQ-induced domestic violence/aggressive tendencies, re-able to socialize, able to reengage in community. Both economic and psychosocial resilience variables have values that range from 1-20.[13]

[Insert Table 2]

Economic Resilience

Table 3 provides simultaneous equation model estimates of the impact of household coping mechanisms on economic resilience. To confirm that robustness of our estimates, we employ five different model specifications. Model 1 includes results for financial coping methods, while also controlling for household characteristics. Results indicate that adoption of financial coping mechanisms results to an increase in economic resilience of

[13] Alternate measures of aggregating ER and PR are employed for robustness purposes (not reported in the paper). Results remain consistent.

households by 4.74 points. In model 2, when labor adjustment coping is added to the baseline model, we find that the impact of financial coping strategy remains consistent. Labor adjustment coping mechanism also has a significant and positive impact on economic resilience, albeit the impact is lower than that of financial method.[14] Model 3 further includes government assistance. We find that it has negative impact of economic resilience. This result remains consistent when more controls are added in the subsequent model specifications. Model 4 also considers non-governmental organization (NGO) assistance. We find that NGOs have no significant role in enhancing economic resilience. This can be because of a host of reasons. There is a systemic lack of oversight on NGO operations and regulations on NGO programs are virtually non-existent. Moreover, local NGOs have minimal resources and their scopes are limited to a narrow subgroup. Model 5 further includes remittance as an additional control. We find that it has positive (and significant) impact on economic resilience. Inclusion of remittance does not affect the consistency of our results. Throughout all specifications (Models 1-5), results remain consistent. We can safely ascertain that strengthening financial access and availability of labor market opportunities can enrich economic lives of households in the face of covariate shocks such as earthquakes. The role of government, although crucial in most cases, is highly sensitive to the quality of political institutions and norms. Centralized rehabilitation policies with inadequate considerations of local dynamics can engender

[14] For robustness purposes, an additional interaction variable for both coping strategy types (*FinCoping*LaborAdjustment*) is included. Results remain consistent. Magnitude for financial coping variable changes slightly, but the narrative still holds. The coefficient for the interaction term is negative (and significant at the 0.1 level) suggesting that there may be a cost to adopting diverse types of strategies. We do not delve into this further.

false hopes among households that can wrongly incentivize vulnerable households and preclude them from adopting other self-reliant measures.

[Insert Table 3]

In Table 4, we look at each financial coping strategy to evaluate their relative impacts on economic resilience. Model 1 presents results for any total financial coping strategies adopted, whereas models 2-4 reports results for sale of assets, borrowing, and use of savings respectively. We find that all three financial coping strategies (sale of assets, borrowing, and use of savings) have comparable impacts on the economic recovery of households. The fact that the joint impact of all three strategies is significantly higher than that of each strategy indicates the cumulative contribution of such strategies is positive. That is, if households are able to adopt a variety of financial coping strategies, that seems to positively impact economic resilience. Table 5 reports findings on labor adjustment coping strategies. Unlike financial coping strategies that have consistent (and positive) effects on economic resilience, labor adjustment impacts vary by types. Households that send more members to labor force for additional income seem to have higher levels of economic resilience. On the other hand, advance labor (working in advance with an assurance of a later cash or in-kind payment) has negative impacts on economic resilience. To explain this, one needs to first understand the in-kind labor-exchange system prevalent in rural Nepal. Because modern property rights and market mechanisms are not well established in agrarian communities, *khetala-pratha*, a form of traditional labor-exchange system is in place. In such system, a household will send one or more members to work for their neighbors in farming and agriculture, who will later also work for them in return. This in-kind labor exchange system is facilitated by social

norms of reciprocity and mutual assistance, which in times of disasters dictate that a less-affected (but affected nonetheless) household would have to assist those who are more-affected. This can have detrimental short-term impacts on their own economic recovery. On the other hand, promises of later payment is not credible when almost everyone involved in contracts have been severely affected by the earthquake. Therefore, by participating in advance labor, a household may be making a bad investment of human capital (or 'wasting' so to speak). We do not observe significant impacts of *out-migration for work* on economic resilience. First, out-migration takes financial resources, which takes away resources that could be directly used for economic recovery. Secondly, it can take a year or two to start saving enough to contribute towards economic recovery. Out-migration is often a long-term labor adjustment strategy, the effects of which may take several years to manifest.

[Insert Table 4]

[Insert Table 5]

Psychosocial Resilience

Estimates of the impact of various household coping mechanisms on psychosocial resilience are reported in Table 6. Following similar strategy, we employ multiple model specifications to test the sensitivity of financial and labor adjustment coping strategies. Model 1 only includes financial coping strategy as an explanatory variable, while also controlling for various household characteristics. In addition to enhancing economic resilience (as discussed earlier), we find that financial coping also enriches psychosocial lives of households. Results from Model 1 indicate that adoption of financial coping measures leads to an increase in psychosocial resilience by 3.1 points. In model 2, labor

adjustment coping is added to the baseline model. We find that the impact of financial coping remains stable, and that of labor adjustment is negative and significant. Since psychosocial resilience reflects the emotional and social aspect of wellbeing, this negative impact is not unexpected. Having to adjust family's labor market involvement constraints social involvement. As more household members join the labor force for more time, social lives are detrimentally impacted. Within the household, this can disturb the pre-disaster level harmony and can cause emotional distress. Note that when we gradually add other variables in models 3 to 5, this result remains consistent. In Model 3, we add government assistance to the model specification in column 3. We find that government assistance has no significant impact on psychosocial lives of rural households. Model 4 further considers NGO assistance. Similar to government, NGOs also do not have any significant impact. Furthermore, remittance, while helpful from economic point of view, does not contribute to psychosocial wellbeing in households struggling with post-disaster challenges (Model 5).

[Insert Table 6]

Table 7 breaks down results by different types of financial coping strategies. Results are consistent across all three financial strategies, namely sale of assets, borrowing, and use of savings. Comparison of these three strategies show that households that (are able to) use savings to cope with post-disaster challenges have the highest psychosocial recovery levels, whereas those that (have to) borrow money have the lowest (but positive) psychosocial recovery levels. In table 8, we present results by different labor adjustment strategies. Findings show that sending more family members to labor force negatively impacts psychosocial recovery. This is consistent with our findings reported in table 6.

On the other hand, we do not find statistically significant relations between the other types of labor adjustment strategies and psychosocial resilience.

[Insert Table 7]

[Insert Table 8]

Discussion of Results

This is among the first microeconomic studies that use the resilience framework to understand post-disaster recovery processes in Nepal. The analyses presented in this study reveals disconcerting realities about the role of government's post-disaster policies in Nepal. The government accumulated billions of dollars in assistance from international donors for post-disaster reconstruction, recovery, and rehabilitation efforts (Bhujel, 2017). However, our observation in the field and findings from data analysis shows that post-disaster public policies and aid dissemination have only served to decelerate economic recovery of households. Descriptive results in Table 4 shows that disaster aid dissemination has been haphazard with no accounting of earthquake damages and household needs. Government's approach has been towards centralizing all efforts, as reflected in the mandate to "channel [all] external assistance through the Prime Minister's Relief Fund" (Nelson, 2015). When we consider the fact that Nepal consistently ranks among the most corrupt countries in Asia, the creation of a centralized National Reconstruction Authority (NRA) to control all aspects of post-disaster policies with the purported intent of "streamlining national and international non-governmental organizations regulation by placing it under a single framework" can hardly be evaluated optimistically (Pradhan, 2018).

Our findings highlight the importance of financial access in enhancing post-disaster resilience. If households are able to borrow money from formal and informal sources and/or sell their liquid assets, they are not constrained into adopting 'bad' coping alternatives such as reducing consumption or sale of productive assets. That is not to say that all forms of financial institutions are uniformly beneficial. Post-disaster policies should remain vigilant against predatory financial institutions that can push agrarian households to adopt measures that can further exacerbate disaster impacts. Moreover, labor market alternatives open up new possibilities of exchanging their knowledge and skills for resources needed for economic recovery. However, our findings indicate that labor adjust involves a critical trade-off between economic and psychosocial wellbeing. When additional household members participate in the labor force or current members in the labor force work longer hours, family and social dynamics are affected. This can happen because of two possible reasons. First, the traditional norms built on caste-based hierarchy stigmatizes *Brahmin* or *Chettri* households from taking jobs that are traditionally perceived as belonging to *Dalits*. Second, these communities are governed by Hindu-patriarchal norms where adult males are breadwinners. Anecdotal stories about household members out-migrating to many Gulf countries to take these *inferior* jobs and adult females entering labor force are abundant. This can have serious negative consequences on their psychosocial recovery. Whether or not this trade-off is worthwhile can only be determined by the specific household. Any post-disaster public policy that attempts to influence those decisions suffers from "the knowledge problem" (Sobel and Leeson, 2007). The more complex the challenge, the more difficult the tasks of prediction and top-down control become. As a consequence, the very solution to one problem ends

up increasing vulnerability in other aspects (Holling, 1996).

In the face of massive public institutional failure to address post-disaster challenges, the sustenance and recovery of Nepalese households rest primarily on their own choice of coping strategies – especially so in rural districts that are largely invisible to international donors, government agencies, and journalists. In that regard, understanding households' choice of coping strategies at both at both individual and collective levels is crucial in that it provides us a window into their recovery processes. Our findings serve an important purpose of informing what ex-post coping strategies households adopted, what worked, and what did not work. By considering both economic and psychosocial lives of households in assessing resilience, we are able to demonstrate that strategies that are deemed effective in enhancing one aspect of wellbeing do not necessarily translate into other dimensions. These inherent trade-offs are highly idiosyncratic and correspond to each household's unique circumstances. Therefore, our findings should not be interpreted to conclude that a specific coping strategy or a set of strategies is/are *the* panacea(s). In fact, our recommendation is precisely the opposite. The purpose of identifying coping strategies and their relative efficacies in enhancing post-disaster resilience is to present a case for expanding market and nonmarket choices that are available to households. Any policies directed towards that goal need to emphasize on a) establishing and strengthening institutions that facilitate market exchanges, and b) cultivating political culture that fosters the coexistence of a multitude of formal and informal institutions and agencies – private, public, or quasi-public – that compete and/or cooperate for the production and provision of various goods and services.

Conclusion

From a purely academic point of view, natural disasters provide exogeneous sources of variation that naturally interests all social scientists. When existing infrastructures and institutions collapse, there are economic, social, and political ramifications that not only permeate through all sectors of human society but also penetrate into cultural and psychological dimensions. We are then forced to rethink our intellectual frameworks, dissolve our disciplinary walls, and reengage in ways that transcend narrow disciplinary theorizing so as to understand and overcome existential threats. The adoption of resilience thinking from ecology into disaster studies stems from an explicit or implicit acknowledgement of such interactive and dynamic nature of social, political, and economic institutions and the natural world under which humans make decisions (Smith et al., 2017). In that regard, one distinctive feature of resilience thinking is that it cannot be confined within disciplinary constraints. By shifting focus away from *one maximization problem-one equilibrium* approach to a framework that accommodates multiple agents, multiple institutions, multiple problems, multiple approaches, and multiple solutions, resilience thinking can open up new avenues of intellectual discourse and policymaking.

Resilience thinking of disaster policies has two implications. First, instead of the thin model of rationality frequently often employed to characterize individuals, it [resilience thinking] compels us to elevate them to "fallible but capable" adaptive beings incessantly engaging in continuous learning and error-correcting processes (Aligica and Boettke, 2011) and continually adapting to changing circumstances and new risks (Mechler,

2016). This dignified treatment of individuals calls for a participatory approach to post-disaster policy formulation and implementation with inbuilt provisions of revisions and reformulations to fit changing needs (Mustafa, 2003). Second, in the face of interconnected problems and multiple potential outcomes, solutions must be flexible and adjustable to account for their unintended externality effects (Smith et al., 2017). Gunderson and Holling (2002) emphasize "adaptive management" for the governance of a socioecological system. Such governance requires a political culture that fosters co-existence and collaboration across multiple agents and organizations representing private, public, and quasi-public sectors. Just like a thriving ecological system that emerges from numerous interactions across multiple species competing and cooperating to adapt to the external environment, a human society based on adaptive management is necessarily polycentric, with multiple loci of power at differing scales (Ostrom, 1998).

This polycentric approach to public policy is especially relevant in the context of post-earthquake Nepal characterized by ethnic/caste-based, religious, economic, cultural, and political cleavages (Rayamajhee and Bohara, 2018a). Moreover, even the same covariate shock affects each household differently and poses unique challenges to each household (Rayamajhee and Bohara, 2018b). If we consider our findings that a) the same coping strategy that has positive impact on one outcome (economic resilience) can have adverse effects on the other outcome (psychosocial resilience), and b) haphazard government policies can hurt, then we are led to conclude that lump-sum policies funneled through one bureaucratic channel can hinder overall post-disaster recovery. That can be devastating to the poor who are particularly susceptible to natural disasters (World Bank

and United Nations, 2010) and face disproportionate disaster damages (Sakai et al., 2017). Even though there is an overwhelming consensus that better post-disaster policies can significantly improve people's welfare (Skoufias, 2003), what constitutes a 'better' policy in countries that are mired in institutionalized corruption and inefficiencies is not clear. The direction that this paper recommends is not one that involves further consolidation of the already ineffective monolithic National Reconstruction Authority (NRA) but one that fosters cooperation and/or competition among multiple autonomous agencies across private, public, or quasi-public domains with varying, even overlapping jurisdictions. Within such polycentric arrangements, policy makers and stakeholders can experiment with diverse approaches within their independent jurisdictions. When one small system fails, another can still operate; and when all small systems fail, larger systems can be called upon (Elinor Ostrom 2003, interviewed by Aligica). Only such people-oriented recalibration of post-disaster policies is consistent with the disaster resilience framework, and can foster adaptive mechanisms that are immune to sudden changes in local conditions.

Table 1: Households by ex-post coping strategies adopted (N=510)

Coping Strategies adopted	Percentage of households
Financial Coping Strategies	
Sale of assets	14.31
Use of savings	34.71
Borrowing	56.86
Any	70.58
Labor Adjustment Strategies	
Advance Labor	13.53
More members in Labor force	6.86
Household member migrated for work	10.39
Any	23.73
Private Transfers	
Family/neighbor/patron help	42.75
Remittance help	7.84
Public (and quasi-public) Transfers	
Government help	85.88
NGO help	67.65
Any	91.37
Household adopted ANY coping strategy (incl. help)	99.61

Table 2: Descriptive Statistics of Variables

VARIABLES	Description	Mean	S.D.
Dependent Variables			
Economic Resilience (ER)	Composite Index representing ability to bounce back to the original level of economic wellbeing [range 4 to 20]	13.05	(2.384)
Components of ER*	Regained pre-disaster level income? [1-5]	3.771	(0.995)
	Recovered lost assets or equivalent? [1-5]	2.039	(1.037)
	Rebuilt house? [1-5]	3.186	(1.383)
	Regained pre-EQ level food consumption level? [1-5]	4.059	(0.837)
Psychosocial Resilience (PR)	Composite Index representing ability to bounce back to the original level of psychosocial wellbeing [range 4 to 20]	14.81	(2.438)
Components of PR*	Recovered from emotional distress? [1-5]	3.143	(1.283)
	Recovered from domestic violence/aggressive tendencies? [1-5]	3.699	(0.993)
	Re-able to socialize with family, friends, neighbors? [1-5]	4.259	(0.695)
	Re-able to engage in community? [1-5]	3.709	(1.057)
Explanatory variables			
Ex-post Coping Mechanisms	Binary Variables unless indicated otherwise		
Financial Coping (total)	Total number of financial coping strategies adopted (0, 1, 2, 3)	1.058	(0.857)
Sale of assets	Sale of productive and non-productive assets	0.143	(0.351)
Use of savings	Use of pre-disaster Savings	0.347	(0.477)
Borrowing	Borrowing from institutional and personal sources	0.569	(0.496)
Labor Adjustment	More household members in the labor force; Advance labor	0.151	(0.358)
Private Transfers	Receive help from friends/relatives/neighbors; Remittance help	0.490	(0.500)
External help (Govt, NGOs)	Receive help from government, NGOs	0.925	(0.263)
Disaster Damages			
House Damage	Equals 1 if household experienced major house damage	0.808	(0.394)
Property Damage	Equals 1 if hh experienced major property damage	0.788	(0.409)
Health Damage	Equals 1 if hh experienced major health injury/death	0.114	(0.318)
Social Participation			
Microfinance	Participation in microfinance group (1 if yes)	0.493	(0.500)
Household Characteristics			
Household size	Number of members in the household	5.606	(2.265)
Age of household head	Age of the household head	47.95	(14.13)
Female	Gender=1 if female	0.555	(0.497)
HH Head Education	*Education Level of household head* None =1; Primary=2; Secondary and Higher=3	1.580	(0.592)
Marital Status-married	Equals 1 if married	0.839	(0.368)
Religion-Hindu	Equals 1 if Hindu	0.714	(0.452)
Caste-Brahmin/Chhetri	Equals 1 if Brahmin or Chhetri	0.420	(0.494)
Occupation-Agriculture	Equals 1 if the household head's occupation is agriculture	0.688	(0.464)
Asset	Asset index based on household assets owned (PCA generated)	2.862	(1.435)
Observations		510	

Table 3: Simultaneous Equation Model Results for Economic Resilience

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Financial Coping Strategies	4.743***	4.351***	4.253***	4.246***	4.315***
	(1.219)	(0.690)	(0.762)	(0.766)	(0.774)
Labor Adjustment Coping Strategies		2.079***	2.172***	2.220***	1.861**
		(0.688)	(0.637)	(0.618)	(0.767)
Government help			-0.557***	-0.496**	-0.496**
			(0.207)	(0.195)	(0.195)
NGO help				-0.198	-0.199
				(0.160)	(0.156)
Remittance					0.582**
					(0.280)
Constant	9.005***	8.783***	9.157***	9.187***	9.253***
	(1.548)	(1.390)	(1.447)	(1.456)	(1.507)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	508	508	508	508	508

Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15

Table 4: Simultaneous Equation Model Results for Economic Resilience by different financial coping strategies

VARIABLES	Model 1 ER	Model 2 ER	Model 3 ER	Model 4 ER
Financial Coping Strategies (total)	4.031*** (0.766)			
Sale of assets		2.946*** (0.488)		
Borrowing			2.838*** (0.869)	
Use of savings				2.982*** (0.503)
Labor Adjustment Strategies	1.880** (0.778)	2.677*** (0.327)	2.648*** (0.592)	2.518*** (0.356)
Government help	-0.458** (0.189)	-0.576** (0.228)	-0.545*** (0.200)	-0.573*** (0.193)
NGO help	-0.184 (0.166)	-0.176 (0.140)	-0.229 (0.158)	-0.188 (0.146)
Remittance	0.551* (0.291)	0.501** (0.224)	0.479 (0.299)	0.401 (0.258)
Constant	9.457*** (1.435)	12.21*** (0.972)	12.00*** (0.838)	11.42*** (0.639)
Observations	508	508	508	508
Controls	Yes	Yes	Yes	Yes

First stage results are omitted for presentational simplicity. Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Simultaneous Equation Model Results for Economic Resilience by different labor adjustment coping strategies

VARIABLES	Model 1 ER	Model 2 ER	Model 3 ER	Model 4 ER
Labor Adjustment Coping Strategies	1.880**			
	(0.778)			
More family members in labor		1.602*		
		(0.930)		
Advance labor			-1.824*	
			(1.100)	
Household member migrated for work				0.334
				(1.309)
Financial Coping Strategies	4.031***	4.494***	4.152***	4.329***
	(0.766)	(1.261)	(1.372)	(1.199)
Government help	-0.458**	-0.427**	-0.422**	-0.449**
	(0.189)	(0.187)	(0.202)	(0.197)
NGO help	-0.184	-0.198	-0.177	-0.178
	(0.166)	(0.168)	(0.181)	(0.182)
Remittance	0.551*	0.552**	0.558*	0.593**
	(0.291)	(0.263)	(0.291)	(0.285)
Constant	9.457***	9.333***	10.56***	9.721***
	(1.435)	(1.562)	(1.946)	(1.718)
Observations	508	508	508	508
Controls	Yes	Yes	Yes	Yes

First stage results are omitted for presentational simplicity. Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Simultaneous Equation Model Results for Psychosocial Resilience

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Financial Coping Strategies	3.080***	3.077***	3.053***	3.020***	2.998***
	(0.746)	(0.665)	(0.674)	(0.667)	(0.668)
Labor Adjustment Coping Strategies		-2.568***	-2.541**	-2.600**	-2.555**
		(0.959)	(1.002)	(1.030)	(1.039)
Government help			-0.0866	-0.217	-0.223
			(0.356)	(0.291)	(0.292)
NGO help				0.420	0.416
				(0.310)	(0.303)
Remittance					0.289
					(0.287)
Constant	11.31***	11.99***	12.05***	12.02***	12.04***
	(1.106)	(1.239)	(1.228)	(1.259)	(1.260)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	508	508	508	508	508

Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1, + p<0.15

Table 7: Simultaneous Equation Model Results for Psychosocial Resilience by different financial coping strategies

VARIABLES	Model 1 PR	Model 2 PR	Model 3 PR	Model 4 PR
Financial Coping Strategies	3.763***			
	(0.631)			
Sale of assets		3.835***		
		(0.337)		
Borrowing			2.947***	
			(0.345)	
Use of savings				4.166***
				(0.459)
Labor Adjustment Strategies	-2.558***	-3.968***	-2.948***	0.264
	(0.945)	(0.761)	(0.911)	(6.218)
Government help	-0.116	-0.163	-0.164	-0.243
	(0.301)	(0.271)	(0.314)	(0.321)
NGO help	0.436	0.503*	0.466	0.421
	(0.304)	(0.285)	(0.323)	(0.261)
Remittance	0.223	0.245	0.295	0.204
	(0.291)	(0.281)	(0.281)	(0.224)
Constant	11.33***	14.25***	13.90***	11.99***
	(1.302)	(1.319)	(1.184)	(2.253)
Observations	508	508	508	508
Controls	Yes	Yes	Yes	Yes

First stage results are omitted for presentational simplicity. Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Simultaneous Equation Model Results for Psychosocial Resilience by labor adjustment strategies

VARIABLES	Model 1 PR	Model 2 PR	Model 3 PR	Model 4 PR
Labor Adjustment Strategies	-2.558*** (0.945)			
More family members in labor		-2.351* (1.245)		
Advance labor			-2.550 (1.744)	
Household members moved away				1.628 (2.546)
Financial Coping Strategies	3.763*** (0.631)	3.876*** (0.530)	3.374*** (0.735)	3.687*** (0.645)
Government help	-0.116 (0.301)	-0.125 (0.278)	-0.0847 (0.311)	-0.110 (0.310)
NGO help	0.436 (0.304)	0.406 (0.285)	0.394 (0.288)	0.414 (0.287)
Remittance	0.223 (0.291)	0.127 (0.237)	0.130 (0.242)	0.201 (0.321)
Constant	11.33*** (1.302)	10.90*** (1.402)	11.99*** (1.825)	10.83*** (1.630)
Observations	508	508	508	508
Controls	Yes	Yes	Yes	Yes

First stage results are omitted for presentational simplicity. Controls included in the model are: age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Kaplan Meier Survival Analysis Graphs

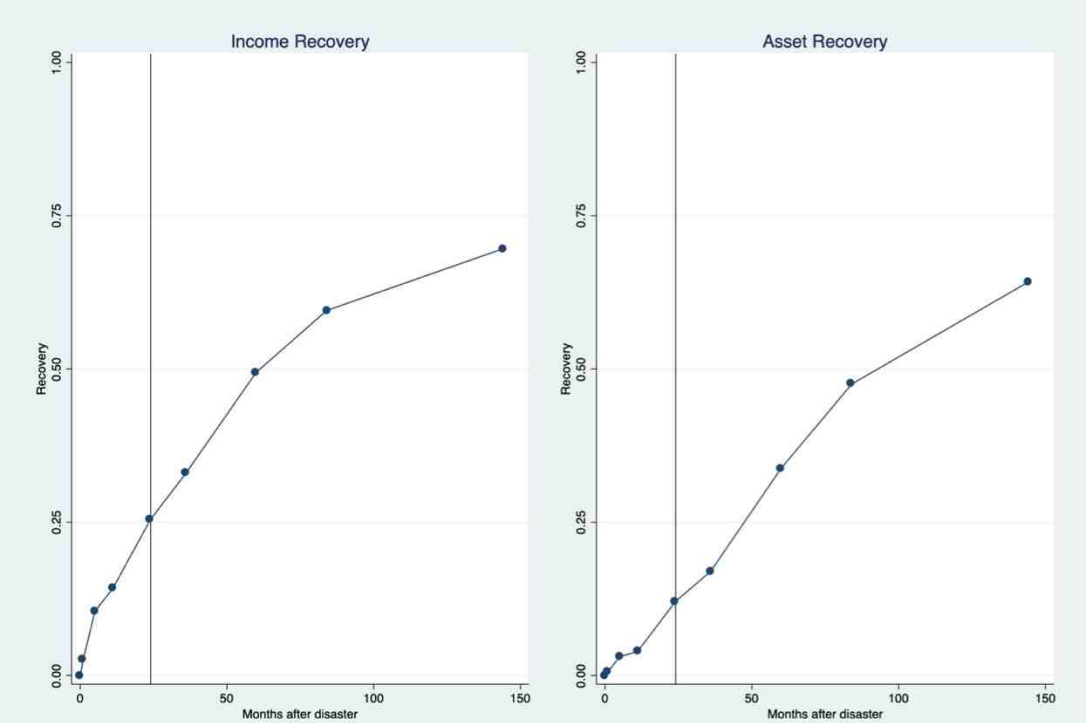


Figure 1: Kaplan Meier Survival Analysis for Income and Asset Recovery

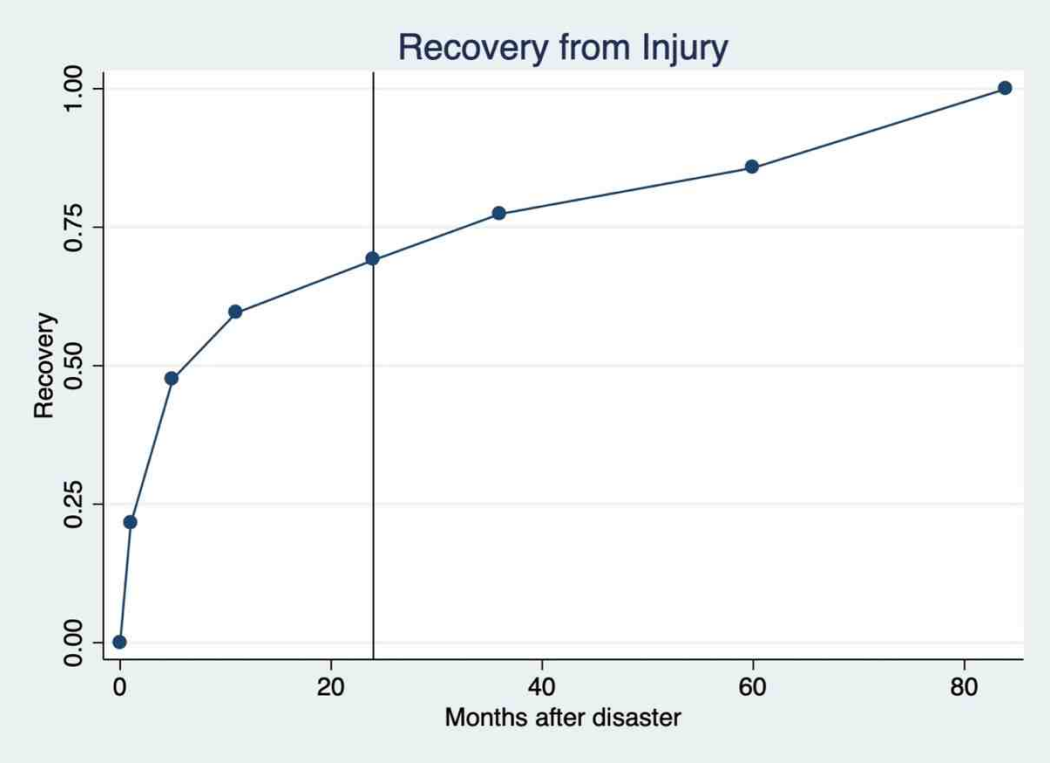


Figure 2: Kaplan Meier Survival Analysis for Recovery from Injuries

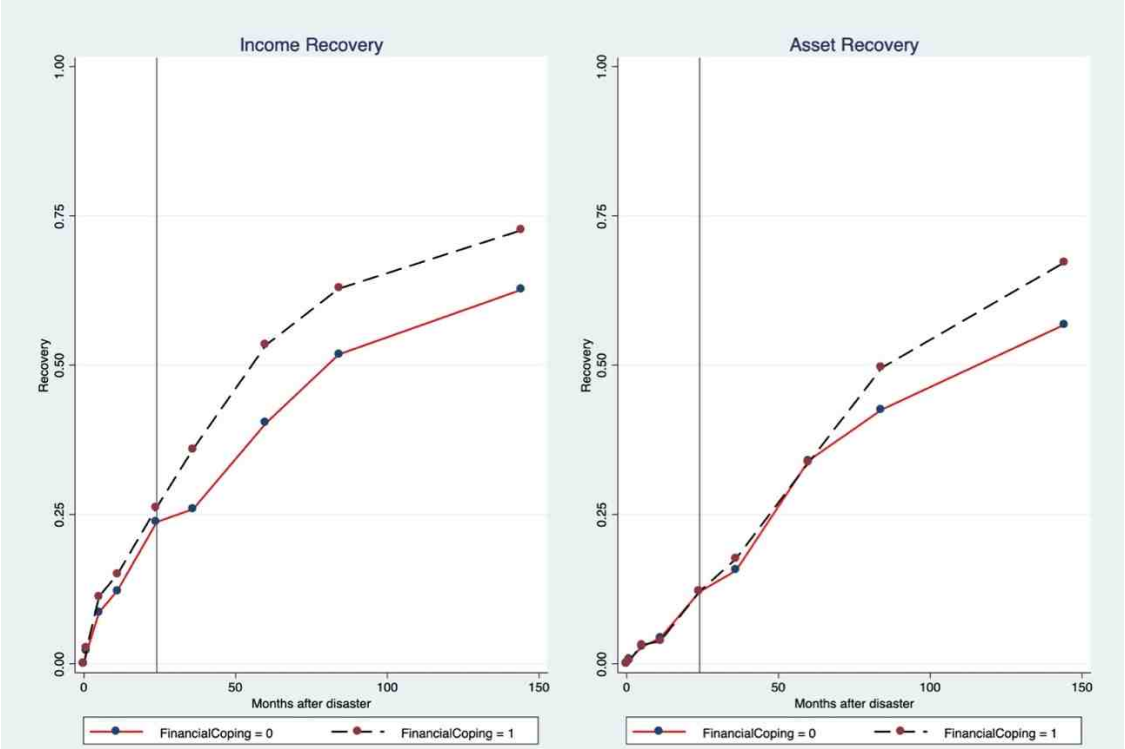
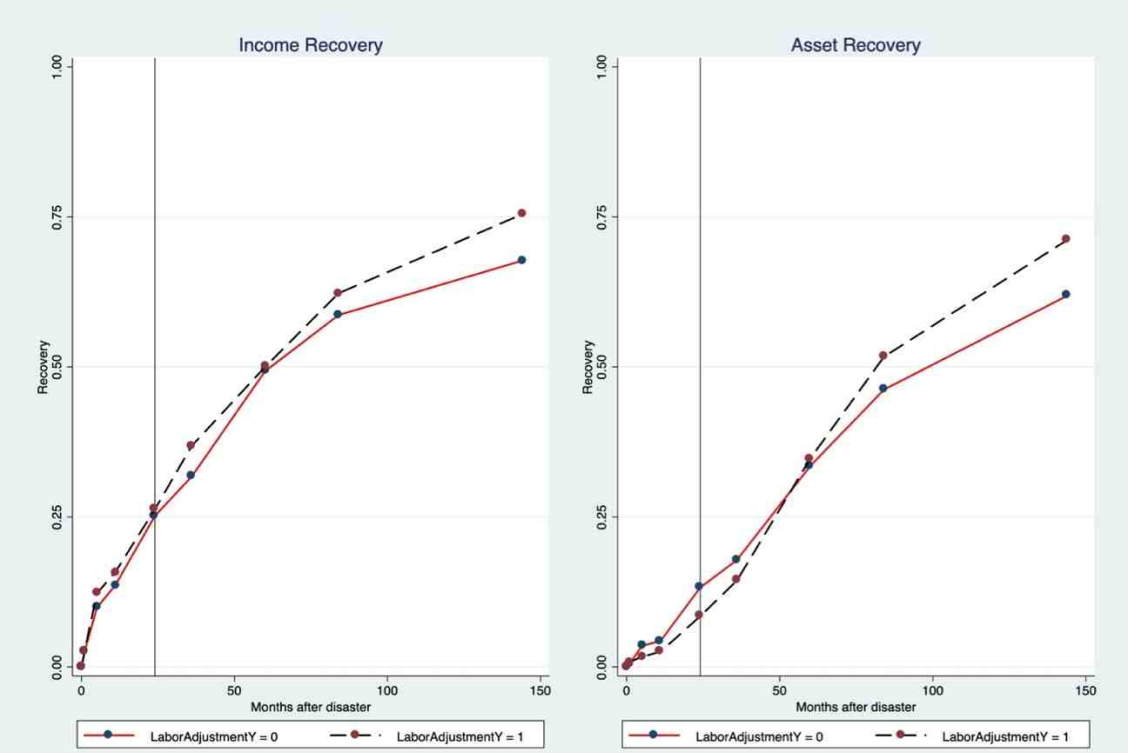
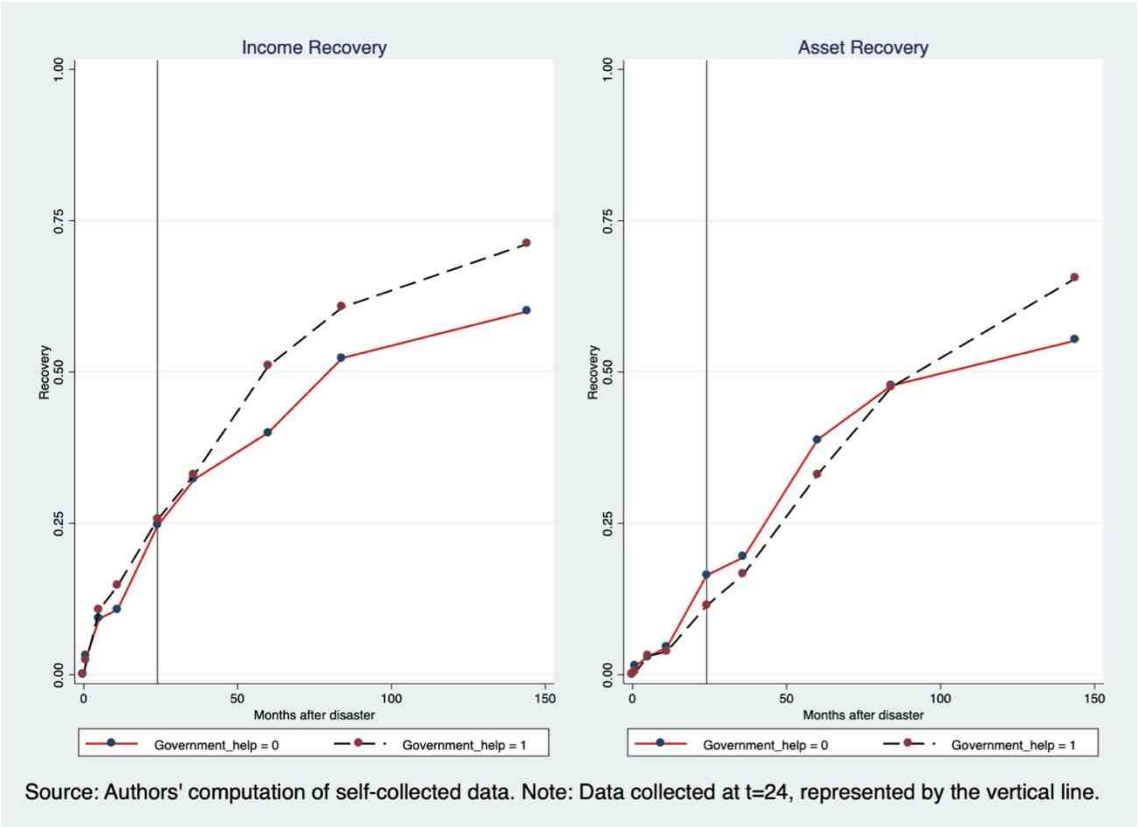


Figure 3: Income and Asset Recovery by Financial Coping Strategy Adoption



Source: Authors' computation of self-collected data. Note: Data collected at t=24, represented by the vertical line.

Figure 4: Income and Asset Recovery by Labor Adjustment Coping Strategy Adoption



Source: Authors' computation of self-collected data. Note: Data collected at t=24, represented by the vertical line.

Figure 5: Income and Asset Recovery by Government Assistance

CHAPTER 3

Social Capital, Trust, and Collective Action in Post-earthquake Nepal

> Until a theoretical explanation – based on human choice – for self-organized and self-governed enterprises is fully developed and accepted, major policy decisions will continue to be undertaken with a presumption that individuals cannot organize themselves and always need to be organized by external authorities.
>
> Elinor Ostrom, Governing the Commons (1990)

Introduction

The issue of post-disaster recovery is a complex one, requiring concerted efforts from public institutions, private firms, and, most importantly, from citizens. The recovery rests on the synchronicity of multiple factors: timely return of residents to the devastated community, coordination of public and private institutions in recovery efforts, readiness of the private enterprise to reopen businesses and organizations, and so on, all of which are directly or indirectly determined by the community's social capital endowment. In that sense, both household and community recovery can be characterized as collective action problems (CAPs) that require multi-level collaboration. However, in communities characterized by low levels of social capital, such collaboration can prove to be an elusive quest. Extant scholarship on disaster resilience has established social capital as a potential driver of post-disaster resilience (Aldrich, 2012a; Buckland and Rahman, 1999; Nakagawa and Shaw, 2004; N. M. Storr et al., 2015). In fact, Aldrich (2012b) argues that social capital serves as a core determinant of post-disaster recovery— more so than a

multitude of commonly referenced socioeconomic factors, magnitudes of disaster damage, population density, and external assistance. This is especially true in many developing economies mired in rampant poverty and institutionalized corruption, where public institutions hurt rather than help the recovery process by crowding out internal resources and external assistance. In such cases, social capital plays an even more central role in post-disaster relief, rehabilitation, and recovery processes (Chamlee-Wright and Storr, 2010; Wetterberg, 2004). However, if the overarching goal is to develop a thorough understanding of the workings of social capital, we ought to move away from its black-box characterization and further scrutinize the causal chain that connects it to post-disaster resilience.

Since extant scholarship establishes that (a) post-disaster recovery can be characterized as a collective action problem, and that (b) social capital is a core determinant of post-disaster recovery, from (a) and (b), it follows that social capital can contribute to post-disaster recovery by overcoming collective action problems. While it is intuitive that working as a collective unit rather than as atomized individuals makes recovery efforts exponentially more impactful, rigorous empirical demonstration of this causal channel is scarce. In an effort to illustrate this causal link, Aldrich, (2012a) postulates three channels by which social capital can foster collective action: establishing new norms about compliance and participation; providing information; and enhancing trust. In a different but related work, Aldrich (2012b) argues that neighbors with high levels of trust are able to share information about bureaucratic procedures and upcoming deadlines as well as deter post-disaster crimes. On the other hand, higher levels of general trust also increases

chances of organization and resource-pooling (Olshansky et a., 2006), which can improve access to loans, supplies, and other resources (Dow, 1999). Isolating each of these causal channels is an empirical nightmare. Clean laboratory experiments can resolve many identification issues, but the transferability of laboratory findings to real world post-disaster scenarios is easily controvertible. All these challenges are further exacerbated by concerns surrounding the allegedly abstract nature of the notion of social capital. As a result, this potentially important causal link has only received a cursory attention in the current disaster studies scholarship.

In this paper, we leave aside inquiries into the broader social capital-recovery link. Instead, taking Aldrich's (2012b) hypothesis as an axiomatic premise, we focus on illustrating one of the causal mechanisms by which this link is materialized in a post-disaster setting. We employ Ostrom & Ahn's (2008) social capital-collective action framework, – in which trust is presented as "the core link" that connects social capital to collective action – as a theoretical motivation and proceed to empirically illustrate this mediatory role. For the empirical demonstration, we employ primary household data that we gathered from Sindhupalchowk, Nepal following the devastating 7.8 magnitude earthquake in 2015. Because this study concerns itself with individual-level motivators of collective action, we envision social capital as endowment that is not confined to meso- or macro- levels of analysis, but rather defined by an individual's access and participation in different types of voluntary associations and social networks. We employ a series of econometric techniques, including structural equation models and mediation analysis, and demonstrate that [bonding] social capital, mediated by mutual trust, can create an

environment where individuals can voluntarily engage in collective action efforts to overcome post-disaster challenges. In doing so, we provide evidence against Mancur Olson's pessimistic portrayal of atomistic individuals, who, in following their individual self-interest, fail to achieve their common or group interest and thereby get perpetually entrapped in a post-disaster dilapidation (Olson, 1965). The purpose of our empirical demonstration is to present social capital as an adhesive that individuals can, under certain institutional contexts, employ to build mutual trust among one another, which in turn can be mobilized through collective action to elevate themselves from their otherwise "*solitary*, poor, nasty, brutish, and short" lives (Hobbes, 1651).

Previous Research

How can atomized, self-interested, and rational beings, who are primarily motivated by their own immediate payoffs, rise above their parochial individual interests and collaborate for joint benefits if each has ample opportunities to free-ride on the efforts of others? The first generation collective action theorists suggest that they cannot – that is, unless we employ an external, often coercive external authority to change the underlying incentive structures or privatize the whole enterprise (Hardin, 1968; Olson, 1965). Influential works of second generation collective action theorists, including prominent scholars like Elinor Ostrom, have definitively refuted the first generation conclusions. If the underlying institutional rules are incentive compatible and a broad set of 'design principles' are rigorously applied, individuals can and do successfully coordinate (Ostrom, [1990] 2015). Through a series of extensive case studies and systematic meta-studies, Ostrom debunks the naïve either-market-or-state dichotomy, and makes a

convincing case for self-governance (Aligica, 2016). But, as a meticulous empiricist whose works are reflections of her "learning from the people" principle, she is careful to specify the type of "organism" that she is studying, namely the common-pool resource (CPR), and even warns against "policies based on metaphors" (Ostrom, [1990] 2015, p. 23-26). In that sense, extending Ostrom's 'design principles' to a natural disaster setting constitutes a violation of the very foundations that her principles are based on. Nonetheless, her conclusions concerning individuals' ability to consolidate their collective efforts and resolve many common challenges are not unique to CPRs, and are pervasive in diverse settings including in post-disaster scenarios.

Recent decades have seen a surge of literature on collective action and public goods provision, particularly coming from laboratory-based applications of game theory (Chaudhuri, 2011; Poteete et al., 2010). These experimental games have largely debunked the textbook model of self-utility maximizing *Homo economicus* wo/man that occupied the core of standard economic theories. Contrary to the blackboard economic theories, individuals willingly offer money to strangers even when presented with hoarding opportunities (Camerer and Thaler, 1995; Oosterbeek et al., 2004); they sacrifice strict economic payoffs over values such as fairness (Hoffman et al., 2007), cultural norms (Henrich, 2004), and cooperation (Fehr and Gächter, 2002; Henrich, 2004). However, when studying the role of social capital, of interconnectivity between individuals, experimental studies that typically presuppose conditions of anonymity and randomness hit the wall. Gurven and Winking (2008), in a study concerning pro-socialness, show that human behavior within a game of experimental studies bears little

or no resemblance to the "context-rich environment" of the real world where people make decisions. Post-disaster scenario is one such "context-rich environment," whose conditions are near-impossible to replicate in a laboratory setting. Moreover, when the study pertains to both prosocial behavior and a post-disaster context, the transferability of such laboratory findings to the real world requires a major leap of faith, which we do not dare take.

Reports on post-disaster collective action for evacuation, provision of public goods, restoration of public utilities, and increasing access to resources are ubiquitous. Aldrich (2012a) lists a series of cases from across the globe where communities have engaged in collective action following major disasters: locals in some neighborhoods organized to plan cooperative, fireproof housing following the 1995 Kobe earthquake in Japan (Olshansky et al., 2005); residents organized watch communities to prevent theft after the 2010 Haiti earthquakes (Burnett, 2010); In Manitoba, Canada, many coordinated communities engaged in evacuation activities following the Red River Flood (Buckland and Rahman, 1999); In Mexico, *los damnificados* (victims) formed collective union to pressure the government to provide housing (Ovalle, 2010); in New Orleans, following Hurricane Katrina in 2005, some residents mobilized the local church to provide club goods to encourage others to return to their communities (Chamlee-Wright and Storr, 2009). In light of these cases, one may incontrovertibly say that individuals often engage in many post-disaster collective activities defying all *Homo economicus* orthodoxies: they often forgo direct economic benefits, engage in charitable efforts that do not directly benefit themselves, and choose not to free-ride even when presented with ample

opportunities to do so. Although appealing to an altruistic model of human behavior is one way we could rationalize these phenomena, doing so puts us in a blind-spot since we do see a rise in illegal and disruptive activities in many instances (Lee and Bartkowski, 2004). Social capital, on the other, allows us to explain such prosocial behaviors during post-disaster contexts without appealing to a stringent model of human behavior.

Field survey studies on the socioeconomics of natural disasters are abundant (e.g. Alam & Rahman, 2014; De Mel et al., 2012). A similarly large body of literature exists on social capital (Dasgupta, 2000; Putnam, 2000; Thöni et al., 2012). However, studies connecting these two strands of literature, on both theoretical and quantitative-empirical levels, was mostly absent until recently (Aldrich, 2010, 2011, 2012a; Aldrich and Meyer, 2015). Scholars across disciplines have issued and repeated calls for detailed investigations into "quantitative assessments of social capital as applied to disasters"(Aldrich, 2012a; Chandra et al., 2010; Koh and Cadigan, 2008). In a way, this paper is a response to those calls. However, rather than simply providing additional proof of social capital's role in a post-disaster scenario, we attempt to fill in the gap in literature by answering the "how" question: that is, we provide an answer to the question "how does social capital enhance post-disaster resilience?". Expanding on Ostrom & Ahn's (2008) hypothesis, we present trust as the connector that establishes the causal link between social capital and post-disaster collective action. In other words, we demonstrate that social capital increases trust among individuals, which, in times of crises such as natural disasters, can foster collective action activities. To do so, we take a quantitative

approach with hopes of providing a more generalizable narrative to the otherwise rich but mostly qualitative literature connecting social capital and post-disaster resilience.

Analytical Framework

Elinor and Vincent Ostrom's approach can be described as one that aims "not so much at grand theory building but rather at specific problems of collective action, governance, and social dilemmas" (Aligica and Boettke, 2011). In that sense, all theories of collective action are context specific, and that a fuller understanding of collective action requires investigating into the broader institutional framework under which the theory itself is realized. Figure 1 provides an analytical framework that paves way for rest of the paper. The arrows that connect variables inside the box relate to pay-off functions in a cooperative game-theoretic framework[15], whereas institutional rules are the 'invisible forces' that shape these pay-off structures in the first place. Different structural and contextual variables can also influence each of these pieces in many ways, which are represented by variables outside the box.

[Insert Figure 1]

This analytical framework is based on institutional rules that allow for reciprocal norms to exist and operate in the realm of collective action. We postulate that, in communities governed by norms of reciprocity, social capital builds trust among members, which in turn increases the likelihood of participation in collective action. That is, the

[15] Theoretical framework for collective action based on reciprocal norms is consigned to online appendix-1.

interconnectivity between members in a community creates conditions such that mutual trust can be built and strengthened based on a common understanding of what constitutes socially laudable and/or reprehensive behaviors. It is through the incorporation of these norms into each individual's pay-off function that the classical Prisoner's Dilemma (PD) game of public-good provision is transformed into a game of assurance such that the possibility of a successful collective action emerges (see Fig. 2). It should be borne in mind, however, that under an alternate set of institutions characterized by restrictions on voluntary collective action and other congregations, these relationships may manifest differently. Our attempt here is not to theorize but to ground empirical analyses in institutional and contextual realities of post-earthquake rural Nepal.

[Insert Figure 2]

Data and Measures

Data Collection

The dataset employed for this study was collected by the lead author with support from the [institution name omitted for peer review purposes] and [institution name omitted].[16] The field survey took place in May-July 2017 in Sindhupalchowk, Nepal with the primary objectives of assessing household level impacts of the 2015 earthquakes and evaluating household responses to the quakes. The fact that Sindhupalchowk was the worst affected district with around 3440 casualties motivated our location choice for the study. The study period was carefully determined to allow for enough variation in

[16] The data collection was part of a research project titled "Determinants of household resilience against natural disaster shocks: pre-post and ex-post analyses of the 2015 earthquakes in Nepal." The project aimed at assessing the immediate household impacts of the 2015 Nepal earthquakes and investigating households' coping responses.

household and community level coping responses as well as recovery processes. During the time of the field survey, most village towns and public infrastructures decimated by the earthquake had not been rebuilt, particularly in remote areas that were only accessible by feet. Wards 8 and 9, which represent the remotest villages included in our analysis, were accessibly only after three to four hours of uphill hike from the closest bazaar with paved road. The lead author and enumerators spent two months in the earthquake devastated villages collecting quantitative data, listening to verbal testimonies, and reaching out to public authorities and village chiefs. The data collection was done using face-to-face interviews with representatives from households selected using stratified random sampling procedure. In each village (denoted in the dataset as wards), the sample size was proportional to the overall population size. The effective response rate was over 97%.

A brief overview of the study area (Summary Statistics)

We interviewed over 500 households in Basbari, Sindhupalchowk. At the time of the field study, Basbari had just been merged into the greater Melamchi municipality under the jurisdiction of the municipal government after having recently restructured as a separate Basbari Village Development Committee (VDC, i.e. a cluster of multiple village units under the administrative jurisdiction of a VDC chief/chairperson). There was a significant confusion among people (and surprisingly among local administrative officials) regarding the final administrative boundaries, as there were rumors about further restructuring. To avoid ambiguity, we retained the original (2011) administrative boundaries. Henceforth, wards will refer to the pre-2011 administrative boundaries.

Basbari comprises of nine wards, which represent the lowest level of administrative units in Nepal. Our respondents belong to diverse socioeconomic, ethnic and cultural backgrounds, with their shared earthquake experiences being the unifying characteristic. 55% of the respondents are female with an average age of 39 years; 83% are married; 34% live in non-nuclear family settings; 41% of our respondents have not receive any formal schooling, and 23% have only attained primary school (grades 1-5) level education. The majority of households (68%) engage in agriculture as their primary occupation. Over 12% of Basbari residents belong to *Dalit* (lowest in the caste hierarchy) 40% belong to one of the *Janajati* (marginalized indigenous) groups. 71% are Hindus, and 27% are Buddhists (see Table 1). To put in perspective, our study area comprises of heterogeneous communities characterized by religious and ethnic (caste-based) cleavages in a rural setting in a developing country.

As a result of the 2015 earthquakes, roughly 12% of Basbari residents suffered from severe bodily harm (injury, death), whereas over 80% lost their homes and another 8.6% experienced some damages (Rayamajhee and Bohara, 2018). By the time of the field study, over 93% still suffered from emotional distress from the earthquake (ibid.). In a post-disaster context characterized by loss and distress, households still manage to participate overwhelmingly in collective action efforts. Figure 3 shows that 51.57% of Basbari residents actively engaged in post-disaster collective action efforts, with an astounding 24.02% reporting very high degrees of participation. This leads us to inquire into the underlying factors that motivate such high rates of collective action efforts.

[Insert Figure 3]

Variables for Empirical Estimation

Table 1 presents descriptive statistics for the sample of households.

a. Post-earthquake Collective Action

Each household representative was asked the following question: *Following the earthquake, how actively did you participate in disaster recovery/reconstruction projects?* To ensure that the respondent understood the question, each enumerator was trained and instructed to elaborate using tangible examples what such projects included: examples include rebuilding a local shrine, participating in community programs, and taking leadership efforts to rebuild schools and roads. Responses were recorded on a likert-scale ranging from 'very inactive (1)' to 'very active(4).' The mean score was 2.43 and the standard deviation was 1.173.

b. *Trust*

A conceptual distinction between trust, trustworthiness, and reciprocity is apparent. We trust those who we deem to be trustworthy, as simple as that. In other words, trust refers to one's perception pertaining to the "reliability of others' dispositions and motivations" (Ferguson, 2013). As Ostrom and Ahn (2008) suggest, trustworthiness can be understood as a component of one's social capital endowment, whereas trust is a product of that endowment (p. 27). However, when we attempt to untangle these concepts empirically, most measures we employ to quantify them end up measuring similar or closely related concepts. In other words, the quantification of trust, trustworthiness, or reciprocity, at least in most observational settings, is prone to duplication and measurement errors.

To account for such operationalization issues and definitional ambiguities concerning trust, we use measurement model to 'distill out' trust. To do so, we employ three separate measures of trust: *a) Trust in people, b) Generalized Trust, and c) Reciprocal ties*. *Trust in people (T_1)* is a variable that captures one's ability to trust people in the village. T_1 can take three numerical values ranging from 1 (none) to 3 (high). *Generalized trust (T_2)* is a binary variable that takes on a value of 1 if the respondent thinks that "*Most people can be trusted*" and a value of 0 if s/he thinks that "*You can't be too careful in dealing with people*." Finally, *Reciprocal ties (T_3)* measures one's perception about the likelihood that friends and/or relatives will reciprocate financially in times of need. Like T_1, T_3 can take three values ranging from 1 (none) to 3 (high). In other words, these three measures of trust (T_1, T_2, T_3) are used to estimate *Trust* (T*), which therefore is a latent variable.

c. Social Capital

The task of pinning down the concept of social capital and/or quantifying it with precision is not an easy one. As many before us have highlighted, social capital, despite its powerful, intuitive appeal, "can take on many different forms," and is "fiendishly difficult to measure" (Dasgupta, 2000; Ostrom, 2000). However, despite these challenges, as Ostrom (2000) points out, there are "underlying similarities among all of the diverse forms" in that those who dedicate resources into "constructing patterns of relationships among humans are building assets whether consciously or unconsciously" (p. 178). This asset that relates to human connectivity is what social capital aims to encapsulate. For our empirical estimation, we use participation in community activities through formally registered membership-based and loosely organized groups. Based on

several focus group interviews, we revised and expanded our original list to include all possible voluntary associations and divided them into 11 categories. Principle Component Analysis is conducted to reduce these potentially multicollinear categories into two orthogonal components each representing bonding and bridging/linking social capital[17]; the former pertains to bond across homogeneous, like-minded individuals within a community, whereas the latter relates to inter-group or across hierarchy links respectively (Storr and Haeffele-Balch, 2012; Woolcock, 2001).

d. Contextual variables and socioeconomic controls

While the temptation to craft a unified theory of human behavior is pervasive across social sciences, a recognition that individual behavior responds and adapts to contexts in which interactions take place, and that it [individual behavior] is not simply a function of individual differences is crucial if we are to make any progress in understanding how individuals make decisions (Ostrom, 2010; Walker and Ostrom, 2009). The context of our study is one of an ethnically diverse, rural post-disaster setting in a developing country. To account for disaster impacts on households, we include two variables: *Health damage* and *Property damage*. Because subjective perceptions of similar future events influence one's collective behavior, we also include *Next EQ* variable. Many other structural variables are found to affect individual behavior in social dilemmas: size of the group, heterogeneity of participants, their dependence of the benefits received, among others (Aligica and Boettke, 2011). Admittedly, a detailed accounting of the institutional context encompassing cultural and historical considerations under which individuals

[17] See Appendix-4.

make economic and political decisions is beyond the scope of a quantitative, empirical investigation. So, as Boettke (2018) frames it, for the purpose of analytical tractability, we simply take many of them as "part of the background conditions" (p. 944). Nonetheless, we acknowledge that these are crucial considerations, so we try to empirically account for them by including variables such as *Community size*, *Generations in Community* (i.e. how long the family has lived in the community is a proxy for historical roots), *Caste-Dalit* (traditionally marginalized caste treated as 'untouchables'), *Caste-Janajati* (traditionally marginalized, indigenous groups not categorized as 'untouchables'), and *Religion-Hindu* in our analyses. Additional controls include gender, age, marital status, education, and occupation. Further details on how these contextual and socioeconomic variables are coded, and their means and standard deviation values are presented in Table 1.

[Insert Table 1]

Empirical Estimation and Results

The Empirical Model

We take the analytical framework from the previous section and translate it into a general mixed (latent and observed) structural equation model (SEM) system. Structural equation models have been extensively used to formalize complex relationships involving latent and observed variables in econometrics (see e.g., Di Tommaso et. al., 2007; Krishnakumar, 2007), and development economics (see e.g., Ballon, 2018; Krishnakumar and Ballon, 2008), among other fields. The use of SEM serves our purpose in multiple ways: first, its illustrative simplicity allows us to consider all potential channels of

influence into a single comprehensive system, second, it allows us to incorporate measurement model for trust within the same analytical structure, third, it allows us to evaluate both the mediated effects (through trust) as well as direct effects of social capital, and finally, it allows us to specify appropriate variance-covariance structure for the system of equations. While a reduced form equation may be a natural way to illustrative the causal channel, doing so will mask the underlying channels and complexities that are central to our narrative. The SEM system employed for our empirical analysis can be represented by the following multi-equation model:

STRUCTURAL EQUATION MODEL:

$$CA = \alpha_0 + \alpha_1 T^* + \alpha_2 SC_{bond} + \alpha_3 SC_{brid-link} + \alpha_4 CV_1 + \alpha_5 X_1 + \alpha_6 X_2 + \varepsilon_1$$

$$T^* = \beta_0 + \beta_1 SC_{bond} + \beta_2 SC_{brid-link} + \beta_3 Z_1 + \varepsilon_2$$

$$SC_{bond} = \delta_0 + \delta_1 X_1 + \delta_2 X_2 + \delta_3 X_3 + \delta_4 X_4 + \varepsilon_3$$

$$SC_{brid-link} = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 X_4 + \varepsilon_4$$

Measurement Model for Trust:

$$T_1 = \phi_0 + \phi_1 T^* + \varepsilon_5, \phi_1 = 1$$

$$T_2 = \varphi_0 + \varphi_1 T^* + \varepsilon_6$$

$$T_3 = \theta_0 + \theta_1 T^* + \varepsilon_7$$

In the above set up, the relationships between post-disaster collective action (*CA*), trust (*T**), bonding social capital (SC_{bond}) and bridging/linking social capital ($SC_{brid-link}$) are represented by the first two equations. Equations 3 and 4 account for the endogenous

processes that determine households' social capital endowment. The remaining equations 5-7 represent different measures of trust: *Trust in People* (T_1), *Generalized Trust* (T_2), and *Reciprocal Ties* (T_3). Because all variables of trust (T_1, T_2, T_3) can suffer from measurement issues, we model them as functions of the actual trust (T*), which, as discussed in the previous section, is a latent variable. Note further that the coefficient for actual trust in equation 5 (ϕ_1) is normalized to 1 so that its magnitude is pegged against T_1. We assume block-independence between the two systems, i.e. equations 1-4 and 5-7. Moreover, we allow for contemporaneous correlation across trust (2), and bonding (3) and bridging/linking (4) social capital equations to account for potential interdependency and/or simultaneity. Doing so is vital to our analysis as there could be unobserved determinants of participation in community groups that could also influence levels of trust and vice versa. For robustness purposes, we test multiple variance-covariance structures to see if that impacts our findings in any way; they do not.[18] Rank and order condition are examined to ensure econometric identification.[19]

Results

Asserting causality using a SEM approach alone can trigger contentious debates (Mueller, 1999). Nonetheless, it [SEM] is a powerful tool to assess the accuracy of complicated causal relationships that are *a priori* identified in the literature (Toma et al., 2012). In that regard, we employ SEM not to ascertain causality but to test the validity of the conceptual framework for understanding collective action postulated by Ostrom and

[18] See Appendix Table A-5
[19] See Appendix-2.

her co-authors (see Ostrom and Ahn, 2008; Walker and Ostrom, 2009) and further expanded and/or examined by social scientists in many post disaster scenarios (e.g. Aldrich, 2012; Chamlee-Wright and Storr, 2009; Storr and Haeffele-Balch, 2012). For internal validity purposes, we employ traditional econometric techniques using instrumental variables that are conventionally employed to make causal claims and compare them against the SEM models under different variance-covariance structures. Table 2 provides a comparison of results from OLS, two-stage least squares, and three-stage least square methods against those of the SEM approach. Coefficients remain robust to alternate modeling approaches. The statistical package (STATA) uses to generate estimates employs iterative generalized least squares (i-GLS) method for the two-stage and three-stage least squares methods, whereas maximum likelihood estimator (MLE) is used in the case of SEM. Notwithstanding differences in convergence approaches, our results across models 2-4 are near-identical. Compared to models 2-4, we find that OLS underestimates the role of trust and overestimates the role of social capital. Results from two- and three- stage approaches are identical because the model is exactly identified. The purpose of this exercise is to demonstrate that SEM is essentially equivalent to multi-stage regression methods (2-sls and 3-sls) under specific variance-covariance structures: under limited information assumption, SEM yields results equivalent to those of two-stage regressions, whereas under full-information assumption, it yields results equivalent to that of three-stage regressions. This is not to say that we are able to successfully establish causality, but that the same concerns with traditional instrumental variable (IV) techniques, that is, those pertaining to the satisfaction of exclusion and relevance criteria of applied instruments (particularly weak instruments)

and to the identification issues, are also prevalent in SEM approaches. However, SEM, with its added functionality of integrating measurement models within, enables us to account for measurement issues, which is one potential source of endogeneity. In that regard, our choice of SEM, especially considering its illustrative superiority over the 2SLS approach, is a sensible one.

[Insert Table 2]

[Insert Table 3]

Table 3 reports our main SEM results. Column 1 presents findings on the determinants of post-disaster collective action. An individual with high trust scores, that is, one whose subjective perception about the trustworthiness of his fellow-citizens, neighbors, and friends/relatives is high, is significantly more likely to participate in post-disaster collective action efforts. The coefficients for bonding and bridging/linking social capital indicate that participation in community-based organizations is significantly and positively associated with *CA* efforts. The mechanisms by which this can happen are many, which we shall delineate in the next section. As we discussed earlier, household decisions regarding participation in post-shock collective action (*CA*) are influenced by a host of factors, including socioeconomic, demographic, and contextual variables. We find that households in which members have suffered from major health damage as a result of the earthquake are less likely to participate in *CA* efforts. Moreover, one's expectations regarding future earthquakes also impact *CA* participation. We find that those who think that the next big catastrophe will occur much later in the future are encouraged to engage in such efforts. This is an intuitive finding in a sense that one might consider it futile to engage in any rebuilding or reconstruction projects if they think that the next big

earthquake is impending. Results indicate that males are more likely than females to participate in post-disaster *CA*, reflecting the patriarchal household dynamics in rural Nepal. The negative and significant coefficient for age reveals that younger cohorts are more likely to participate in post-disaster *CA* efforts.

On the other hand, participation in these community-based groups can enhance mutual trust among its membership, and can also help establish relationships with similar groups in other communities. This relationship is presented in Column 2. Interestingly, we find that, among the two categories of social capital included in the model, only bonding social capital (proxied by participation score in community-based user groups) have a significant (and positive) impact on trust. Because bonding social capital represents social ties among homogeneous individuals/groups, it can bring members with shared interests and background together and can amplify mutual trust. On the other hand, while bridging and/or linking social capital can bring people together for collective efforts (as described before), they do not necessarily build mutual trust. On the contrary, the negative sign (although not significant) of the coefficient indicate that participation in religious, civic, political affairs can be divisive. This is not surprising in the current context of globally ubiquitous political and religious polarization. In Nepal's national context, the decade long Maoist insurgency (1996 to 2006) and a series of political upheavals following the Comprehensive Peace Accord signed in November, 2006, testifies to that fact. Lastly, we find that past history of *Family Abandonment* within a family negatively influences trust.

Note that many of the factors that impact post-disaster collective action also influence individual participation in community-based organizations and/or groups (Columns 3 and 4). Furthermore, owing to Nepal's Hindu traditions and their influence on many aspects of social and political lives, we take into account the impact that religion and caste can have in encouraging or precluding entry to many community-based organizations. For example, someone belonging to *Majhi* (Dalit) may face significant barriers if s/he attempts to join a forest user-group, since *Majhis* have been traditionally confined to fishing-related occupations, whereas a *Kami* (another Dalit caste) household, in some cases, may not be allowed to join water user group, because a Brahmin-dominated group may treat her/him as an untouchable; similarly, an adherent of *Kirat* faith may not be able to join a *Guthi-Samaj* (a religion-based welfare group). As suspected, results reveal that being a *Dalit* is a major barrier to entry for both user groups and civic/political groups. *Janajatis* on the other hand, do not face as dire levels of discrimination as do the Dalits. Note, however, that the coefficient signs for *Caste-Janajati* in columns 3 and 4 are negative, indicative of its negative (but not statistically significant) association with community group participation. The bottom heavy caste system in Nepal, with more pronounced and numerous sub-caste classifications towards of the bottom of the hierarchy leads to weak social capital towards the bottom at both intra- and inter- caste levels. This weaker social capital among ethnic minorities or marginalized groups is prevalent in other Asian countries[20]. On the other hand, *Hindus* have higher levels of bonding as well as bridging/linking social capital, reflecting the cultural and political

[20] Arouri et al. (2015) observe a similar relationship in their disaster resilience study in Vietnam.

dominance that they [Hindus] continue to enjoy, relative to non-Hindus, in the former Hindu kingdom of Nepal. Coefficients for other controls show that being a female is associated with lower levels of social capital (of both categories); Joint-family households, perhaps owing to their bigger family sizes, tend to have higher levels of bonding social capital, but this does not lead to higher levels of bridging/linking social capital; Households whose primary source of income is agriculture tend to have higher levels of participation in user groups; Educated households tend to have higher levels of social capital (both categories).

Columns 5, 6, and 7 show results from the measurement model. As discussed earlier, the coefficient for reciprocal ties (T_3) is pegged at 1. The significant (and positive) coefficients for *Trust* mean that the relationship between the latent variable and its measures is consistent and that the chosen indicator variables are relevant.

All of the these models are estimated using linear regressions with robust standard errors where the processes (equations) that predict trust and social capital are allowed to contemporaneously correlate. The path diagram for the specified SEM model (Table 3) is presented in Figure 4.

The Mediatory Role of Trust

Table 4 displays results from the mediation analysis. Following SEM estimation, we compute direct and mediated effects that the two categories of social capital have on post-

disaster collective action[21]. Panel A presents direct and indirect effects of bonding social capital, whereas Panel B reports those of bridging/linking social capital. We find that bonding social capita has both direct and indirect (that is, mediated through trust) effects. Roughly 40% of the total effect that bonding social capital has on collective action is mediated through trust. In other words, trust explains 40% of the association between bonding social capital and collective action. This is crucial from a policy perspective, because any measures that aim at enhancing bonding social capital but somehow ends up depleting mutual trust through misaligned incentives does disservice to the community. On the other hand, while bridging/linking social capital has direct effects on collective action, we find that no (significant) effect is mediated through trust in this case. In fact, the negative (but not significant) sign points to the opposite direction.

While this study does not delve into the innerworkings of the direct (non-mediated) impacts of social capital, many of these effects have been extensively investigated. Some of these effects occur through increased access to informal and social-resources (Beggs et al., 1996), social-learning (Storr et al., 2017), provision of club goods (Chamlee-Wright and Storr, 2009), increased solidarity and civicmindedness (Tatsuki, 2007), and so on.

[Insert Table 4]

Sensitivity Analysis

[21] The adjacent flow-diagram helps us understand how these effects are calculated. Path A represents the causal effect of social capital (any type) on trust, path B links trust to collective action, and path C is the direct link between social capital and collective action. Indirect effect of the specific form of social capital occurs through paths A-B and is calculated as the product of these two effects (Direct effect=A*B). Total effect is the sum of direct (C) and indirect (A*B) effects, that is: Total effect=A*B+C.

A number of robustness checks were implemented to evaluate the sensitivity of our results to alternate modeling approaches and specifications[22]. Our findings hold.

Discussion and implications

Our results underscore the central role that social capital plays in resolving collective action problems, which is critical for post-disaster recovery. Our findings that both a) strong ties among homogeneous members in a group (bonding social capital), and b) weak ties among heterogeneous groups or vertical ties across hierarchies (bridging and linking social capital) lead to higher levels of post-disaster collective action corroborate the claim by Nakagawa and Shaw (2004) that social capital is indeed the "missing link to disaster recovery." We provide further evidence that bonding social capital also has indirect effects, in that, it results in a higher degree of mutual trust among members in homogeneous groups, thereby increasing probabilities of cooperation for collective action. On the other hand, secondary findings reveal some disconcerting realities. Caste and religion are strong (negative) predictors of both bonding and bridging/linking social capital. This suggests that caste- and religion-based discrimination continue to preclude membership in community-based organizations. Even though Article 24 of the newly promulgated constitution of Nepal has established the *Right against Untouchability and Discrimination* (Const. of Nepal, 2015), constitutional guarantees alone are insufficient. Perhaps formal rules that reward inclusion in many facets of social life would be a step

[22] Detailed description and results from robustness checks are provided in appendix-3.

forward. Education also seems to positively impact social capital, so that nudges us to remain hopeful.

These results contribute to both theoretical and policy discussions. First, we shed light into the social dimension of human behavior that frequently interacts with, and occasionally even dominates, the strictly (economic) pay-off maximizing behavior. This further emphasizes Ostrom's (2010) point that "a more general theory of individual choice that recognizes the central role of trust in coping with social dilemmas" is needed. The theoretical challenge, however, is not to be misunderstood as one of developing an all-encompassing theory of human behavior, but rather one of fitting multiple configural approaches that enable researchers to investigate factors that "enhance or detract from the emergence and robustness of self-organized efforts within multilevel, polycentric systems" (p. 642). Only such theory or a cluster of non-contradictory, situational theories can satisfactorily reconcile the competitive, (economic) pay-off maximizing behavior in one setting with the cooperative, trust-building, social norm abiding, reflective behavior in a different setting (Ostrom, 2007). Such theoretical framework may take us a step closer towards explaining how a common individual acting solely on his rational will, when facing extraordinary post-disaster challenges, is often willing to subdue his/her strictly atomistic volitions and 'cash-out' the accumulated social capital. In such situations, s/he not only trusts others, but yearns to become trustworthy. To that end, s/he chooses to extend benefit of the doubt to her/his neighbors and naturally elevates the sub-optimal social equilibrium to better optima.

Secondly, on the policy side, this paper provides a more cautionary message than a prescriptive one. By presenting a post-disaster scenario where individuals mobilize their social capital to build mutual trust among one another and participate in collective action, we provide an insight into the domain of human behavior that post-disaster public policies often fail to account for. The implication is rather straightforward: Any policy aimed at overcoming post-disaster challenges or regulating invidious activities should not hinder mutual trust, or tear down the social fabric that is in place. As shown by a recent laboratory based study, any externally imposed minimum standard rules that aim to promote cooperation, although prevent egregious trust violations, end up inhibiting trust formation and depleting levels of trust and reciprocity *irreversibly* (Rietz et al., 2018). Therefore, rather than introducing new rules directed at precluding "bad" behaviors in the aftermath of disasters, a prudent choice could be do let the community's social capital play out its process uninterruptedly.

Our findings should not be extrapolated to conclude that social capital alone can solve first and second order collective action problems. Resolutions of larger CAPs, including many post-disaster recovery challenges, require formal or informal institutions and organizations that, in many instances, bring in ideas, resources, policies, and methods from the outside without an adequate understanding of local environment and social conditions. This paper presents no arguments or evidence to suggest that such programs cannot reach their goals or are somehow less effective. However, if the resolution of CAPs are to go hand in hand with the preservation and advancement of democratic values, norms of self-governance, and more importantly, sustainable development, our

findings are important in that they unequivocally establish that enrichment of social capital and furtherance of local trust are necessary intermediaries to that end. Therefore, any institutions and organizations, that have, as parts of their mission the resolution of CAPs, should strengthen and mobilize existing social capital, and work locally towards building trust and reciprocal norms conducive to economic recovery.

Conclusion

Elinor Ostrom spent several decades resolutely seeking to answer the following question: What are the conditions under which individuals can organize as a collective unit to overcome CAPs associated with the use and preservation of common pool resources? At the heart of her design principles aimed at resolving CPR problems is the quest for a sustainable mechanism of honoring and enforcing commitments (Ferguson, 2013). Such mechanism is virtually impossible to create and maintain without the community's "ability to develop a shared sense of trust" among its members – that is, a sort of a mutual bond and shared understanding that transcends the economic (in its strictest sense) sphere (ibid.). As Ferguson (2013) puts it, "the group needs to develop sufficient social capital to create mutual trust, and thus render cooperative commitments credible" (p. 203). However, developing social capital is a rather elusive quest, especially when we think of it as a policy to be crafted and implemented; there is no *deus-ex-machina* solution to generating it [social capital]. In other words, context matters. A solution that works in one scenario in one community may inhibit resolution in a different scenario in a different community. So, we should be cautious about not transporting Ostrom's CPR findings into a natural disaster setting without a full consideration of the local

institutional context. However, one unequivocal message from her work that we can apply ubiquitously is this: wo/men are not perpetually locked into a prisoner's dilemma puzzle. They are able to come up with solutions to their problems in ways that often puzzle the most omniscient experts, if indeed they exist.

The objectives and findings of this paper are rather modest. Insofar as the metric is the formulation of an effective 'policy solution' to post-disaster recovery, we fail decisively. Instead, what we set forth to do is to illuminate one of the many possible mechanisms by which individuals in a post-disaster setting can come together to rebuild their families and communities. The domain that this paper explores can be categorized as one of institutional design, of 'continuous knowledge process,' where 'fallible but capable beings' incessantly engage in continuous learning and error-correcting processes at operational as well as collective-choice levels (Aligica and Boettke, 2011). It is within the scope of these interactions across different levels that social capital facilitates collective action by altering beliefs and expectations regarding trust and trustworthiness of other agents. If this is forgotten or ignored, our findings serve merely as distractions (p. 57). The paper also refrains from providing in bullet points the determinants of successful post-disaster collective action. In fact, we do not know whether or not these collective action efforts were successful. Success or failure of any post-disaster collective action efforts depends on an array of contextual factors, the determination of which is beyond the scope of this paper. By demonstrating that individuals can mobilize their social capital to build trust among one another and engage in mutually beneficial collective action efforts, we show that citizens, even in the direst and rugged corners of

the world, can mobilize their networks for bettering their conditions. The presumption that "individuals cannot organize themselves and always need to be organized by external authorities," which was pervasive then and still remains the dominant dogma influencing post-disaster policies in Nepal and elsewhere, is ill-informed and needs to be extinguished if enhancing disaster-resilience is the goal (Ostrom [1990], 2015).

Table 2. 1: Descriptive Statistics of Variables

VARIABLES	Description	Mean	S.D.
Dependent Variable			
Post-EQ Collective Action	Following the earthquake, how actively did you participate in disaster recovery/reconstruction projects? (1 very inactive,….4 very active)	2.431	(1.173)
Measures of Trust			
Trust in People	Level of trust among people in the village (1 none, 2 low, 3 high)	2.202	(0.718)
Generalized Trust	General view about people's trustworthiness (Equals 1 if trustworthy, 0 otherwise)	0.536	(0.499)
Reciprocal ties	Likelihood that friends/relatives will financially reciprocate in times of need (1 none, …3 high)	2.566	(0.695)
SOCIAL CAPITAL			
Bonding	Participation scores for Forest, Agricultural, Water groups	-3.49e-09	(1.361)
Bridging-linking	Participation scores for civic, political, religious and sports groups	-5.04e-09	(1.531)
CONTEXTUAL VARIABLES			
Community size	Size of the ward (1=small, … 3 large)	1.869	(0.815)
Generations in Community	Equals 1 if households have lived in the community for more than a generation, 0 otherwise.	0.839	(0.368)
Health damage from EQ	Equals 1 if household experienced major health injury/death, 0 otherwise	0.114	(0.318)
Property damage from EQ	Equals 1 if household experienced major property damage, 0 otherwise	0.788	(0.409)
Next EQ	In how many years do you think the next big earthquake will occur?	139.5	(272.0)
Family Abandonment	Equals 1 if incident(s) of abandonment in the family	.1294	(.3359)
CONTROL VARIABLES			
Female	Gender=1 if female, 0 if male	0.555	(0.497)
Age	Age of the respondent	39.75	(14.70)
Married	Marital Status=1 if married, 0 otherwise	0.839	(0.368)
Family type-Joint	Equals 1 if joint family	0.343	(.4752)
Education	Highest level of education attained (1-6)	2.308	(1.460)
Occupation-Agriculture	Equals 1 if the household head's occupation is agriculture	0.688	(0.464)
Caste-Dalit	Equals 1 if Dalit, 0 otherwise	0.127	(0.334)
Caste-Janajati	Equals 1 if Janajati, 0 otherwise	0.406	(0.492)
Religion-Hindu	Equals 1 if Hindu, 0 otherwise	0.714	(0.452)
Observations		510	

[1]Participation scores generated using Principle Component Analysis varimax rotation-Appendix 1

Table 2. 2: Model Comparison

	Model 1	**Model 2**		**Model 3**		**Model 4**	
	OLS	2SLS		3SLS (Full-information)		SEM (Full-information)	
VARIABLES	**Collective Action**	First-stage **Trust in People (T_1)**	2nd-Stage **Collective Action**	First-stage **Trust in People (T_1)**	2nd-stage **Collective Action**	**Trust in People (T_1)**	**Collective Action**
Trust in People (T_1)	0.167**	-	0.854*	-	0.854*	-	0.854*
	(0.0682)		(0.452)		(0.452)		(0.452)
Bonding Social Capital	0.148***	0.0515**	0.108**	0.0515**	0.108**	0.0515**	0.108**
	(0.0397)	(0.0254)	(0.0502)	(0.0254)	(0.0502)	(0.0254)	(0.0502)
Bridging-Linking Social Capital	0.139***	0.0533**	0.108**	0.0533**	0.108**	0.0533**	0.108**
	(0.0355)	(0.0228)	(0.0434)	(0.0228)	(0.0434)	(0.0228)	(0.0434)
Family Abandon. (instrument)	-	-0.345***	-	-0.345***	-	-0.345***	-
		(0.0926)		(0.0926)		(0.0926)	
Contextual Variables	YES	YES	YES	YES	YES	YES	YES
Household demographics	YES	YES	YES	YES	YES	YES	YES
Socioeconomic factors	YES	YES	YES	YES	YES	YES	YES
Constant	2.648***	2.067***	1.252	2.067***	1.252	2.067***	1.252
	(0.409)	(0.247)	(1.009)	(0.247)	(1.009)	(0.247)	(1.009)
Observations	508	509	508	508	508	508	508
R-squared	0.206	0.096	0.043	0.098	0.043		

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full parameter estimates for Models 1-4 are provided in appendix Table 9.

Table 2. 3: Structural Equation Model Results

VARIABLES	(1) Post-EQ Collective act.	(2) Trust§	(3) Bonding SC	(4) Bridg-Link SC	(5) Reciprocal ties	(6) Generalized trust	(7) Trust in people
Trust (T*)	0.775***	-	-	-	1	1.277***	3.057***
	(0.294)				(0)	(0.250)	(0.795)
SOCIAL CAPITAL							
Bonding (SC_{bond})	0.144***	0.129**	-	-	-	-	-
	(0.0394)	(0.0552)					
Bridging-Linking	0.136***	-0.0543	-	-	-	-	-
($SC_{brid-link}$)	(0.0347)	(0.0462)					
CONTEXTUAL VARIABLES (CV_1)							
Community size	-0.0118	-	-	-	-	-	-
	(0.0591)						
Generations in commty.	0.0249	-	-	-	-	-	-
	(0.138)						
Health damage from EQ	-0.243*	-	-	-	-	-	-
	(0.138)						
Propt. damage from EQ	0.0212	-	-	-	-	-	-
	(0.116)						
Next EQ (expected)	0.000448***	-	-	-	-	-	-
	(0.000155)						
Family Abandonment (Z_1)	-	- 0.116***	-	-	-	-	-
		(0.0448)					
Household demographics (X_1)							
Female	-0.503***	-	-0.265**	-0.449***	-	-	-
	(0.112)		(0.118)	(0.148)			
Age	-0.0111***	-	0.00590	0.00150	-	-	-
	(0.00420)		(0.00512)	(0.00577)			
Married	-0.105	-	0.115	-0.0802	-	-	-
	(0.132)		(0.162)	(0.202)			
Family type-Joint	-0.0130	-	0.249**	0.00613	-	-	-
	(0.102)		(0.115)	(0.143)			
Socioeconomic factors (X_2)							
Education	0.0186	-	0.0869*	0.203***	-	-	-
	(0.0434)		(0.0503)	(0.0618)			
Occupation-Agri	0.161	-	0.226*	0.0892	-	-	-
	(0.106)		(0.116)	(0.133)			
Cultural/Religious factors							
Caste-Dalit (X_3)	-	-	-0.343*	-0.443**	-	-	-
			(0.188)	(0.176)			
Caste-Janajati (X_3)	-	-	-0.261	-0.0351	-	-	-
			(0.173)	(0.208)			

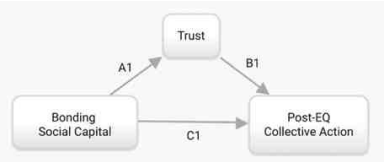
Religion-Hindu (X_4)	-	-	0.574***	0.580***	-	-	-
			(0.169)	(0.185)			
Constant	3.050***		-0.881*	-0.615	2.584***	0.554***	2.240***
	(0.384)		(0.455)	(0.528)	(0.0305)	(0.0241)	(0.0372)
Observations	506	506	506	506	506	506	506

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Equations (2), (3) and (4) are allowed to have contemporaneous correlation. §Trust is a latent variable measured by three indicator variables: reciprocal ties, generalized trust, subjective trust on people.

Table 2. 4: Mediation Analysis

Panel A
Mediator Variable: Trust
Treatment Variable: Participation Score for Bonding Social Capital

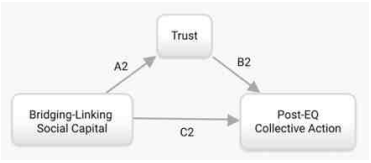
Effect	**Coef.**	**Robust SE**
Average Causal Mediation Effect (A1*B1)	.0999**	(.0427)
Direct Effect (C1)	.1438***	(.0394)
Total Effect (A1*B1+C1)	.2438***	(.0576)
Percentage (%) of total effect mediated	40.97%	



Panel B
Mediator Variable: Trust
Treatment Variable: Participation Score for Bridging-Linking Social Capital

Effect	**Coef.**	**Robust SE**
Average Causal Mediation Effect (A2*B2)	-.0421	(.0358)
Direct Effect (C2)	.1359***	(.0346)
Total Effect (A2*B2+C2)	.0938*	(.0491)

No statistically significant mediation effects



Notes: Authors assume independent causal pathways to conduct mediation analyses.

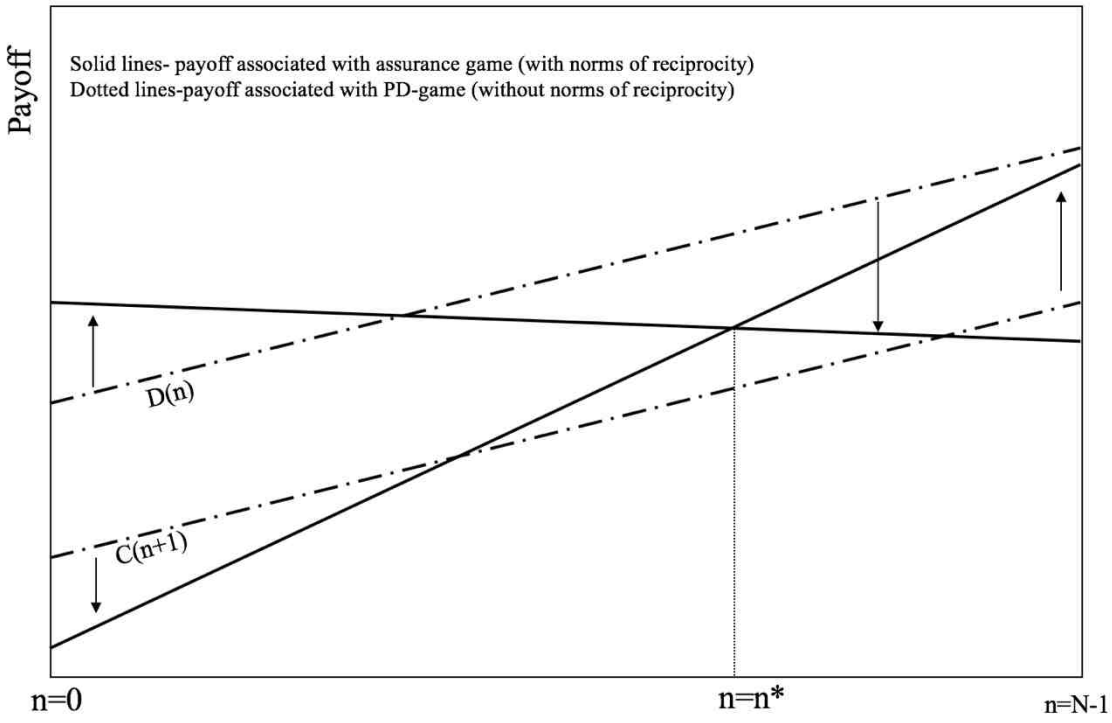


Figure 2. 1: n-Person Game of Collective Action

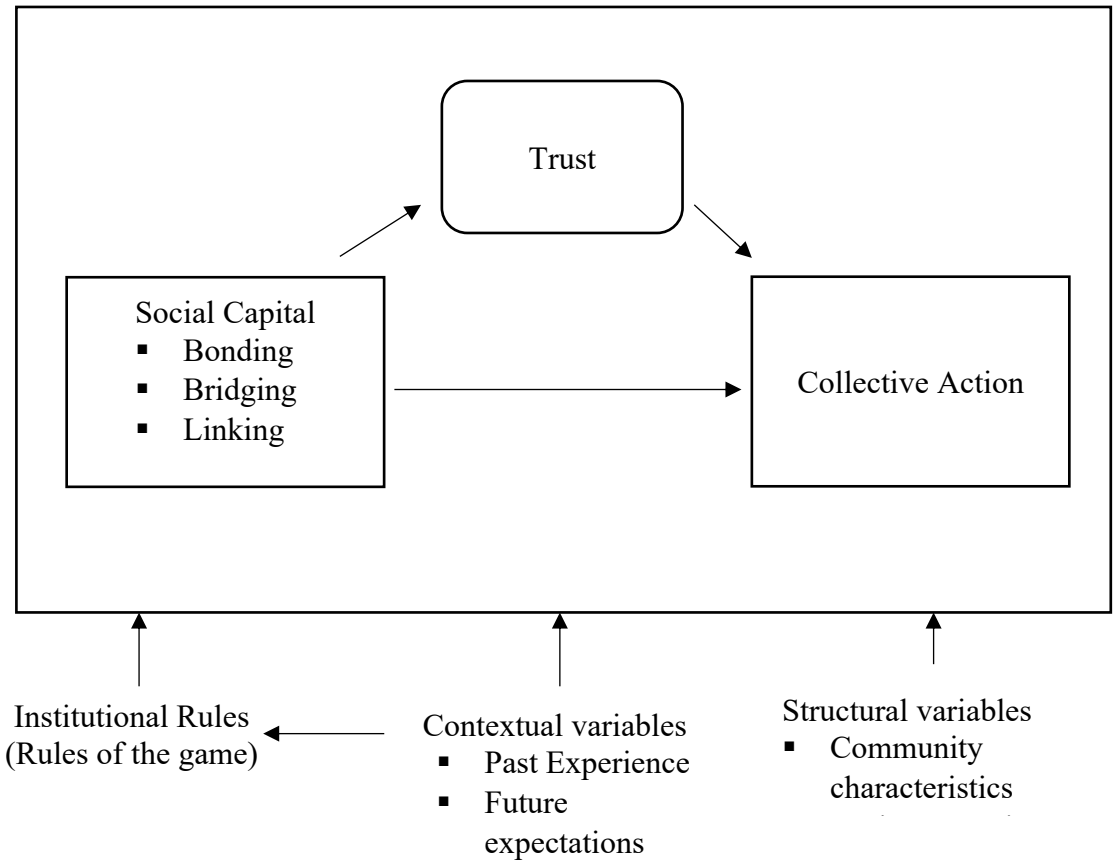


Figure 2. 2: Analytical Framework based on authors' adaptation from Ostrom and Ahn (2008)

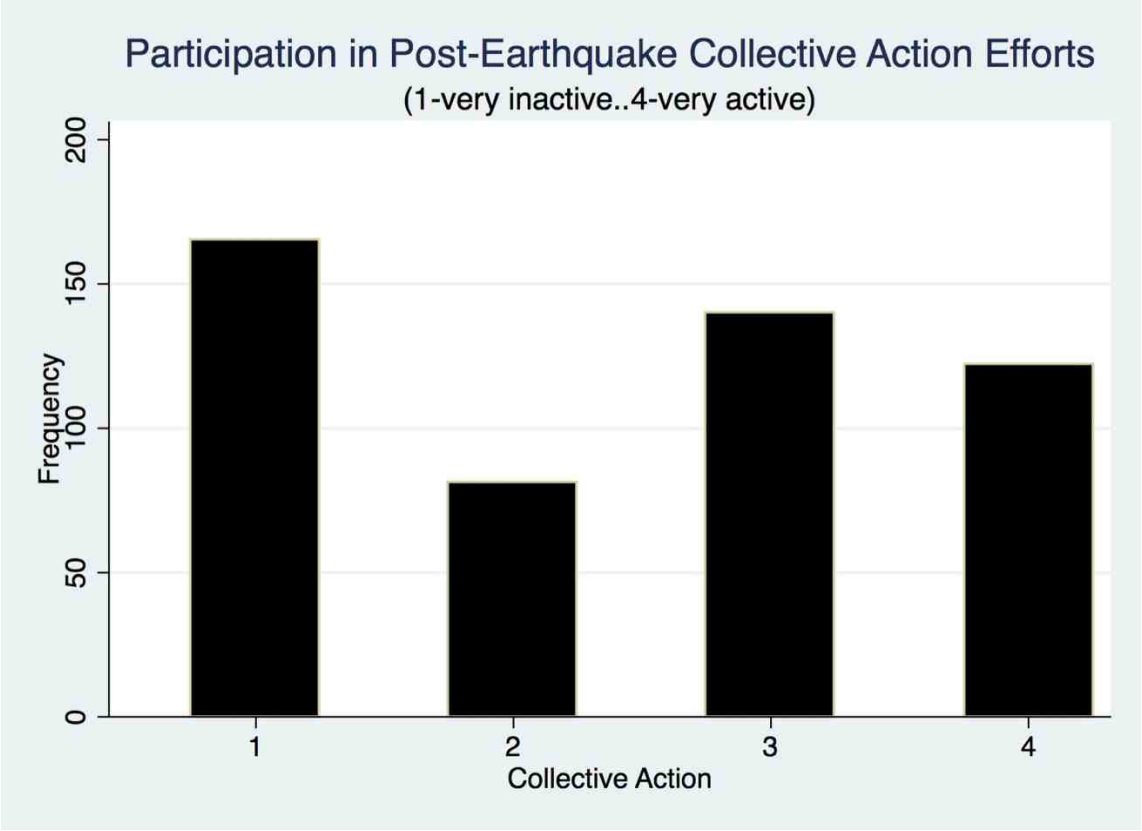


Figure 2. 3: Levels of Collective Action Engagement

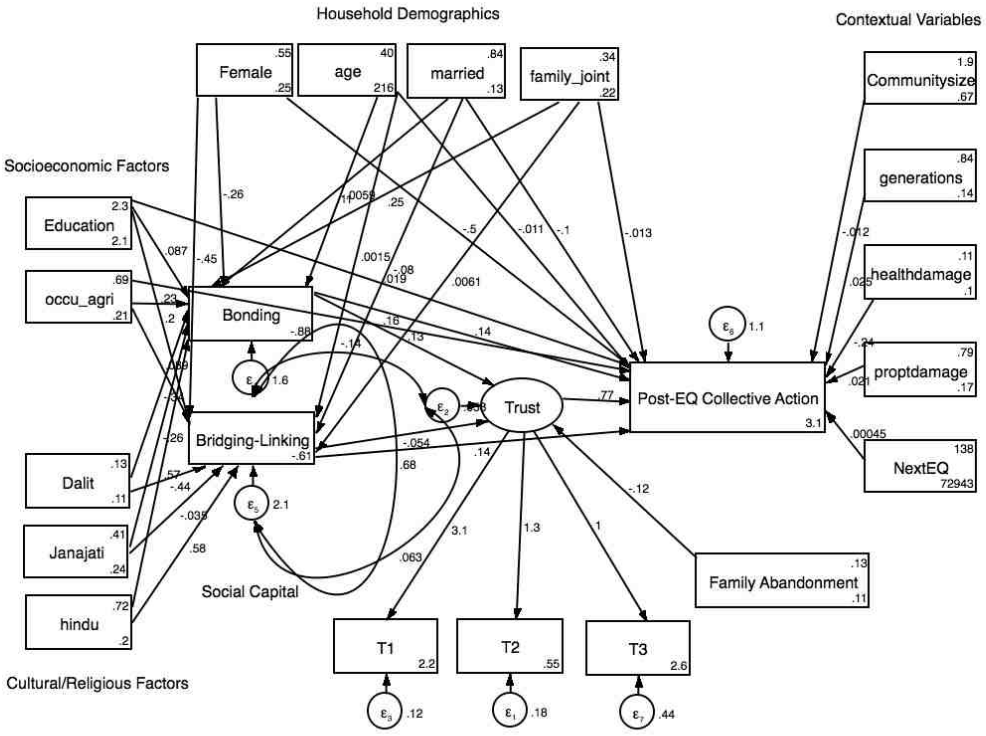


Figure 2. 4: Path Diagram

CHAPTER 4
On the Dynamic Nature of Goods: Applications in Post-Disaster Contexts

Introduction

A few days after the devastating 7.8 magnitude earthquake struck Nepal, the government [of Nepal] released an official statement demanding that "[all] donations be channeled into the Prime Minister's Disaster Relief Fund"(Francis, 2015). The move, motivated by concerns about "the number of groups in Nepal and around the world collecting donations without the government's permission," had implicit goals of reducing redundancy, precluding misallocation of funds, and curbing corruption (Nelson, 2015). Exactly two months following the earthquake, the National Planning Commission of Nepal organized the international conference on Nepal's Reconstruction (ICNR) to raise funds for reconstruction, recovery, and rehabilitation efforts (Bhujel, 2017). Development partners and donors pledged over $4 billion in disaster assistance. However, it took the government another six months to form the National Reconstruction Authority (NRA) and formulate a 'comprehensive five-year plan – Post Disaster Recovery Framework (PDRF)' to utilize funds to address post-disaster challenges. PDRF adopted a recovery vision of establishing "well-planned, resilient settlements, and a prosperous society" and tasked itself with ensuring "safe structures, social cohesion, access to services, livelihood support, and capacity building" (NRA, 2016). In short, NRA became the monocentric governing body charged with all responsibilities of planning, implementing, and overseeing every aspect of post-disaster reconstruction and recovery. To put it differently, it [NRA] was the sole assessor of needs, and provider of all goods –private,

public, or otherwise– that are associated with rehabilitation, reconstruction, and recovery from the earthquake. The lessons that Elinor Ostrom learned from rural agricultural villages in Nepal—that heterogeneous communities across Nepal have unique challenges and that they use a wide range of traditional norms and complex institutional rules to govern their social and economic affairs – were conveniently ignored. Instead, a one-nation-one-solution approach to post-disaster policymaking was adopted as the national mantra to control all aspects of production and provision of all post-disaster goods and services.

An extensive body of literature has debunked the omniscience presumption of expert-guided central planning efforts to elicit and respond to information regarding post-disaster needs of people (e.g. Leeson and Sobel, 2008; Sobel and Leeson, 2006, 2007). However, market-versus-state debates on post-disaster recovery are of limited use without an adequate consideration of the typology and nature of goods and services. The assessment of earthquake damages and/or reconstruction of an interstate highway requires a very different "policy" approach than that of fulfilling household needs. In fact, as we shift our focus away from the national economy to the needs of individuals, households, and local communities, post-disaster challenges become increasingly idiosyncratic. As I have stated elsewhere, disaster damages pose unique challenges to each household, especially in communities characterized by ethnic, religious, and cultural heterogeneity (Rayamajhee and Bohara, Forthcoming). Therefore, debates surrounding the *appropriate role* of the central government or markets are misguided in that they stem from a simplistic private-public dichotomy of goods and services. I contend that most

goods that are naively assumed to be public by many post-disaster aid programs in developing countries are quasi-public; they are characterized by varying degrees of excludability and subtractability, and often fall within the "neither state nor market" domain. On the other hand, some goods that are typically considered private may require non-market provision mechanisms in cases where physical infrastructures or institutional structures that make markets feasible are absent.

This chapter remains agnostic as to whether or not state-led post-disaster assistance succeeds or fails. Without other institutions to compare performances against, empirical studies that evaluate the welfare impacts of state-led post-disaster aid reveal very little. The fact that one agency's involvement in Nepal may have helped prevent worse outcomes says nothing about alternative ways the funds could have been better allocated. A fitting analogy is one of throwing a pebble in a still pond: Such action always brings about ripples, but any plausible claim about its effectiveness requires comparison against ripples from other pebbles. When disaster assistance is treated as a packageable product with prohibitively substantial economies of scale, lumping the production and provision of the package under the jurisdiction of one agency follows naturally, regardless of the number of donor agencies involved and the diversity of goals. For this exercise, we begin with an acknowledgement that national and international agencies will continue to design, implement, control, and supervise many aspects of post-disaster relief, rehabilitation, reconstruction, and recovery, particularly in developing countries, regardless of the potential perverse outcomes of such efforts. Given this reality, the questions this chapter asks and ponders on are as follows: What are the characteristics of

goods and services that constitute a post-disaster relief package? Are such characteristics endogenous? Are they dynamic? The answers to these questions can then pave ways to systematically analyze the appropriate modality(-ies) of post-disaster aid dissemination. A thorough understanding of the nature of each good or service is a necessary first step before we begin to formulate a framework that maps institutional types and levels to the scale of its production and provision.

First, I begin with an analysis of the nature of goods and services from Samuelson onwards. I briefly discuss the limitations and implications of the private-public dichotomy that Samuelson-Musgrave forwarded. Then, Buchanan's contributions to the debate is reviewed. Subsequently, I examine how the Ostroms' framework that was built on the public choice foundation expands the narrow private-public dichotomy and provides a realistic and inclusive taxonomy of goods and services. The third section discusses the dynamic nature of goods and services based on their shifting degrees of excludability and rivalrousness. Because the nature of goods is institutionally contingent, I argue that post-disaster institutional changes can lead to changes in their nature and their typology. The fourth section presents four case studies from different manmade and natural disasters in Chicago, New Orleans, Nepal, and Indonesia to provide empirical evidence for the dynamic nature of post-disaster goods and services. The section delves into challenges that stem from shuffling of goods and services across different quadrants within the good-classification table. Section V briefly touches on the implications of the dynamic nature of post-disaster goods and services on disaster management. The final section concludes.

Beyond the Private-Public Dichotomy of Goods

Samuelson's (1954) formal exposition of what he termed *collective consumption goods* laid the foundation for the modern theory of public goods. He categorizes consumption goods into two types – private and collective – based on their binary characterization as either rivalrous or non-rivalrous. Samuelson, alongside Musgrave, is credited for the textbook definition of a public good as a good that is both non-rivalrous and nonexcludable.[23] Although he viewed his theory as having "little to contribute to discussion of the appropriate role of government," *publicness* of a good has been *the* theoretical justification for its public provision by the state (Hammond, 2015). Because individuals have incentives to hide their true valuation of collective consumption goods when opportunities to free ride on others exist, he contends that such goods are under-supplied by competitive markets. The implication of this Samuelsonian dichotomy is that the "servant" of the "ethical observer," the state, ought to set the optimal taxes and subsidies to ensure optimal supply of such goods. A major deficiency with this conceptualization of goods is that it deals only with polar cases with "little reference to the real world" (Enke, 1955). In fact, a vast majority of goods provided by the government are not exclusively "enjoyed in common" in that one's consumption of such good leads to some subtraction, either in quality or quantity, for others (Margolis, 1955).

[23] Although Samuelson's mathematical definition of public goods from his 1954 paper *The Pure Theory of Public Expenditure* is the most accepted formal model of public goods, the qualitative understanding of public goods owes more to Musgrave's work excludability criterion (Desmarais-Tremblay, 2014). Musgrave (1969) was the first to use both criteria (non-rivalry and non-excludability) for defining pure public goods (Pickhardt, 2006).

Examples include education, hospitals, highways, and even police and judicial services (p. 347).

In an effort to close the gap between Samuelson's "purely private" and "purely public" goods, Buchanan develops the theory of clubs (Buchanan, 1965). While some goods and services can be reasonably called "private" even by the strictest criteria of rivalry and excludability, goods that satisfy the characteristics of collective consumption are hard to find. Instead, they exhibit varying but finite degrees of "publicness". He argues that the utility that an individual derives from the consumption of any good or service depends, regardless of its ultimate place on the private-public spectrum, upon the "number of other persons with whom he must share its benefits" (3). The task he undertook was then to determine the "membership margin" to attain the "most desirable cost and consumption sharing arrangement" (2). Thus, by emphasizing an individual's utility rather than the good or service itself, he makes a subtle case for the "rivalrousness" of all goods. For each good, a unique optimal sharing threshold, N_j can be computed which indicates the degree of its "publicness." Buchanan's model relies on the possibility of exclusion to attain optimal-sharing arrangements, which requires "flexible property arrangements" and "excluding devices" (14). That is, for any given property rights regime and the state of technology with considerable excludability restrictions, club good theory closes some gap in the private-public spectrum but not all gaps. An alternate theory that does not assume away excludability is needed to fill other gaps.

Taking the nature of the goods and services as "the analytical entry point," the scholars of the Bloomington institutionalism picked up where Virginia School left off (Aligica and Boettke, 2009). For Ostroms, the typology of a good determined by the "jointness of use or consumption" on the abscissa and "exclusion" on the ordinate defines its nature (Ostrom and Ostorm, 2002). This framework is a step forward towards understanding both of these attributes (subtractability and excludability) in degrees rather than "all-or-none" categories (p. 77). Understood this way, a good belongs to a specific typology only insofar as its degrees of subtractability and excludability place it to that specific quadrant. In other words, when these degrees change substantially, the nature of a good defined in terms of its publicness (or privateness) also changes. This mode of analyzing goods reveals Ostroms' pragmatic bend since no prior theory of goods – Samuelsonian private-public theory or Buchanan's club theory – had room for rivalrous goods that are non-excludable, namely the common pool resources (CPR).

In the case of CPR, exclusion may not be possible for a number of reasons. Aligica and Boettke (2009) point out that technology and institutions can create forms of exclusion and at times destroy them (p. 40). In the Turkish villages of Bodrum and the Bay of Izmir, the lack of an overarching institutional mechanism to design appropriation rules and address internal conflicts meant that new entrants seeking opportunities for quick economic gains could not be excluded (E. Ostrom, 2015: 145). This led to overfishing and rent expropriation. In fisheries in Nova Scotia and Newfoundland, exclusion was attained because many local villages devised their own rules to determine who can use local fisheries and how resources are to be harvested (p. 144). When exclusion is viewed

as being endogeneous as E. Ostrom does, one can then begin to think about institutional diversity to address the heterogeneity of goods. This provides us with conceptual tools to think about institutional diversity based on the unique position that each good occupies within the subtractability-excludability matrix. If we are to simply follow the logic that private goods are best suited for private provision by a number of firms competing in the marketplace, then any good that has some degree of privateness – that is, those goods that are not fully public – should be provided through some competitive mechanism. Even if we overlook studies that show that public goods can be more efficiently produced by private firms[24], taking this logic seriously leads us to conclude that only purely public goods that are definitively non-exclusive and non-rivalrous are suitable for monopolistic provision by the state.

The challenge then can be defined as that of institutional matching (Furton and Martin, 2019). Framing the problem this way has an advantage over the market-versus-government-failure paradigm in that it facilitates more productive discussions, incites more relevant research questions, and allows one to synthesize insights from public choice and new institutional economics (p. 198). Viewed this way, the relevant question is no longer "what is the appropriate criteria for the provision of goods by the state?" For Ostroms, the public economy does not mean government monopoly but instead a mixed economy with maximum participation of the private sector in the production and delivery of public goods and services (Ostrom and Ostorm, 2002, p. 75). Even Oates's (1972) "decentralization theorem" that shows that "efficient public goods provision occurs at the

[24] For examples of this, see Candela and Geloso (2018); Koyama (2012); Tabarrok (1998), among others.

lowest level of government that internalizes relevant externalities" (Boettke et al., 2011) assumes too much in that it still places all goods into two separate buckets – *private versus public*. By freeing us from this private-versus-public two-bucket trap, Ostroms open up the possibility of several potential arrangements for the supply and delivery of public goods and services. An analysis of the nature of goods is a pre-requisite before proceeding to the central question: What are the appropriate institutional arrangements best catered to provide a variety of goods and services in a dynamic economy where technology and institutions are constantly evolving?

Dynamic Nature of Goods

Despite their insistence that exclusion and rivalrousness are matters of degrees and not of dichotomies, Ostroms frequently use a 4x4 matrix (Figure 1) to present the taxonomy of goods[25]. After all, they are clear that these are not "all-or-none" categories (p.77). To understand why, one needs to delve into their epistemic choices. First, their emphasis is not to get the model right for the purpose of overall generalizability, but to "cut through complexity and retain enough elements" to make sure that the model is " realistic and relevant for the situations under consideration[26]" (Aligica, 2014, 74). Secondly, the specific taxonomy is best suited to analyze a particular class of goods they were studying

[25] Source: E. Ostrom, Gardner, Walker, and Walker (1994). Different variations of the same taxonomy can be found in Ostrom and Ostorm (2002) and elsewhere.

[26] This in no way suggests that her approach was subjective and opportunistic. Aligica (2014) provides a detailed discussion of Ostrom's epistemic and methodological approaches in chapter 3. She makes a distinction between frameworks, theories, and models. Frameworks use the most general set of variables to evaluate all settings. A theory specifies relevant components of a framework to best describe a phenomenon. Several theoretical perspectives can be consistent with a single framework. Models only capture a narrow set of parameters and variables to illustrate or examine a theory or make predictions based on the theory (p. 93, 94).

that are a) difficult to exclude, and b) subtractible, namely, common pool resources. Third, this presentation serves a distinct purpose in that it pays homage to its public choice roots by providing a common framework to place both club goods and common pool resources alongside private and public goods. Therefore, this taxonomy is not to be interpreted as a rigid framework that merely expands the traditional two-box classification of goods into a four-box one.

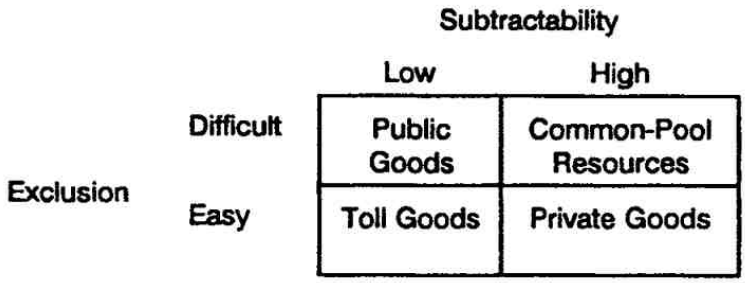


Figure 3. 1: Conventional Classification of Goods (Source: Ostrom, Gardner, and Walker, 1995)

When viewed this way, the taxonomy of goods is not one with four distinct boxes that determine a good's "type" but instead is one defined by varying degrees of excludability and rivalrousness. This opens up possibilities for new ways of analyzing goods that is consistent with the dynamic economy of the real world marked by frequent technological and institutional innovations. In other words, if the nature of goods is defined by specific features that have no theoretical or empirical basis for remaining static, then extending this logic to its end, we are left to conclude that a dynamic taxonomy of goods is the next 'trivial' step. The only intermediary task we have left is to present cases where goods and

services shift their nature.[27] Before proceeding, let us briefly discuss each of these two features.

Exclusion

A good or service is excludable to the extent that non-purchasers can be precluded from enjoying its benefits. It is possible to create incentives for the private provision of a public good by bundling its consumption with another good that is excludable (Demsetz, 1970). Candela and Geloso (2018) show that such bundling arrangements can occur even without any involvement of the state. We leave aside such possibilities and assume that non-excludability is a qualifying criterion for the public provision of goods and services. For our purpose, it is sufficient to show that exclusion of a good, even by the least stringent standards, is not exogeneous. Ostrom (2003), in trying to distinguish between public goods and common pool resources, presents arguments to this effect. Collective action problems for these two categories of goods differ vastly "in regard to how costly or difficult it is to devise physical and institutional means to exclude others" (p. 241). In other words, it is possible, albeit with varying levels of difficulty, to devise "physical and institutional means" that allow one to tinker with degrees of exclusion. It can be argued that profit opportunities in devising such means of exclusion drives entrepreneurs to provide private solutions to many public good problems. Cowen (1985) uses the provision of protection services as an example of a good that has dual modes of

[27] Note that the burden of proof required for the empirical validity for this claim is extremely low. We need to only convince readers that the observed cases of the shifting nature of goods are not exception but normal occurrences. However, to make a plausible counter-case, one needs to show that no good ($n \rightarrow \infty$) has dynamic characteristics.

supplying (p. 59). The same service can be supplied either by a patrolman walking the beat or by burglar alarms. The first is *a non-marketing mode* with higher difficulties of exclusion, whereas the second is *a marketing mode* where exclusion is feasible. Cowen (1985) contends that the publicness of every good is institutionally contingent.[28,29] That is, any good can be made more or less public by examining it in different institutional contexts. Movie theatre is one such example of a good where exclusion is attained by requiring admission fees.[30] Changes in existing institutions can not only alter costs of exclusion but can also influence exclusion criteria (legal rules, cultural norms).

Rivalrousness/Subtractability

A rivalrous good is one that may be provided to an additional person at a very low marginal cost. The quantity (or quality) of a purely non-rivalrous good is not reduced for others because of one person's use. Weather forecast, roads, fire station, and national security are presented as typical examples. Critiques point out that no good satisfies such criteria. Roads during heavy traffic is rivalrous, as additional users lead to more congestion (Cowen, 1985). The very existence of intersections and stoplights proves that one person's use of the good necessarily interferes with that of another person (p. 55). Coyne (2015) makes a similar case for the rivalrousness of national defense. Because the same missile cannot protect two geographic areas within the nation, the use of that

[28] Cowen presents seven such "institutional elements of importance": 1) production technology, 2) quantity of production, 3) distribution mechanism of the product, 4) intensity of demand for the product, 5) definition of marginal unit, 6) definition of "consumption", and 7) different meanings of exclusion (p. 53).
[29] Similar arguments have been presented by Aligica and Boettke (2009). As discussed earlier, they argue that technology and institutions can create or destroy forms of exclusion (p. 40).
[30] With larger turnout, however, difficulties for exclusion increase (p. 61). It is possible for during crowded times for a person to watch multiple shows by paying admission fees for one movie.

missile to protect New York City necessarily subtracts from (the possibility of) its use to protect Los Angeles (p. 374). That is not to argue that national defense is a private good, but rather that rivalrousness itself should be viewed as a continuum and not as dichotomies. Despite some degree of rivalrousness, it is safe to say that national defense exhibits a higher degree of non-rivalrousness than bread or pen. More importantly, rivalrousness of the same good is institutionally contingent. Cowen (1985), invoking Minasian (1964), presents television as an example of a good that can be changed from a public good into a private good by technological innovations (p. 55). Other elements of institutional contingency include level of use, appropriate choice of marginal unit, and the quantity or service capacity of a good (p. 55, 56). Formal and informal governing institutions also influence the rivalrousness of goods. As a more perverse case, we may consider *Dalits* in part of the Indian sub-continent who are considered "untouchables." Under the highly segregated, discriminatory system of untouchability, goods that are typically deemed non-rivalrous such as schools, temples, shrines, rivers, or bazaars become rivalrous in a sense that a Dalit's entry to such public places make these places 'impure,' thereby precluding a Brahmin priest from entering them. In other words, a good's degree of rivalrousness is not necessarily its intrinsic feature. Various factors such as the state of technology, or legal, political, religious, and cultural institutions can influence its level of rivalrousness.

Nature of Goods in a Post-disaster Context

Chamlee-Wright (2010) characterizes a post-disaster context as one where "much of the order we take for granted is shattered" (p. 4). When a covariate shock of a considerable

magnitude strikes, infrastructures and institutions that hold communities and nations together can collapse (Rayamajhee et al., 2019). Because the attributes that determine the typology of goods are institutionally contingent as previously discussed, it must then be the case that post-disaster institutional shock leads to changes in the typology of goods. The precise direction of that change is an empirical question. However, it is not unreasonable to assume that the direction will generally be away from the status quo. To better understand the dynamics, let us use Ostroms' *4*x*4* typology of goods presented in Figure 1 as the starting point. For analytical simplicity, I slightly deviate from the conventions and present a revised good-classification in Figure 2. The origin (0,0) represents the point of maximum non-excludability and non-rivalry/non-subtractability, where the purely public good is situated. The top-right corner is the point of maximum excludability and rivalry, which is reserved for purely private goods.

Consider a good A_i that is to be produced and/or provided in a post-disaster context, where i=0,1,2,3….N-1 represents a (x,y) coordinate in Figure 1 such that high x and y values represent high degrees of subtractability and excludability respectively; N-1 indicates the number of feasible configurations that A_i can attain. Horizontal lines L_{Ht} and vertical lines L_{Vt} indicate thresholds at period t that determine excludability and subtractability respectively. For instance, for A_i such that $i(x > L_{Vt}, y > L_{Ht})$, the good is considered private, and so on. In Figure 1, A_0 is the original position of good A_i at a specific period. Alternate positions A_1, A_2, A_3 are other feasible configurations of good A_i. For illustrative purposes, we assume N=4. After a shock (technological or institutional change), A_i can move from A_0 to A_1, A_2, and A_3 with probabilities P_1, P_2, P_3 respectively.

On the other hand, L_{Ht} and L_{Vt} can shift from their original positions (L_{H0} and L_{V0}) to new positions (L_{Ht} and L_{Vt} , t>0) with corresponding probabilities of P_4, P_5, P_6, and P_7 respectively.[31] While we have limited the number of possible positions of A_i, L_{Ht}, and L_{Vt} to a bare minimum necessary for analysis, it should be noted that a large number of configurations are feasible. Another crucial consideration to bear in mind is that Figure 1 represents a one-shot (n=1) representation of n ∈ [0,1,2,3,…N-1] possible sequential moves. So, the policy challenge of production and production of goods gets increasingly difficult as we add additional goods and services and/or increase the number of sequential moves to n>1.

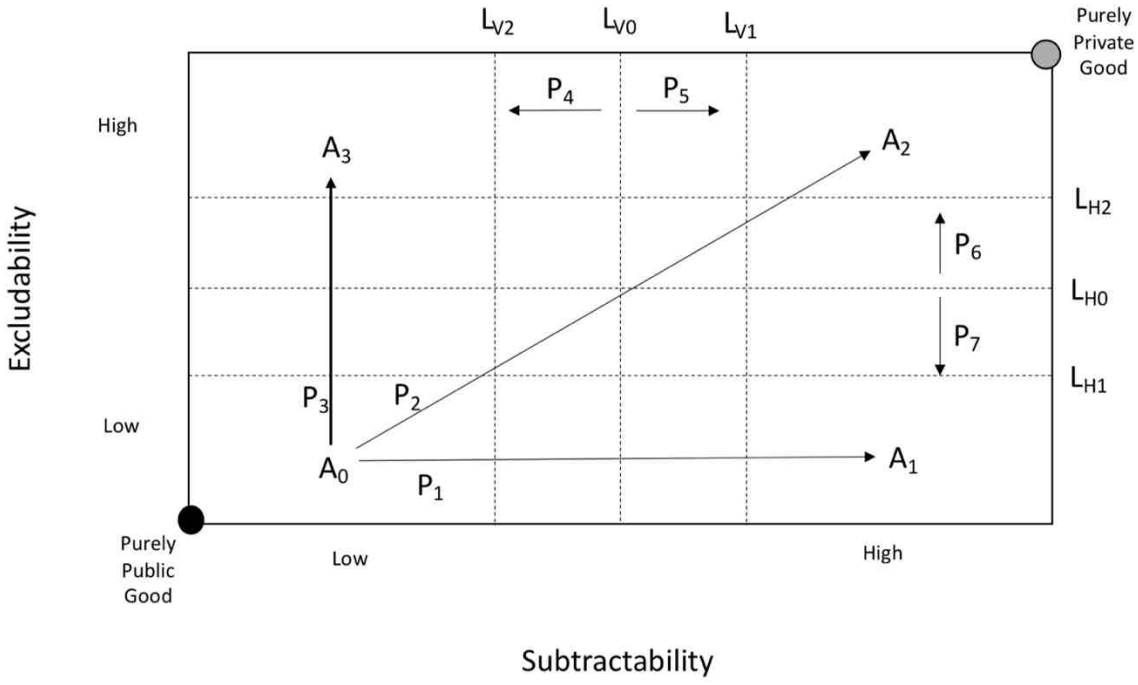


Figure 3. 2: Dynamic Nature of Post-Disaster Goods and Services

[31] Note that because institutional changes can be incorporated into the analysis through changes in levels of excludability and rivalry, shifting L_{Ht} and L_{Vt} may seem redundant. However, we allow shifts in L_{Ht} and L_{Vt} to account for exogeneous changes in these thresholds. If we adopt a narrow definition of institutions, these shifts can account for factors that are not accounted as institutional change. For example, shift in political rhetoric alone can lead to differences in the precise thresholds for L_{Ht} and L_{Vt}.

Cases of Post-disaster Reshuffling of Good Classification

Chicago Fire 1871

Skarbek (2014) provides a detailed account of the role of the Chicago Relief and Aid Society (henceforth referred to as CRAS), which she characterizes as "a voluntary association of agents with a stake in relief outcomes," in post-disaster relief efforts. In the absence of formal political or bureaucratic organization to handle disaster relief, CRAS "leveraged organizational assets" and "constitutional rules" to effectively overcome challenges of moral hazard and free-riding (p. 155). Skarbek argues that once aid contributions have been made, they "exhibit features of a common pool resource" (p. 156). That is, they are rivalrous in consumption, but non-excludable to disaster victims. Relief aid that CRAS oversaw after the Chicago fire is a bundle of goods that include food, clothing, emergency shelter, security services, and medical services (p. 161, 167, 168). These are diverse goods of varying levels of excludability and rivalry in normal times and are provided through different private and public institutional arrangements. Following the Chicago Fire, CRAS was able to mobilize local knowledge, expertise, and will-power to conduct the *appropriate bundling* of these goods as *disaster relief*. Like many of successful CPRs that Ostrom (1990) describes, CRAS was able to devise operational rules based on "strong pre-established principles" (p. 174). Excludability was attained using appropriation rules that specified "who had rights to withdraw resources" from the collected aid funds and what the eligibility criteria were for receiving aid (p. 173). Locally instituted mechanisms for detecting fraudulent claims, "credible enforcement strategy" involving self-monitoring by fellow community members, and

mobilization of local knowledge to assess needs and disseminate aid ensured that aid reached those populations who were “most in need” (p. 169).

Figure 3 provides a breakdown of *disaster relief* bundle based on their pre-disaster conventional classification. Goods that are traditionally deemed public such as security and fire services, and those that are deemed private such as food, clothing, shelter and medical services, were lumped into one *disaster relief* package. This re-bundling is an institutional solution that CRAS deemed most appropriate under the circumstances where both government and markets are non-existent or dysfunctional. Lack of private mechanisms such as storage facilities necessary for private provision of vegetables and other perishable items meant that a non-market, non-governmental solution was needed. CRAS was able to use local expertise of Murray Nelson to transform a local skating rink into a frost-proof building for storage purposes (p. 173). On the other hand, the absence of local (and national) political and bureaucratic apparatus meant that security services were no longer appropriate for public provision. In that sense, both private and public goods had lost their privateness or publicness because of the changes in their degrees of excludability and rivalry. New institutional solution was necessary to address this new situation where the conventional static classification of goods was unable to provide a practical framework to overcome this challenge. CRAS provided that solution.

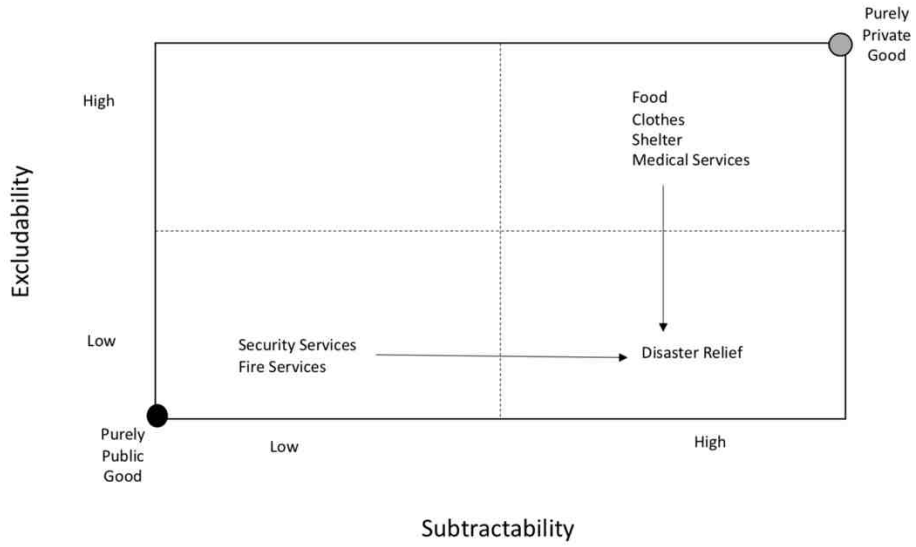


Figure 3. 3: Chicago Fire 1871

Hurricane Katrina 2005

Chamlee-Wright and Storr (2009) report the case of Mary Queen of Vietnam (MQVN) community in New Orleans East after Hurricane Katrina in 2005 where the local Catholic church utilized "a bundle of club goods" to solve social coordination problem in the wake of the disaster. Note that this bundle is unique in that its constituents are rather diverse and idiosyncratic. This "highly specific culturally and linguistically appropriate" bundle of goods included: (i) Vietnamese language training, (ii) religious services, (iii) occasional weekend markets for selling Vietnamese produce, arts and crafts, (iv) informal social space, (v) meeting space for religious and non-religious groups, (vi) organization structure for social coordination, (vii) community leadership for collective action, and (viii) ethnically appropriate charitable aid (p. 440). Additionally, because church members included local business owners and professionals, other secondary goods such as medical, legal, and financial services also came attached alongside the church bundle. Many of these services could be classified as private in peaceful times (e.g. ethnically

sensitive goods or financial and medical services) that are suitable for private provision by competing firms. However, in a post-disaster setting where infrastructures that support private provision are interrupted, local institutions can serve as 'clubs' and provide many of these services.

The diversity of these goods requires more attention. The club (MQVN church) provides cultural services (intermediary goods) that lead to greater "Vietnameseness" (final good) (p. 441). Vietnameseness, in this context, is analogous to "behavior conducive to upward mobility" (Bankston and Zhou, 2000). There is a very unique type of bundling of goods occurring here. One good (cultural services) leads to another good (Vietnameseness) which can then lead to the final good (opportunities for upward mobility). In normal times, Vietnameseness can be characterized as being highly non-excludable and non-rivalrous. In pre-Katrina MQVN, it would be impossible to exclude another community member from acquiring Vietnameseness. Nor can one person's Vietnameseness preclude someone else from acquiring it. However, the disaster altered the nature of Vietnameseness as a good. Because the community that made the good public is shattered, it loses its publicness. An existential threat means that Vietnameseness is no long as abundant. Since it has a positive value, the church can then provide it as a *club* good. The 'new' Vietnameseness (as a good), although non-rivalrous, is now excludable to some extent. The same analogy applies for other culturally sensitive services.

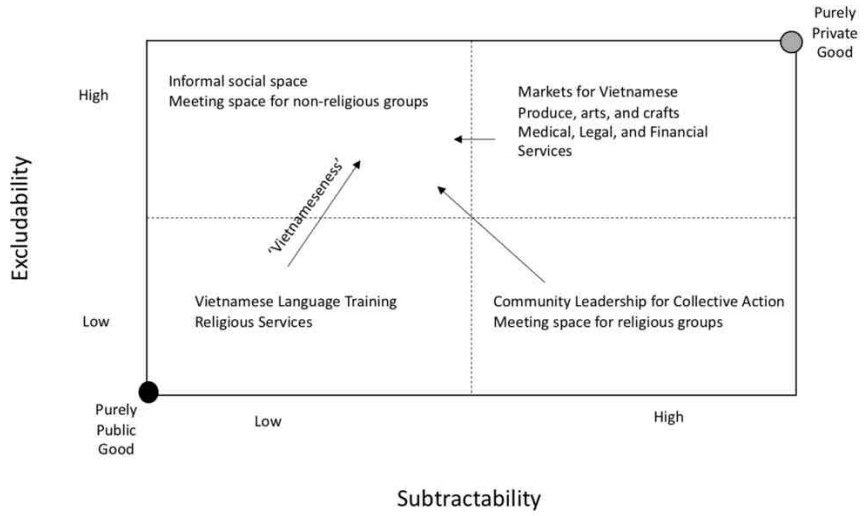


Figure 3. 4: Hurricane Katrina 2005

Nepal Earthquake 2015

Himal Southasian's[32] "Notes from the field" page archives many journalism based accounts of post-disaster relief and rehabilitation activities following the 2015 earthquake in Nepal. An archived article by Rabi Thapa (2015) documents reconstruction efforts across Kathmandu's many cultural heritage sites destroyed by the earthquake, which he dubs as "irreplaceable cultural teasures." Thapa reports preservation and reconstruction efforts from three sites in particular: the 5th century of Swayambhunath temple, 6th century Rato Machhindranath temple, and the 19th century Kalmochan temple.

From the Kalmochan site, he reports:

> Police and army personnel were silhouetted atop the ruins, and were passing bricks down, hand to dusty hand. But I could also see scores of volunteers milling about, strapping on

[32] *Himal Southasian*, South Asia's first regional news and analysis outlet, describes itself as an "independent, non-nationalist, pan-regionalist" source of news coverage and critical analysis on South Asian affairs.

> masks and gloves. All around me, youths were stopping and entering the temple complex. Soon, the road was half blocked by parked motorcycles, their riders joining spontaneously in the clean-up of a beloved Kathmandu landmark.

These stupas, temples, and artifacts connect the modern, urbanized Kathmandu metropolis to its rich Hindu-Buddhist roots. The loss of these *cultural treasures* would be catastrophic to Kathmanduites. However, the *publicness* of these treasures means that their restoration and preservation pose a collective action problem. No matter who contributes towards the restoration and preservation of these efforts, once restored, these sites are non-rivalrous and non-excludable. However, if we analyze the motivations of many volunteers, it becomes clear that there is a sense of cultural duty to contribute towards these efforts. This sense of duty is evident from testimonies such as this: "If we don't do, who will?" What that means is that the *opportunity to participate in cultural preservation* is a type of desirable good with positive utility that is both rivalrous and excludable. It is rivalrous because each site can only afford so many volunteers without congestion. It is excludable because local clubs/groups in-charge of a particular site can (and do) send volunteers away to a different site if they see congestion happening. In some cases, exclusion was also attained with the help of police and government personnel. However, in an overwhelming number of cases, locals organized daily night-watch to "make sure nothing gets stolen." In this particular example, although the public good (cultural treasures) did not morph its character, the *participation opportunity* emerged as a 'new' good with a distinctly private character (excludable and rivalrous) from the rubbles of the 'old' public good.

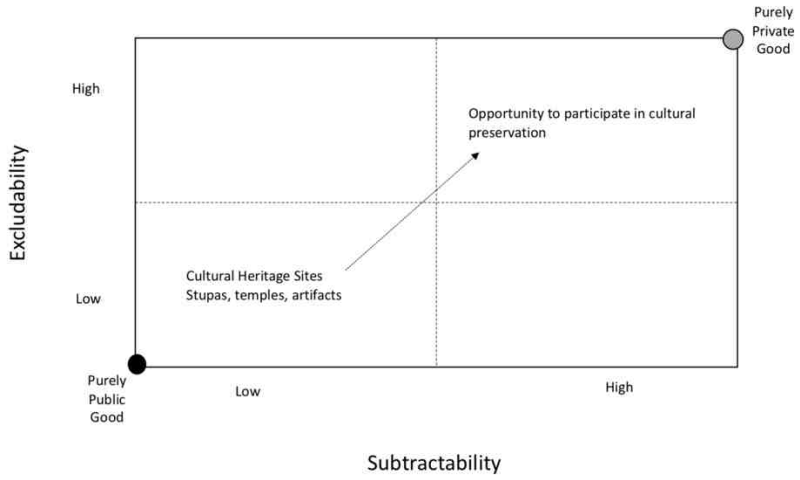


Figure 3. 5: Nepal Earthquake 2015

Indonesian Tsunami 2004

The 2004 Indian Ocean Tsunami destroyed many coastal villages in Aceh, Indonesia, sweeping away almost all physical capital. The international response was huge and swift. For 120,000 houses destroyed, 134,000 new houses were built by 2009 (Henderson and Lee, 2015). In a non-disaster context, house is an archetypal private good. Doors or gates ensure that entry is restricted to members of the household. Property rights provide protection against forceful confiscation. If one household purchases a house, that specific house will no longer be available to another household. However, in a post-Tsunami context where 91% of houses in Aceh were wiped out, the institutions that preserved their privateness were no longer intact (p. 623). Henderson and Lee (2015) describe the situation is Aceh:

> Usually the basic house design is imposed by the implementer. The builder normally buy materials and hires and supervises carpenters, plumbers, day labor, and the like. Not only are these contracts between implementers and builders incomplete, enforcement in court

> is costly, given the slow working of the local system and the potential for corruption in Indonesia.

Given the "slow working of the local legal system," prohibitive costs of contract enforcement, and rampant corruption, not only was the legitimacy of ownership (of houses) challenged but the market for materials and labor required for reconstruction was also dysfunctional. Henderson and Lee (2015) note that, in post-Tsunami Aceh, "potential for contract hazards is high" (p. 620). This can lead to cases where a builder demands more money "in an attempt to expropriate qusi-rents" when the construction is partially complete. Because the costs of finding new builders and enforcing the original contract are prohibitive, the implementer has no choice but to cave in. Henderson observes that international implementers have incentives to perform regardless of domestic hurdles because they face "reputational costs" in the context of the repeated game of contracting in aid disasters (p. 620). However, for domestic builders, low-probability-high-intensity shocks present one-shot prisoner's dilemma games where incentives are aligned in ways that shirking becomes the dominant strategy.[33] When infrastructures and institutions necessary for private transactions and contract enforcement are stripped away as in the case of Aceh, the good loses its private nature. Cowen's (1985) analysis that the nature of a good depends on (a) how much of the good is produced, and (b) how intense the demand is for the good is particularly relevant here (p. 53). The intense, highly inelastic demand for housing leads to increased demand for

[33] Henderson and Lee (2015) note that domestic implementers are likely to face this incentive because they "do not operate internationally" and because "in Aceh many (domestic implementers) were short-lived" (p. 621). In the case of domestic builders, there is reason to think that similar incentive-structure exists, especially when donors and implementers are international.

plumbers, carpenters, day labor, and materials. Moreover, when private citizens, domestic and international aid agencies, implementers, builders, and local and national governments are all competing for the finite pool of labor and capital, the equilibrium does not reflect the 'true' demand for those goods in that international aid agencies and governments do not face realistic budget constraints.[34,35] In that sense, distorted incentives and price-indifference faced by some players means that the market is not allowed to function normally. All these factors distort the privateness of houses. This can be presented as a case where the good (house) mostly retains its original levels of rivalrousness but the lines L_{Ht} shifts, thereby shrinking the domain of the private markets because excluding devices such as property rights, contract enforcement, and ability to freely exchange in the market place are hindered for all private goods. Note that this 'new publicness' does not, however, mean that government is best equipped to provide this good.

[34] In relative terms, international aid agencies and governments have endogenous budget constraints. Higher assessments of destruction and need is potentially positively associated with higher donations.
[35] Henderson and Lee (2015) find that *donor-implementers* outperform *international implementers*, *domestic implementers*, and *BRR (government)* because they face proper incentives.

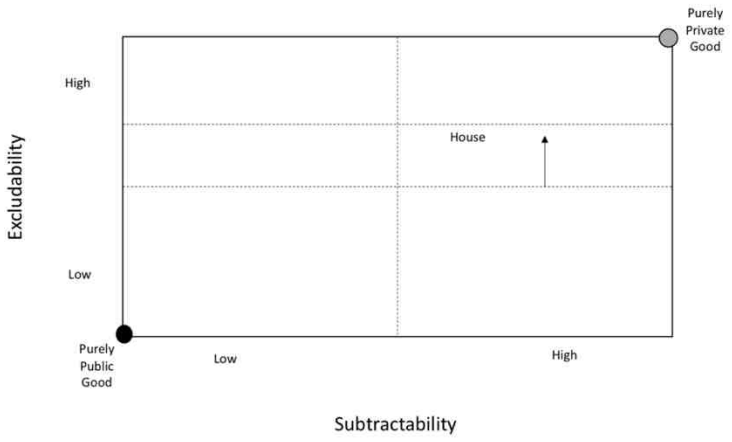


Figure 3. 6: Indonesian Tsunami 2004

Towards Institutional Matching

The foregoing cases emphasize the dynamic feature of post-disaster goods' classification— that is, the typology of goods is defined by the existing technology and institutions, both of which are constantly evolving. Disasters are exogeneous shocks that shake existing institutions, including, in many cases, those that facilitate market operations and the protection of property rights. Simultaneously, they also shock public institutions and hinder public good production and provision. The cases show that, not only do goods move across boxes/quadrants in the good classification table, but the lines [separating the types] themselves become blurry or flexible (see Figure 6). In such situations, a one-size-fits-all approach that does not account for the diversity and fluidity of post-disaster goods and services, is, ineffective, if not outright detrimental to recovery and wellbeing. Therefore, instead of adhering to a static model of good classification, I emphasize the need to constantly reexamine the shifting nature of post-disaster goods and services. Admittedly, this chapter provides no readymade solution that can be applied based on bullet-point instructions. Instead, by focusing on the typology of goods, it

provides a nuanced view of post-disaster challenges and points out that the *Gargantua* approach – one that treats many aspects of post-disaster relief, rehabilitation, reconstruction, and recovery as one relief package – does not have a solid theoretical and empirical footing. The diversity of goods and their dynamic nature means that post-disaster policy responses should be directed towards identifying and working with a diverse set of possible institutional arrangements suited for their production and provision. This way of understanding post-disaster challenges using the 'institutional matching' paradigm as opposed to the standard optimal resource allocation view steers us towards building a conceptual framework that matches institutional types and levels to the nature of the good.

The Bloomington scholars emphasize ideas, but not for the sake of mere theoretical, normative, and philosohical inquiry (Aligica, 2014). What adds weight to their ideas is their "insistence on the fact that social scientists should try to think not only in terms of creating theory but also of applying it" (Aligica and Boettke, 2009). The Institutional Analysis and Development (IAD) framework that Ostrom proposed provides a "deceptively simple" yet powerful toolkit that allows us to navigate the complexities of the real world with multi-tiered, intertwined institutions that many technically sophisticated models in social science even fail to recognize (p. 72). By demonstrating through cases studies from all around the world where humans are able to craft a "wide diversity of institutional arrangements" to "govern, provide, and manage public goods and common-pool resources," Ostrom asks us to take off our black-and-white glasses and see the world in its full colorfulness (Ostrom, 2010, p. 642). The dichotomous view of private-versus-public and market-versus-state may fit nicely into a blackboard model, but

they cannot account for diverse institutional arrangements that communities and societies devise to solve their problems. Nor do they adequately account for internal dynamics within private firms (Williamson, 1975). This paper provides further evidence of the limitations of such views in post-disaster management.

Moreover, reconstruction and rehabilitation efforts following a disaster are best characterized by co-production processes — that is, active participation of disaster victims and other citizens is an important input into the production function. The coordination of such co-production processes becomes increasingly difficult as the bureaucratic hierarchy gets steeper. Sobel and Leeson (2007) attribute this difficulty to the knowledge problem that a central planner faces in a highly idiosyncratic post-disaster context. Another factor that exacerbates the coordination problem is one of incentive misalignment. Regardless of how benevolent the management of a central planning agency may be, one cannot assume that each government agent is motivated by the goals of efficiency and equity in post-disaster aid dissemination. This is especially true when we consider the fact that the performance of the agency is evaluated as a whole, and not as individuals or independently mobilized teams. In light of these considerations, efforts should be devoted to investigating polycentric approaches to post-disaster management where a variety of adaptive institutions compete and/or cooperate in a multitude of ways for the production and/or provision of a wide range of post-disaster goods and services. Instead of the hopeless quest for one unified theory of human action and economic organization that we naively assume will resolve post-disaster challenges, this paper maintains that Ostrom's warning that "further efforts to build a single theory are counter-productive" should be taken seriously (Ostrom, 2003)

Conclusion

What we seek to establish in this chapter is that the typology of goods – because they are institutionally contingent – can shift in their degrees of excludability and rivalry following a covariate shock. Because the rationale for private or public provision of goods stem from these two attributes, changes in the levels of these attributes must necessarily lead to changes in institutional arrangements best suitable for their continued provision. The foregoing cases from manmade and natural disasters demonstrate that bottom up commercial and non-commercial institutions such as business, corporate entities, voluntary associations, and municipal governments are better equipped to understand the changing nature of goods during uncertain times and adjust their modes of goods provision accordingly. CRAS and the Catholic church of MQVN are able to utilize their rich social capital and local expertise to overcome coordination failure problems. CRAS leveraged their organizational assets and constitutional rules in a typical successful common-pool-resource fashion for the provision of disaster relief. The MVQN church acted as a club to provide diverse and highly specialized goods many of which are not typically considered club goods. Not only was the church able to provide these goods, but it was also able to use them for the higher purpose of ensuring community return. The case from Nepal earthquake presents a raw view into how individuals form clubs (without even formally calling it as such) in an *ad hoc* basis and even coordinate with public officials and police to rebuild their lost cultural treasures. It also presents us with an example of how public goods can present us with private incentives that can make it both excludable and rivalrous. In the Aceh case, although the good itself (house) only

slightly changes its degrees of excludability and rivalrousness,[36] the failure of public institutions and the lack of market infrastructures rendered good-classification meaningless. In this case, donor-implementers (often foreign) outperform both domestic implementers and the government. The lack of appropriate incentives and personal stake in the recovery process led the domestic implementers to engage in rent expropriation. This case tells us that what may seem like local governance from outside the sheath does not always correspond to self-governance.

Our analysis that bottom up institutions are more effective than central authorities for the provision of local public needs is consistent with theoretical and empirical studies in economics and public policy in a wide variety of non-disaster situations as well (Ostrom, 2015). However, those in charge of post-disaster relief, rehabilitation, and reconstruction often present 'bottom up' strategies that are designed, implemented, and monitored by a slew of experts and planners. Phrases like 'local knowledge,' 'participatory approach,' and 'citizen science' appear in every whitepapers and recovery plans. The cases presented in this chapter tell us that bottom-up does not simply mean domestic or local. The litmus test for what constitutes 'bottom-up' is self-governance. If the de facto rules at the operational level are inadequate to address imminent challenges, mechanisms to make changes in operational rules at collective-choice and constitutional levels through active participation of self-governing citizens must be in place. Self-governance cannot be designed as an expert-guided 'optimal' policy to be implemented through careful control from benevolent rulers. Amid terror and devastation brought forth by natural disasters

[36] We do not find explicit indication of excludability and rivalrouness of the good (house) changing in the Aceh case.

lies an opportunity to observe, analyze, and understand diverse institutions at all levels and of all types. Disasters have a way of presenting and amplifying the inner-workings of all such institutions. A careful examination of post-disaster recovery processes tells us that the entrepreneurial spirit of both private and public entrepreneurs and the sheer will of citizens are necessary conditions for successful rebounding. Any carefully crafted policies that threaten these conditions guide us not towards but away from recovery and prosperity. Any successful disaster recovery is always a story of many heroes – of private, public, and social entrepreneurs, of self-governing citizens – and never one of a single hero, the planner-rescuer.

CHAPTER 5

The *Neither-Market-Nor-State* Role of Social Entrepreneurs in Post-Disaster Contexts: Evidence from the Dhurmus-Suntali Foundation's Giranchaur Namuna Basti Project in Nepal

Introduction

In reference to the fate of Dalits or "untouchable" communities in Sindhupalchowk, Nepal in the aftermath of the devastating 2015 earthquake, Bownas and Bishokarma (2018) describe the post-disaster situation as one when "the fundamental features of society and culture and laid bare" (Oliver-Smith, 1996). That is, disasters are "*crise revalatrice*" that destroy most existing infrastructures and institutions, and have economic, social, and political ramifications that "permeate through all sectors of human society" (Oliver-Smith, 1996; Rayamajhee et al., 2019). When a disaster strikes, it provides social scientists a rare window into the inner-workings of all institutions, formal and informal. Fragile institutions often cannot survive the chaos brought by disasters; they hide, underperform, or remain dormant. Formal institutions that do not have skin-in-the-game are likely to fail, and only those with "stake in relief outcomes" stand to succeed (Skarbek, 2014). Because voluntary organizations and informal associations fulfill this incentive-compatibility criterion, they often play important roles in the provision of goods and services that are critical for post-disaster recovery (Rayamajhee, 2019; Rayamajhee and Bohara, 2018). However, their roles are not confined to the mere provision of goods and services but extend to building solidarity, strengthening social fabric, and promoting civic engagement and public participation. This is true both in post-disaster contexts and in normal times but is more pronounced in the former context. Often, social entrepreneurs use such organizations and associations as platforms to

mobilize citizens, revitalize communities, and lead to recovery and progress (Chamlee-Wright and Storr, 2009, 2010). However, their roles have only received meagre attention in the academic literature (ibid.).

This article is an effort to fill that gap in the literature. Our contributions are twofold. First, we use insights from Elinor Ostrom and the scholars of the new institutional economics to analyze why this gap exists. We argue that the market-versus-state dichotomous view of the economy masks the role that the 'third sector' plays in our society. It isolates economics from rest of the social sciences and provides only a parochial explanation of the broader socio-ecological and institutional foundations upon which economic activities occur. This bipolar view deemphasizes the complex motivational structures that characterize humans. As a result, the diverse institutional arrangements humans devise, including private-for-profit, private-non-profit, governmental, and community arrangements, that "operate at multiple scales to generate productive and innovative as well as destructive and perverse outcomes" remain unaccounted for (E. Ostrom, 2010). The purpose of this article to address that deficiency. We build on the Ostromian arguments for institutional diversity in an attempt to situate the 'third sector' within a broader framework that is unconfined by the private-public dichotomy. We argue that the 'third sector' has a distinct social space that neither the market nor the state can justifiably occupy. It is within this 'third domain' that citizenship emerges and thrives. We use Ostromian insights on co-production and self-governance to argue that social entrepreneurs operate within the 'third domain,' even though their roles may often overlap with that of the private and the public sectors. While their stated

missions often involve provision of specific goods, their activities have positive externalities outside of the market and state.

Our second contribution is empirical. We use the case of Dhurmus Suntali Foundation's Namuna village project in Nepal following the 7.8 magnitude earthquake in 2015 as a quasi-experimental set up to examine the pivotal role that social entrepreneurs play within the 'third sector' domain to promote public participation, civic engagement, and active citizenship in post-disaster contexts. We adopt Boettke and Coyne's (2009) 's definition of social entrepreneurship as "entrepreneurship driven by social considerations – peer recognition, appreciation, strengthening social ties and bonds, etc – rather than economic (profit) or political (power) considerations" (p. 171). Dhurmus and Suntali are actors-turned-entrepreneurs whose post-disaster entrepreneurial drive was motivated neither by profit nor by power, so they satisfy the criteria perfectly.[37] Although we have come across a few studies in recent years that evaluate the role of social capital in facilitating post-disaster collective action (see Aldrich, 2012; Chamlee-Wright and Storr, 2011a; Chamlee-Wright and Storr, 2011b; Rayamajhee and Bohara, 2018; Storr et al., 2017), the distinct role that social entrepreneurs play in such contexts remains understudied. In a few studies that exist on this topic, the attention is overwhelmingly on the economic or political roles of social entrepreneurs[38]. To the best of our knowledge, no

[37] We discuss more on this in section III.

[38] Chamlee-Wright and Storr (2010) and Pipa (2006) provide accounts of the role of social entrepreneurs in post-Katrina contexts. The former's work showcases the role that social entrepreneurs played in resolving collective action problems; The latter's study focuses on their roles in post-disaster relief during the immediate aftermath of Hurricane Katrina. Lacho et al. (2006) describes the role of business nonprofits and trade associations in post-Katrina business recovery. Holcombe (2007) describes how community-based religious congregations helped fulfill many post-disaster community needs in New Orleans.

empirical study evaluates the distinctly 'third sector' role of social entrepreneurs in the aftermath of natural disasters. Moreover, there is no academic work on the role of social entrepreneurs in the post-disaster recovery following the 2015 earthquake in Nepal. We deem that any accounts on the post-disaster recovery of Nepal that do not adequately highlight the role of social entrepreneurs cannot be considered thorough or accurate. This is especially true in rural districts like Sindhulpalchowk, Gorkha, and Dolakha[39], where the government's presence was perfunctory and private enterprises remained by and large dysfunctional for a considerable time due to infrastructure damages (Rayamajhee and Bohara, 2018b).

The remainder of this article is organized as follows. Section II attempts to theorize the role of social entrepreneurs from the Ostromian perspective. Section III describes the role that Dhurmus and Suntali played in rebuilding communities in the aftermath of the Nepal earthquake. The section situates Dhurmus-Suntali's contributions within the neither-market-nor-state domain. Section IV discusses data collection, methods, and summarizes results. Section V discusses broader implications and concludes.

Theory of Social Entrepreneurship: An Ostromian Perspective

Ostrom adopts a broad definition of institutions as: prescriptions that humans employ to "organize *all* forms of repetitive and structured interactions" (Ostrom, 2009, p. 3). We encounter institutions of varying kinds when interacting in a wide variety of complex situations. As citizens, we expect others and are expected by others "to be able to reason

[39] These were also the districts most affected by the earthquake (CRED, 2015).

about, learn, and eventually know what to do in many diverse situations that we confront" of which markets and states only constitute a subset (p. 4). Even among markets, there is a great variation in rules conducive to contexts and cultures that shape the way interactions take place. A shopping mall in Minneapolis and bazaars in Mumbai operate with dramatically different operational rules. States are governed by widely dissimilar constitutions and laws as well. Many of these rules governing situations and behavior are manifested in formal documents or ratified and implemented through formal mechanisms, organizations, and agencies. Some institutions we interact with daily include "families, neighborhoods, markets, firms, sports leagues, churches, private associations, and government at all scales" (p. 3). However, institutions can also take tacit forms. Cultural norms, traditions, and superstitions are some common examples. This broad view of institutions provides a special space for social entrepreneurship that does not treat it as an aberration to *the* standard. In fact, one implication of the institutional diversity perspective is that there is no single standard. Viewed this way, the scales and distinctions that are used to characterize institutions and box them into specific categories themselves become contestable. While scholars of other traditions may view institutions in terms of their publicness or privateness[40], Ostromian lens treats such categorization as contestable, as merely one possible way among a multiplicity of ways to analyze institutions. As Vincent Ostrom argues, "what constitutes the public [or private] sector is not a matter of simple definition but is itself a contestable matter that must necessarily be contestable in modern societies" (V. Ostrom, 2008, p. xxv). Ostroms open

[40] Samuelson's (1954) distinction of public goods as *collective consumption goods* that are non-rivalrous is often used to make a case for the public provision of such goods because private markets are unable to provide them due to opportunities for free-riding.

up a crevice from within the traditional private-public dichotomy through which emerges a space large enough to fit in a wide variety of institutional arrangements. Within that space lies social entrepreneurship of different types – not as an exception to the rule but as a special category of institutions with critical roles to play within the neither-market-nor-state sphere.

Two Ostromian insights are particularly useful in situating social entrepreneurship within the institutional diversity framework – a) emergent property of institutions, and b) the nature of goods as an analytical entry point. First, Ostrom distinguishes her treatment of institutions from Max Black's characterization of them as "regulations, instructions, precepts, and principles" that are "laid down by an authority (a legislation, judge, magistrate, board of directors, university president, parent) as required for certain persons" (Black, 1962; E. Ostrom, 2009). While such top-down rules do fit into Ostrom's "list" of institutions, her understanding of institutions is exponentially more expansive[41] (Crawford and Ostrom, 1995). In *Governing the Commons*, she presents cases after cases from around the world where communities of common pool resource users have devised and implemented rules that are not "laid down by an authority" (E. Ostrom, 1990). Instead, many of these rules are emergent in that they address local idiosyncrasies and sometimes peculiar local needs. Her field observations led her to conclude that, instead of *the* general theory of human behavior, the focus should be in developing "more configural approaches to the study of factors that enhance and detract from the

[41] Crawford and Ostrom (1995) provide a syntax for understanding diverse institutions. Their A-D-I-C-O framework provides a comprehensive framework that can provide a systematic understanding of the roles of all formal and informal institutions (cultural norms, values, laws, etc.) in shaping and influencing human activities in diverse settings.

emergence and robustness of self-organized efforts" towards the resolution of collective action problems (E. Ostrom, 2010). Once we acknowledge the possibility of the *emergent* nature of institutions (henceforth referred to as *institutional emergence hypothesis*), then we can conceive of a wide diversity of institutions emerging to address infinite needs and problems that people and communities across the world face. The mere presence of diverse classes of problems that individuals and communities face logically dictates us to accept that infinite institutional configurations are possible[42]. Among the many possible configurations of institutions, one category is social entrepreneurship.

The *institutional emergence hypothesis (IEH)* discussed above reveals to us the *possibility* of social entrepreneurship as a potential subset of all possible institutions. However, not all possible institutions are feasible (Boettke and Fink, 2011). Analysis of the institutional feasibility of social entrepreneurship requires an investigation of the nature of goods and services it provides and the types of collective action problems it resolves. Market-entrepreneurial theories present an entrepreneur as someone who is 'alert to profit opportunities that already exist and are waiting to be exploited,' (Kirzner, 1973) 'carries out new combinations,' and exploits 'untapped markets,' (Schumpeter, 1934) 'always searches for change, responds to it and exploits an opportunity,' (Drucker, 1985).[43] We deviate from such theories in that we do not extend market-entrepreneurship theories into the social realm. Many social entrepreneurs, including the ones this paper

[42] Of course, not all possible institutional configurations are feasible (Boettke and Fink, 2011). Nonetheless, this calls for institutional plurality as the only valid framework to understand all forms of social organizations.

[43] For further details discussion of social entrepreneurs in light of market entrepreneurial theories, refer to Chamlee-Wright and Storr (2010), pages 151-155. The authors employ such theories to discuss the role of social entrepreneurs in post-Katrina New Orleans.

focuses on, do not seek for profit opportunities, search for changes, or exploit opportunities in the same way that commercial entrepreneurs may do. Moreover, often these changes are exogeneous and unexpected. Nonetheless, one common characteristic between social and commercial entrepreneurs is that they address needs that are not yet (adequately) fulfilled. For instance, Austin et al. (2006) note that social entrepreneurs fulfill social needs that are not fulfilled by markets. Based on *IEH*, we may also contend that social entrepreneurs emerge not just when markets are unable to fulfill such demands but also when the government fails to provide them. However, viewed from the Ostromian lens, such claims fall short. If social entrepreneurs exist only to fulfill unmet demands because other 'legitimate' institutions fail, then that only gives us a partial theory of social entrepreneurship where its role is secondary. What that would imply is that, if markets or governments function satisfactorily, the domain of social entrepreneurship should shrink. However, the presence of well-functioning markets and democratic governments only serve to strengthen social entrepreneurship, which is a contradiction. Ostromian perspective forces us to reevaluate the claim. Because social entrepreneurs operate in their own distinct realm, the fact that they provide what would otherwise be deemed private or public goods should be viewed as positive externalities. This begs the question: What do social entrepreneurs provide?

For Ostroms, the nature of goods and services serves as "the analytical entry point" (Aligica and Boettke, 2009). In other words, any discussions on the appropriate roles of the private sector or the public sector are counterproductive without adequate consideration of the nature of goods and services that are the central to the discussion. In

other words, questions such as “what is the good?” and “what is its nature?” need to be answered satisfactorily before we can begin to ponder on “who should provide it?” We contend that the “good” that social entrepreneurs provide is a platform for active citizenship, where individuals with shared values and purpose can come together to cultivate their common humanity. Social entrepreneurs provide a common space, – in both physical and metaphorical sense – where citizens can practice “the science of association and the art of associating together” (V. Ostrom, 2008, p. 94). That space is what makes the ‘public’ possible; it is where the sense of self-governance emerges, and seeds of democratic principles are sown. While it is often the case that social entrepreneurs provide goods and services that can be categorized as either private or public, they serve as intermediary goods that facilitate collective action of higher orders. What then is the nature of that “good”? Ostromian insight on co-production is pertinent here. As Aligica and Tarko (2013) note, the Ostroms’ extensive empirical studies “revealed an entire series of cases wherein the collaboration between those who supplied a service and those who used it was the factor determining the effective delivery of the service” (p. 732). Ostromian approach places citizenship at the “center of governance system” (Aligica, 2018, p. 3). We contend that citizenship belongs to the class of “goods and services” that is not suitable for top-down provision because it involves a great degree of co-production. Minus “the informed and motivated efforts of service users,” that is, citizens’ participation in co-production processes, the service that is provided “deteriorates into an indifferent product with insignificant value” (Aligica and Tarko, 2013; Parks et al., 1981).

It is in the co-production of *active* citizenship that social entrepreneurs' central role lies. This is the domain that neither the private market nor the state can satisfactorily occupy. Although the state can and does provide citizenship, it is merely formal at that level. Social entrepreneurs provide a local platform where citizenship can be practiced, where citizens can fulfill their part of the co-production process. Social entrepreneurs take various roles depending on contexts. They are social activists and community organizers for social causes, abolitionist during the times of slavery, civil and women's rights activists against discriminatory practices, and leaders of charitable organizations (Chamlee-Wright and Storr, 2010). When social ills exist and there is sufficient *demand* for activism to eradicate such ills, social entrepreneurs fulfill that demand. When a natural disaster strikes, and there exists a *need* for collective action, social entrepreneurs work towards fulfilling that need. Often, these demands and needs may overlap with the goods and services that markets or states typically provide. When institutions and infrastructures necessary for their functioning are not in place, social entrepreneurs may temporarily provide such goods and services or work towards reinstating vital infrastructures and institutions. However, their roles are in no way "secondary," "tributary," or "accidental," but rather central to the cultivation of active citizenship (Aligica, 2016). They occupy a vital space within the neither-market-nor-state domain that is essential for fostering a culture of mutual assistance, charity, and solidarity upon which formal institutions including markets or states are built.

Dhurmus-Suntali Foundation and the Giranchaur Namuna Basti Project

When the devastating 7.8 magnitude earthquake struck Nepal in April 25, 2015, Sitaram Kattel aka Dhurmus and Kunjana Ghimire aka Suntali were in Syracuse, New York as a part of a month-long musical tour (eKantipur, 2019). The Dhurmus-Suntali duo immediately returned to Nepal and organized relief efforts in the earthquake affected districts. What started out as an immediate response to the devastation brought about by the earthquake led to the establishment of the Dhurmus-Suntali Foundation (DSF). The comedians-turned-social-entrepreneurs duo did not have a long term vision in mind when they started, but their observations on the ground made them soon realize that there was a dire need for reconstruction and long-term rehabilitation of earthquake victims (DSF, 2019). Immediate relief was not going to be enough. Both Dhurmus and Suntali had become household names through their sitcom television series "Meri Bassai" that began in 2006. Kattel remains the script writer, co-director and actor of the series. The duo was able to mobilize their fame and public exposure to appeal for donations and acquire broad support through social media and television outlets. After they decided that tarpaulins, mats, noodles, and rice was not going to ensure long-run recovery, especially since entire villages in Sindhupalchowk, Nuwakot, and Dhading were destroyed, they came up with the idea of low-cost "integrated model villages" that would pool common resources to rebuild settlements and necessary amenities (eKantipur, 2019). This study centers around one such village, Giranchaur Namuna Basti (GCNB) in Sindhupalchowk.

GCNB was the second integrated model village that DSF built for 800 people after the Pahari Nauma Basti in Kavrepalanchowk district (DSF, 2017). [44] Dhurmus and Suntali's central role in the creation of Giranchaur Namuna Basti is obvious. They envisioned the project, consolidated necessary capital, manpower and resources, and implemented it. However, their work was only possible because of the active participation of all citizens and input from all stakeholders. The Namuna Basti[45] is emblematic of co-production processes involved in post-disaster recovery. During the initial stages of the project, villagers, frustrated by the lack of appropriate government response and insufficient or unsatisfactory efforts from non-governmental agencies, were skeptical. Suntali recalls that "Sitaram (Dhurmus) and his aides were chased away" in many instances (eKantipur, 2019). However, they soon began to form relationships with the concerned communities and stakeholders, and were able to demonstrate that their intention was to work with the villagers and for the villagers. As one recent study notes, both government and non-government agencies working towards post-disaster reconstruction "preferred to hire outsiders" for a variety of reasons (Bownas and Bishokarma, 2018). Because outsiders tend not to come with families to the worksite, there are less distractions. They do not take time off for festivals or weddings and are cheaper overall (p. 8). Bownas and Bishokarma (2018) note that Dhurmus Suntali Foundation's integrated model village in Giranchaur, Sindhupalchowk is a notable exception to this pattern (see fotenote 14, p. 8). DSF's approach was an 'exception' because, unlike the contractors working on behalf of other agencies who "rarely took the effort to integrate local labor into projects,"

[44] GCNB comprises of 66 houses (where over a 100 families currently reside), three children parks, four parks, three vehicle parkings, nine Child-friendly taps, four public toilets, one community hall, one view tower, and one chautara.
[45] The English translation is model village.

Dhurmus-Suntali made active efforts to include villagers who were going to be the final owners and caretakers of the model villages. Local participation in recovery efforts encouraged many volunteers to join their efforts as well (Himalayan News Service, 2016a).

There is little doubt that many of the tasks that DSF shouldered, the government or markets could deliver too, given the right set of infrastructures and institutions. However, post-disaster situation in Sindhupalchowk was such that the infrastructures and institutions necessary for the functioning of markets and the government were in shambles (Rayamajhee et al., 2019). Rayamajhee (2019) also points out that institutional changes in the aftermath of disasters create conditions where the status quo approaches (markets or states) tend to be ineffective in the provision of goods and services. In such cases, community-based organizations have better incentives, local knowledge, and "stake in relief outcomes" to outperform top-down organizations and agencies (Chamlee-Wright and Storr, 2009; Skarbek, 2014). DSF's success can be partly attributed to these factors. However, large part of its success has to do with its goals that extend beyond the provision of goods and services, that of unity, solidarity, and citizenship. Alongside reconstruction, DSF launched what it called a unity campaign[46] that had as its central goal the unification of people for the common purpose of national reconstruction. In Kattel's own words, politicians' wrongdoings "weakened unity" and further divided the

[46] Although DSF only officially announced its unity campaign in 2017, many of its post-disaster activities reflect the message of unity towards nation-building. Their Namuna Basti project incorporates the Himal-Pahad-Tarai (Mountains-Hills-Plains) theme that is meant to unite Nepalis of diverse backgrounds spread across three ecological belts in Nepal – the mountainous Himalayan region, the Mahabharat range, and the fertile Terai plains.

people of Terai (plains) and Pahad (mountains) and that there exists a dire need to "strengthen unity and harmony"(Himalayan News Service, 2017). It is the need for national solidarity and harmony in the time of crisis that other agencies, both private and public, had failed to deliver that DSF addressed.

As a result, DSF was able to galvanize all sectors of the society together for its dual mission of "uniting community" and "social development" (DSF, 2019). Dhurmus and Suntali were able to use their fame to secure partnerships with private organizations, corporations, government agencies. Ministry of Federal Affairs and Local Development (MoFALD) provided financial (albeit nominal) and administrative support. Nepal Army provided labor support. The newly elected Prime Minister Pushpa Kamal Dahal donated his first salary to DSF's campaign and noted that their campaign "has spread positive message across the country and this is developing as a culture" (Himalayan News Service, 2016b). Private companies donated construction materials, United Nations and other international agencies provided vital partnerships, and other charitable organizations joined in. Amid overwhelming attempts by all interested parties to portray the duo as national heroes, they remained committed to their co-production model for post-disaster recovery which puts citizens at the heart of governance. For them, citizens were the agents of change. Dhurmus and Suntali were, and remain, mere facilitators.

Study Area and Data Collection

The dataset for our empirical analysis comes from a field survey that we conducted in May-July, 2017 in Sindhupalchowk, Nepal. We conducted face to face interviews with

over 500 households that were selected based on stratified randomized sampling procedure using the conventional right-hand-rule. The 2015 earthquake claimed over 9000 Nepali lives. Sindhupalchowk district was disproportionately affected with over 3440 casualties (Shakya, 2016). The two other most affected districts are Kavrepalanchowk and Gorkha. Following the 2015 earthquake, DSF initiated two Namuna Basti projects, one in Pahari, Kavrepalanchowk and the second one in Giranchaur, Sindhupalchowk. Our study area covers Giranchaur (ward 6) and all other wards (total of 9) in the former Basbari Village Development Committee (VDC[47]) as well as many wards of the surrounding Melamchi municipality. As noted in a different study in post-earthquake Sindhupalchowk, the area went through several changes in administrative boundaries following several regime changes (Rayamajhee and Bohara, 2018), so we used pre-2011 administrative boundaries to avoid ambiguity. Majority of residents in Basbari and the surrounding Melamchi area rely on agriculture for their livelihood, although remnants of the old caste-based division of labor are still visible. Besides agricultural production, *majhis*[48], for instance, still engage in fishing, and *pariyars*[49] sew clothes. Two rivers, Sindhukhola and Indrawati pass through Basbari. The former divides Giranchaur from rest of the Basbari villages, whereas Indrawati separates Basbari from the neighboring Koiralatar and Sipaghat. Rural villages in Nepal are organized in clusters, with separate ethnic identities occupying separate villages. Often, the names of these villages identify what ethnic groups/castes live there.[50] Basbari is

[47] Each VDC, led by a VDC Chief/Chairperson, is a cluster of village units
[48] Translated as fishermen. Majhis or danuwars are classified as *Dalits*.
[49] Translated as tailors, also classified as *Dalits*.
[50] For example, Koiralatar, Bhotechaur, and Sipa-Pokhare in Basbari are named after Koirala (Brahmin), Bhotes (indigeneous), and Pokharels (Brahmin).

characterized by mountainous terrain with dramatic changes in elevation in between villages, which exacerbates post-disaster recovery challenges.

Empirical Estimation and Results

Empirical Estimation

To estimate the impact of Giranchaur Namuna Basti (GCNB) project on fostering citizenship, the paper evaluates three measures of active citizenship (*Citiz*) that we deem are relevant in post-disaster contexts: volunteering activities, community engagement, and participation in post-disaster reconstruction efforts (PDRE). In the next section, we show that households within the GCNB village and those living in the villages surrounding GCNB do not have statistically significant differences insofar as metrics for the determinants of citizenship are concerned. Nonetheless, there remain concerns that GCNB may have had neighborhood effects in that the benefits received by GCNB could have spilled over to neighboring villages. We cannot achieve pure randomization in that sense. However, the fact that there may be spillover effects does not invalidate, but instead strengthens, the case that social entrepreneurship fosters citizenship. To account for potential differential impacts and spillover effects, we use alternate thresholds – at 10, 30, 60, 90, and 120-minute radii – to distinguish the 'treatment' group from 'control' groups.

The empirical estimation was done using the following model specification:

$$Citiz_{i,m} = \beta_0 + \beta_1 GCNB_{r,i} + \beta_2 HCF_i + \beta_3 X_i + \beta_4 CF_i + \beta_5 EQDamage_i + \beta_6 Asset_i + \beta_7 Access_i + \varepsilon_i$$

In the above set up, $Citiz_{i,m}$ represents respondent *i*'s measure of citizenship, where *m* indicates three measures: volunteering activities, community engagement, and PDRE participation. These variables will be discussed further in the results section. $GCNB_{r,i}$ is our variable of interest, where r indicates different threshold levels (*r*) at 10, 30, 60, 90, and 120-minute radii. For each *r*, *GCNB* takes a value of 1 if the respondent lives within the radius and 0 if s/he lives outside the radius. Our coefficient of interest is β_1. It is possible that human capital factors (*HCF*) such as education, health, and occupation could affect *citizenship*. Although, we shall later show that there are no statistically significant differences across groups based on these characteristics, we include these variables are controls in our model. Moreover, household characteristics (*X*) such as household size, age of household head, as well as respondents' gender and marital status are included as controls. We also consider cultural factors (*CF*) such as caste and religion that may explain part of the variation in outcome measures. The model also includes a vector of disaster damage (*EQ-Damage*) variables (home damage, property damage and injuries) to account for the lingering impacts of the 2015 earthquake on *citizenship*. Family resources was controlled for using *asset* index. Additionally, we use *distance to the nearest market center* to control for the access to and presence of commercial activities (*Access*) that may serve to foster interaction. Participation in community-based microfinance organizations is also included in the model. When estimating each model, standard errors are clustered by wards (village units).

Results

The GCNB project placement in Giranchaur was random, at least insofar as the metrics for civic engagement and citizenship are concerned. In fact, during our conversations with officials at the Dhulikhel Hospital's Bahunepati clinic, we learned that several other villages had been considered as potential sites, including Majhi-gaun and Thapa-gaun. The choice of Giranchaur was not born out of convenience. For one, Thapa-gaun or villages in the vicinity of Bahunepati bazaar would have been more convenient and significantly cheaper. Giranchaur spans wards 5 and 6, which are at least an hour and a half uphill hike away from the main road. Parts of ward 6 took us up to 2 hours (of hike) to get to, which makes it a 'bad choice' in logistical terms. Also, the fact that Giranchaur was predominantly occupied by Tamangs and Lamas, both of which are indigenous groups, tells us that it was not due to the efforts from community leaders' or the community's social capital that attracted Dhurmus-Suntali to Giranchaur. Brahmin and Chhetris have enjoyed political and social privileges in the Hindu-dominated cultures for centuries and are more likely to have high social and political capital than indigenous groups or other castes (Rayamajhee and Bohara, 2019). Dhurmus and Suntali themselves belong to Brahmin-Chhetri groups, so if their choice was based on cultural or caste proximity, Tiwari-gaun, Thapa-gaun, or Parajuli-gaun could have been chosen. Table 1 (columns 1, 2, and 3) presents comparison between GCNB and non-GCNB households. We find that they are not significantly different in any consequential way. Their access to markets, participation in microfinance groups, household sizes, age of household heads, gender composition, education levels, occupations, agricultural land, and self-assessed health are statistically identical. We do see differences in caste and religion composition across GCNB and non-GCNB households, a very expected scenario in consideration of

the diverse cultural heterogeneity in Nepal (Varughese and Ostrom, 2001). However, as Varughese and Ostrom (2001) show, the wide cultural heterogeneity is "not a strong predictor of the level of collective activity." Their influence in that realm is limited to birth, marriage, and funeral rituals, which is also evident from the observed differences in marital statuses across the two groups. Moreover, the 2015 earthquake led to similar levels of destruction across both groups, both in terms of damages to dwelling facilities and property. So, it was not the level of destruction that determined the choice of Giranchaur.

Volunteering Activities

We asked each household representative if they have recently engaged in any voluntary activity (at both individual and collective levels) for the benefit of the community. We also made sure to distinguish such activity from their engagement in the GCNB project. The distinction is important because involvement in GCNB cannot be viewed as volunteering, even if they may have worked without pay, because there are economic gains to be made from such involvement. Furthermore, DSF employed (and paid) local villagers even if they were going to be the beneficiaries of the Namuna Basti once rebuilding was completed. We recorded their responses as either a 'yes' or a 'no.' Table 2 reports findings from logistic regressions with standard errors clustered by wards. Columns 1 and 2 present the impact that DSF's 'intervention' had on community members' involvement in volunteering activities. *Dist0* indicates within GCNB (if *dist0*=1) and without (if *dist0*=0). Controls (column 2) included in the model are: participation in microfinance groups, distance to the nearest market center

(bazaar/chowk), age of household head, education, occupation, asset, marital status, religion, caste, and earthquake damage variables. Controlling for potential factors that could influence volunteering activities, we find that DSF's GCNB project has significant impact on volunteering activities. To account for potential spillover effects, we also use different thresholds: 10, 30, 60, 90, and 120-minute radii from the GCNB village. The distance in time is used because geolocation-based distance can mask the ruggedness of mountainous terrain. We deem that villagers' 'local knowledge' of the relative distance is more relevant than the absolute distance. We find evidence for the presence of spillover effects up to an hour away from the project location (columns 3-8).[51] Table 3 reports marginal effects. Residents of the GCNB village are over 17% more likely to engage in volunteering activities than non-residents (columns 1 and 2). As we increase the radius to 10, 30, and 60-minute distances, we see that in-group residents, compared to out-group residents, are 12%, 8.9%, and 7.5% more likely to engage in volunteering activities, after controlling for all the variables previously discussed.

Community Engagement

Next, we asked how involved each respondent was in her/his community. We specified that community engagement constitutes involvement in local governments, and local voluntary associations and organizations (both formal and informal). Each respondent was asked to rate their community engagement on a likert-scale ranging from 1 (meaning 'very inactive') to 5 (meaning 'very active'). Because only 27 and 57 responses were recorded as 2 ('somewhat inactive') and 3 ('neutral'), we reorganized the bins in a 1-3

[51] Appendix TableA1 presents results for dist90 and dist120.

scale, and recoded 1 to mean 'inactive/neutral.' Table 3 reports results from ordered logistic regressions with standard errors clustered by wards on community engagement. Results from column 1 and 2 indicate that the GCNB project has positive effects on community engagement. Columns 3-8 suggests that there exist significant spillover effects up to an hour outside the GCBN village.[52] Results are robust to inclusion or exclusion of all control variables discussed in the previous section. Table 5 reports average marginal effects. We find that residents of the GCNB village are 18% less likely to remain inactive, 7% more likely to remain active, and 11% more likely to remain very active, compared to non-residents.[53] If 10-minute radius is considered as a cut-off threshold, we find that the effect diminishes in magnitude but persists: 15% less likely to remain inactive, 6% more likely to remain active, and 9% more likely to remain very active. We see significant spillover effects up to an hour away. Findings on community engagement are consistent with those on volunteering activities.

Participation in Post-disaster Reconstruction Efforts (PDRE)

Finally, we asked each respondent how much they agree that they participate in current post-disaster reconstruction efforts. Responses were recorded in a likert-scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). Bins 1 ('strongly disagree') and 2 ('somewhat disagree') had insufficient responses (35 and 32), so we reorganized them as a 3-point-likert scale and recoded them to mean a) low-1 if responses were 'strongly disagree,' 'somewhat disagree' or 'neutral,' medium-2 if the response was 'agree' and

[52] The spillover effect dissipates outside the 60-minute radius. See Appendix Table A3 for results.
[53] These results are from models that include control variables.

high-3 if the response was 'strong agree.' Table 6 presents results from ordered logistic regressions with standard errors clustered by wards on PDRE. Compared to results for volunteering activities and community engagement, we find that GCNB's impacts on PDRE had wider spillover effects. The effects persisted up to a 90-minute radius. Even at 120-minute radius, there were lingering effects (although not robust to model specifications with control variables). Average marginal effects reported in table 7 show that residents of GCNB are 9% less likely to have low levels of PDRE-participation, and 7% more like to have high levels of participation.[54] We find no significant marginal effects for the medium PDRE-participation rate. Consistent with results from Table 6, findings from Table 7 show that GCNB has consistent spillover effects on PDRE up to 90-minute radius. Unlike volunteering activities and community engagement, the effects do not seem to systematically decline at a steady rate. Although these effects dissipate after 90-minute radius, at cut offs below the 90-minute mark, the effects seem to depend less on the threshold chosen.

Conclusion

The purpose of this paper is not to present a heroic portrayal of Kunjana Ghimire and Sitaram Kattel. Instead, using Dhurmus and Suntali's social entrepreneurial roles in fostering citizenship as one case study, we attempt to link "the problem of citizenship and the model of social agency" with the overarching goal of placing the Ostroms' work in the context of the institutionalist program. This need has been articulated by several

[54] These numbers are based on results reported in columns (2), (4), and (6) that include all control variables. Columns (1), (3), and (6) present model-findings without control variables.

scholars of the Ostromian tradition, most notably and vigorously by Paul Aligica (2018). Aligica (2018) contends that the citizenship-social agency relationship that Ostroms try to capture "are not outliers driven by the Ostroms' normative priors fueled by their interest in self-governance" (p. 119). Instead it consitutes an integral part of the institutionalist research agenda that requires further investigation on both theoretical and empirical levels (ibid.). Viewed from this perspective, the notion of citizenship is not an exogeneous construct with no human agency. Instead, citizenship emerges when atomistic individuals previously stuck in the blackboard-type Prisoner's Dilemma (PD) games 'decide' to interact with each other (e.g. Gurven and Winking, 2008), establish mutual bonds (e.g. Rayamajhee and Bohara, 2018), forge collective narratives (e.g. Chamlee-Wright and Storr, 2011), and collectively manage their common resources (e.g. Ostrom, 2015). In each case these studies, there are social entrepreneurs, told and untold, working to faciliate interaction and coordination in constitional, collective-choice, and operational levels.

This renewed view of social entrepreneurship based on the centrality of human agency in all economic and non-economic activities asks us to reconsider the prior equilibrium-centric methods of theorizing in light of a revised one characterized by "possibilism" and "responsibility" (Aligica, 2018, 137). Possiblism, because human ingenuity and agency always exceeds theoretical expectations, as Ostrom's work convinces us. She asks theorists and practitioners to imagine "a world of possibility" and not of "necessity" (E. Ostrom 1998, 15-16). Responsibility, because no theory of human behavior or society, "no method or algorithm," "no operations research, systemic thinking, or expert system"

can save us from the “troubles of judgment, analysis, and responsibility” (Aligica, 2018, 137). The role of social entrepreneurs become pivotal in political economy conceived this way. However, it is not just a matter of perspective. Heaps of empirical studies, including a handful ones mentioned in this paper, are consistent with that narrative. In Ostrom’s own words, “we are neither trapped in inexorable tragedies nor free of moral responsibility for creating and sustaining incentives that facilitate our own achievement of mutually productive outcomes” (E. Ostrom, 1998). A diversity of social actors, citizens and social entrepreneurs alike, have devised and will continue to devise ways that flummoxes all theorists of human behavior and society.

Once we bring back human agency into the analysis of social processes as a vibrant alterantive to the structural determinism perspective, social entrepreneurs occupy a crucial spot in the polital economy space. Just as competitive markets become possible through the ingenuity and dedication of commercial entrepreneurs, citizenship emerges from the active human agency of social entrepreneurs. Profit opportunities in the untapped markets do not automatically generate new players in the game. Market entrepreneurs actively look for such opportunities, use their endowment and capabilities, take considerable risks, overcome adversities, and introduce new products. Understood this way, competition is an emergent outcome built on the efforts of many entrepreneurs, and not an axiomatic premise. An analogous logic of human agency applies to social entrepreneurs. Social entrepreneurs may not seek for profit opportunities, but they respond to social challenges and community needs, motivate individuals and communities to forge alliances, innovate incentive-compatible strategies for co-

production, and find ways to overcome hurdles. In other words, citizenship emerges as part of many co-production processes.

Elinor Ostrom's early investigations of entrepreneurs in the public sector comparable to those in the private markets, vis-à-vis public entrepreneurs, guided much of her later study of public economies and commons. A social entrepreneur differs from a public entrepreneur in one fundamental sense.[55] Polycentricity and competitive governance are "preconditions" for public entrepreneurship in that only a governance framework characterized by multiple, overlapping jurisdictions organized across different levels of governments can provide public entrepreneurs with appropriate incentives to engage in entrepreneurial ventures within the public domain (Aligica, 2018, p. 21). This, however, is not a strong precondition for a social entrepreneur. One may think of social and political activists like Martin Luther King, Nelson Mandela, or a more pertinent case of Dhurmus-Suntali where governance systems exhibit substantial monocentric tendencies. Nonetheless, polycentricity, although not essential, can at times be catalytic to social entrepreneurship. Other times, social entrepreneurship can emerge precisely to address the lack of polycentric arrangements conducive to human well-being. The distinction and interaction between formal and informal institutions will help further clarify this point. Formal and informal institutions[56] operate in conjunction, united across multiple facets

[55] Social and public entrepreneurs share common features: they are both largely motivated by the goal of solving collective action problems and social dilemmas. Their roles can often overlap, and the distinction can appear blurry. However, they are not identical. Social entrepreneurs are from within the citizenry, whereas public entrepreneurs work in the public sector. The latter can be bureaucrats, politicians, judges, or police working in various areas and levels of the public sector.

[56] Formal institutions include economic, political, legal institutions that typically operate according to codified, established set of rules. Informal institutions include social norms, practices, customs, rituals, traditions that are relatively loosely organized and codified (ibid.).

but also fragmented by multiple sutures, at different levels and scales (p. 125). Social entrepreneurs are the bridges between formal and informal institutions. They understand both the *de facto* and the *de jure* rules, and are able to navigate through granular areas where the two classes of rules do not match. Often social entrepreneurial roles involve smoothing the granular surfaces marked by inconsistencies across the *de facto* and *de jure* arenas. Social entrepreneurs operate in the muddy zone in between the markets and states. They bridge the formal and the informal, and work for the people and often with the government. Their success is contingent on their ability to recognize "local and personal knowledge of the social actors directly involved on the ground," adapt their strategies constantly to cater to changing circusmtances, and work alongside citizens in co-productive processes (p. 131). The empirical findings from our analysis of the Dhurmus-Suntali Foundation's work in Giranchaur solidifies this case.

Table 3. 1: Means Comparisons Across Groups

	(1)	(2)	(3)	(4)	(5)	(6)
	0 min radius		p-value	10 min radius		p-value
VARIABLES	Inside	Outside	(1)-(2)	Inside	Outside	(4)-(5)
Part in Microfinance	.605	.484	0.1512	.593	.48	0.1023
	(.080)	(.023)		.064	(.023)	
Dist. nearest market	57.92	47.89	0.2349	52.32	48.16	0.5485
	(5.21)	(2.35)		3.868	(2.452)	
Health (self-assesd)	2.368	2.260	0.4452	2.372	2.254	0.3092
	(.138)	(.038)		.115	(.039)	
Education-hhhead	1.657	1.574	0.4018	1.644	1.572	0.3799
	(.094)	(.027)		(.071)	(.028)	
Occupation-agriculture	.710	.686	0.7584	.762	.678	0.1898
	(.074)	(.021)		(.055)	(.022)	
Agric. land (ropanis)	9.027	7.787	0.4190	8.892	7.746	0.3626
	(1.40)	(.422)		(1.110)	(.433)	
Household size	6	5.574	0.2653	6	5.554	0.1555
	(.496)	(.100)		(.360)	(.103)	
Age-hhhead	45.28	48.16	0.2285	46.389	48.150	0.3685
	(2.170)	(.652)		(1.646)	(.673)	
Female	.5	.559	0.4800	.508	.560	0.4464
	(.082)	(.022)		(.065)	(.023)	
Marital Status	.736	.847	0.0744	.745	.851	0.0378
	(.072)	(.016)		(.057)	(.016)	
Religion-Hindu	.184	.756	0.0000	.237	.776	0.0000
	(.063)	(.019)		(.055)	(.019)	
Caste-BrahminChhetri	.0526	.449	0.0000	.135	.456	0.0000
	(.036)	(.022)		(.044)	(.023)	
House Damage	.894	.800	0.1582	.813	.807	0.9059
	(.050)	(.018)		(.051)	(.018)	
Property Damage	.8157	.786	0.6664	.745	.793	0.3968
	(.063)	(.018)		(.057)	(.019)	
Injuries	.3421	.334	0.9265	.423	.323	0.1265
	(.077)	(.021)		(.064)	(.022)	
Observations	38	472		59	451	

Note: Means comparisons across 30, 60, 90, 120-minute radii can be made available upon request. The differences between in- and out- groups gets further diminished (both magnitude and significance levels) as we increase radii from 30 onwards.

Table 3. 2: Logit Regression Results for Volunteering

VARIABLES	(1) volunteer	(2) volunteer	(3) volunteer	(4) volunteer	(5) volunteer	(6) volunteer	(7) volunteer	(8) volunteer
dist0	0.731***	0.795***						
	(0.283)	(0.266)						
dist10			0.507***	0.551***				
			(0.136)	(0.189)				
dist30					0.434***	0.407***		
					(0.107)	(0.136)		
dist60							0.384***	0.342***
							(0.0930)	(0.124)
Constant	0.167	-0.589	0.161	-0.627	0.144	-0.641	0.150	-0.643
	(0.122)	(0.896)	(0.117)	(0.923)	(0.116)	(0.907)	(0.111)	(0.888)
Observations	507	505	507	505	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Log-likelihood	-346.3	-315.6	-346.9	-316.2	-346.8	-316.5	-347.1	-316.8

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Table 3. 3: Average Marginal Effects for Volunteering

VARS	(1) ME	(2) ME	(3) ME	(4) ME	(5) ME	(6) ME	(7) ME	(8) ME
dist0	0.179**	0.173***						
	(0.069)	(0.055)						
dist10			0.124***	0.120***				
			(0.034)	(0.042)				
dist30					0.106***	0.089***		
					(0.026)	(0.030)		
dist60							0.094***	0.074***
							(0.023)	(0.027)
N	507	505	507	505	507	505	507	505
EQ-Damage Variables	No	Yes	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Table 3. 4: Ordered Logit Regression Results for Community Engagement

VARIABLES	(1) Comm Engag	(2) Comm Engag	(3) Comm Engag	(4) Comm Engag	(5) Comm Engag	(6) Comm Engag	(7) Comm Engag	(8) Comm Engag
dist0	0.679***	0.873***						
	(0.154)	(0.289)						
dist10			0.542***	0.745**				
			(0.176)	(0.292)				
dist30					0.657***	0.817***		
					(0.151)	(0.189)		
dist60							0.613***	0.730***
							(0.139)	(0.212)
Constant cut1	0.179**	0.420	0.192**	0.461	0.244***	0.565	0.241***	0.586
	(0.0914)	(0.632)	(0.0831)	(0.641)	(0.0902)	(0.621)	(0.0907)	(0.616)
Constant cut2	1.677***	2.160***	1.689***	2.202***	1.752***	2.318***	1.746***	2.333***
	(0.165)	(0.679)	(0.143)	(0.678)	(0.132)	(0.645)	(0.129)	(0.641)
Observations	507	505	507	505	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Log-likelihood	-502.2	-451.3	-502.3	-451.2	-500	-449.1	-500.5	-450

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, marital status, religion, occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage

Table 3. 5: Average Marginal Effects for Community Engagement

VARIABLES	Inactive		Active		Very Active	
	(1)	(2)	(3)	(4)	(5)	(6)
dist0	-0.168***	-0.181***	0.0744***	0.0723***	0.0934***	0.109***
	(0.0370)	(0.0560)	(0.0245)	(0.0234)	(0.0141)	(0.0337)
	(7)	(8)	(9)	(10)	(11)	(12)
dist10	-0.134***	-0.154***	0.0593***	0.0617***	0.0745***	0.0925**
	(0.0428)	(0.0583)	(0.0199)	(0.0224)	(0.0250)	(0.0366)
	(13)	(14)	(15)	(16)	(17)	(18)
dist30	-0.161***	-0.168***	0.0712***	0.0669***	0.0899***	0.101***
	(0.0357)	(0.0335)	(0.0175)	(0.0117)	(0.0211)	(0.0229)
	(19)	(20)	(21)	(22)	(23)	(24)
dist60	-0.150***	-0.150***	0.0665***	0.0600***	0.0839***	0.0904***
	(0.0328)	(0.0396)	(0.0153)	(0.0137)	(0.0204)	(0.0265)
	(25)	(26)	(27)	(28)	(29)	(30)
dist90	-0.0161	0.0529	0.00715	-0.0213	0.00893	-0.0316
	(0.0681)	(0.0756)	(0.0296)	(0.0323)	(0.0384)	(0.0434)
	(31)	(32)	(33)	(34)	(35)	(36)
dist120	-0.0637	-0.00385	0.0283	0.00155	0.0354	0.00230
	(0.0723)	(0.0648)	(0.0322)	(0.0261)	(0.0405)	(0.0387)
Observations	507	505	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, marital status, religion, occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Table 3. 6: Ordered Logit Regression Results for Participation in Post-disaster Reconstruction Efforts (PDRE)

VARIABLES	(1) PDRE	(2) PDRE	(3) PDRE	(4) PDRE	(5) PDRE	(6) PDRE	(7) PDRE	(8) PDRE	(9) PDRE	(10) PDRE	(11) PDRE	(12) PDRE
dist0	0.598**	0.479**										
	(0.286)	(0.242)										
dist10			0.568***	0.383*								
			(0.212)	(0.212)								
dist30					0.749***	0.581***						
					(0.196)	(0.214)						
dist60							0.779***	0.618***				
							(0.200)	(0.236)				
dist90									0.778***	0.544**		
									(0.239)	(0.249)		
dist120											0.734**	0.485
											(0.359)	(0.304)
Const cut 1	-0.92***	-0.725*	-0.902***	-0.708*	-0.848***	-0.612	-0.840***	-0.573	-0.680***	-0.450	-0.491*	-0.336
	(0.117)	(0.401)	(0.113)	(0.400)	(0.0926)	(0.426)	(0.0920)	(0.414)	(0.136)	(0.356)	(0.282)	(0.431)
Const cut 2	1.532***	1.944***	1.555***	1.960***	1.635***	2.074***	1.648***	2.116***	1.838***	2.249***	2.010***	2.347***
	(0.188)	(0.344)	(0.186)	(0.347)	(0.166)	(0.365)	(0.169)	(0.350)	(0.237)	(0.311)	(0.398)	(0.433)
Observations	506	503	506	503	506	503	506	503	506	503	506	503
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Lg-likelihood	-505.2	-474.9	-504.7	-475	-501.5	-473.1	-500.9	-472.7	-497.2	-471.8	-499	-472.9

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, marital status, religion, occupation of household head, household assets, and EQ damage variables.

Table 3. 7: Average Marginal Effects for Participation in Post-disaster Reconstruction Efforts

VARIABLES	Low		Medium		High	
	(1)	(2)	(3)	(4)	(5)	(6)
dist0	-0.119**	-0.0882**	0.0294	0.0210	0.0899**	0.0672**
	(0.0588)	(0.0438)	(0.0249)	(0.0129)	(0.0380)	(0.0328)
	(7)	(8)	(9)	(10)	(11)	(12)
dist10	-0.113**	-0.0706*	0.0277	0.0168	0.0853***	0.0538*
	(0.0447)	(0.0389)	(0.0215)	(0.0123)	(0.0253)	(0.0275)
	(13)	(14)	(15)	(16)	(17)	(18)
dist30	-0.148***	-0.107***	0.0365*	0.0255**	0.112***	0.0811***
	(0.0395)	(0.0383)	(0.0199)	(0.0127)	(0.0234)	(0.0274)
	(19)	(20)	(21)	(22)	(23)	(24)
dist60	-0.154***	-0.113***	0.0381*	0.0271**	0.116***	0.0861***
	(0.0398)	(0.0420)	(0.0205)	(0.0135)	(0.0233)	(0.0303)
	(25)	(26)	(27)	(28)	(29)	(30)
dist90	-0.152***	-0.0998**	0.0381*	0.0243*	0.114***	0.0755**
	(0.0468)	(0.0447)	(0.0224)	(0.0147)	(0.0288)	(0.0312)
	(31)	(32)	(33)	(34)	(35)	(36)
dist120	-0.144**	-0.0888	0.0364	0.0211	0.108**	0.0677*
	(0.0703)	(0.0544)	(0.0298)	(0.0165)	(0.0464)	(0.0396)
Observations	506	503	506	503	506	503
Controls	No	Yes	No	Yes	No	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, marital status, religion, occupation of household head, household assets, and EQ damage variables.

CHAPTER 6
Conclusion

If not "Leviathan" it must be "anarchy" is the dominant dogma in post-disaster management (E. Ostrom, 2010). All four papers (chapters 2-5) in this dissertation contest the myopic market-state dichotomy from which the dogma emerges. First, the challenges that stem from the failure of markets to facilitate voluntary transactions and the inability of private associations to resolve many collective action problems during a post-disaster situation do not automatically lend themselves to the "Leviathan" disaster management approach. In fact, our findings in chapter 2 indicate that Nepal government's attempt to monitor and control post-disaster relief, rehabilitation, reconstruction and recovery has only exacerbated the problem.

Secondly, such false dichotomy masks the critical role that voluntary associations and social entrepreneurs play in post-disaster contexts. In chapter 3, I empirically demonstrate that communities are able to mobilize their social capital to build trust among one another to resolve post-disaster collective action problems. Chapter 5 presents a case from Dhurmus-Suntali Foundation's Giranchaur Namuna Basti Project in post-earthquake Nepal to underscore the distinctly *neither-market-nor-state* role that social entrepreneurs play in post-disaster recovery. Using DSF-GCNB's post-disaster involvement as a quasi-experimental set up, I highlight their social entrepreneurial role in the co-production of active citizenship. I argue that this role is uniquely social entrepreneurial in that neither the market nor the state has appropriate incentives to address it.

Thirdly, the *Gargantua* post-disaster management derives its theoretical motivation from the "publicness" of post-disaster challenges. That is, any post-disaster challenge, when viewed as a Prisoners' Dilemma puzzle, can be characterized as one mired with free-riding opportunities. In a similar vein, the provision of post-disaster goods and services towards relief, rehabilitation, and reconstruction are implicitly assumed to be non-excludable and non-rivalrous. Chapter 4 contests the pure publicness or privateness of such goods. Using institutional-contingency of excludability and rivalrousness as a premise, I present cases where disaster shocks lead to institutional changes thereby changing the nature of post-disaster goods and services defined in terms of excludability-rivalrousness attributes. The policy approach, understood from this lens, is one of "institutional matching" rather than optimal resource allocation. Such approach provides a better theoretical framework to account for a diverse set of institutional arrangements suited to different contexts that individuals, households, and communities devise to overcome many post-disaster challenges.

All four papers in this dissertation attempt to link theoretical insights from Elinor Ostrom and the Bloomington School to post-disaster settings. Among my central contributions is to present the relevance of Ostromian insights to non-CPR settings where the goods and services are not necessarily non-excludable but subtractible. This work is by no means comprehensive. In fact, I have barely scratched the surface. Readers of this dissertation should view this work as setting up a foundation to build more robust research programs that extend Ostromian insights from their study of common pool resources and local public economies to understand self-governance and resilience in a wide variety of

settings with different challenges. Rather than taking Ostromian prescriptions such as the 'design principles' and directly applying it to other settings, these chapters reveal to us the possibility of employing the Ostroms' analytical tools to generate new set of 'design principles' to fit into diverse contexts. Ostromian approach is not merely one of testing an established theory or ascertaining narrow causality. Instead, it is one that encourages learning from individuals and communities. Blackboard theories are useful but should not be treated as end-all-be-all of social sciences. Researchers of human behavior and organization should keep our eyes wide open and be ever-ready to be surprised by the 'subjects' we are studying.

APPENDIX

Chapter 3

1. Theory of Reciprocal Norms and Collective Action
2. Model Identification
3. Sensitivity Analysis
4. Principal Component Analysis for Social Capital
5. Full Parameter Estimates for Models in Table 2
6. References

1. Theory of Reciprocal Norms and Collective Action

In Manebhanjyang, a rural village in Basbari, village elders are considering a post-earthquake collective action project involving the reconstruction of a local stupa (Buddhist shrine) that was damaged by the 2015 earthquakes. Our representative individual Pemba, who resides in Manebhanjyang, is contemplating whether or not to participate in the reconstruction project. We characterize Pemba, not based on strict rational egoist assumptions, but on characteristics consistent with norms of intrinsic reciprocity (Sobel, 2005). That is, his volitions and actions are subject to *the tribunal of the impartial spectator*, – to that of *the man within the breast*, – whose "jurisdiction is founded in the desire of praise-worthiness, and in the aversion to blame-worthiness" (Smith [1759] 1982, p. 130-131). His ill-actions, even when unnoticed by outside spectators, haunt him, and he is angered when someone deceives him. In both instances, he experiences a subtraction from his net utility (ψ), – by guilt in the first case and by anger in the second. Similarly, when his good actions are reciprocated by good actions from others, he feels a sense of approbation ("warm glow"); when he retaliates someone's bad action with a similar bad action unto them, he feels a sense of "getting even." In such cases, he experiences an increase in his overall utility (β).

To conceptualize this formally, we adopt a modified public-good game from Ferguson (2013) and retain his notations (p. 96). Pemba's utility (pay-off) function is given by:

$$(1)\ u_i = -c_i + \alpha \sum_{j=1}^{N} c_j + z_s \beta - z_o \psi.$$

In equation (1), c is the cost of contributing towards collective action, $\alpha < 1$ is the marginal product of c, *N* is the maximum number of eligible contributors in Manebhanjyang, *j=1,....N*, z_s is the proportion of players who take the same action as Pemba, and z_o is the proportion of those who take the opposite strategy. Although a multitude of institutional arrangements can exist, independently or simultaneously, that produce a variety of pay-off structures[57], a non-overlapping institution characterized by a social norm (*SN*) arrangement with no material or social sanctions is adequate for out exposition. [58] [59] In this institutional arrangement, the interconnectivity between members in a community, that is, the community's intrinsic social capital, directly manifests through social norms (*SN*). In turn, *SN* shapes the payoff structure through β and ψ by determining what constitutes a socially laudable or reprehensible behavior. Incorporating $\beta > 0$ and $\psi > 0$ into the pay-off function changes the classical Prisoner's Dilemma (PD) game of public-good provision into an assurance game, such that a possibility of a successful collective action emerges. This is critical because models based on strict rational egoist assumptions that do not fully explain cooperation that occurs in many

[57] The institutional framework that our formal model is based upon is that of a [typical] social norm of the *A-D-I-C* structure which has a deontic (*D*) but no or-else (*O*) statement. For further details on the 'syntax' of institutions, refer to Crawford & Ostrom (1995).

[58] Ferguson defines *SN* as "mutually understood and expected behavioral regularity" that determines one's ethical worldview within the social domain (2013, p. 168). Bowles's (2009) definition is similar: *SN* are "ethical prescriptions governing actions towards others" (p. 97). Fehr and Gachter's (2000) experimental findings highlight the role of punishment in reducing incidences of free-riding, but we contend that social enforcement through explicit social or material sanction is not necessary for [social] normative prescriptions to effectively increase cooperation levels in post-disaster settings.

[59] Consideration of the underlying institutions under which the games of life are played and the pay-offs are attained is vital to developing a fuller understanding of collective action. As William Riker (1980) puts it, "we cannot study simply tastes and values, but must study institutions as well" (p. 444). Institutions shape motivations, behavior, and outcomes. Our choice of intrinsic reciprocity based *SN* reflects a specific social setting of a rural Nepali village as it pertains to post-disaster collective action. Many concurrent institutional rules with stronger deontic (*D*) and severe or-else (*O*) statements can co-exist in other facets of social life.

CAPs in the lab and field (Gächter, 2006; Ostrom, 2000). Again, following Ferguson (2013), we interpret the [joint] magnitude of β and ψ as reflecting mutual trust within an institutional framework of reciprocal norms.[60] We represent this by $\tau(p, t, SN) = \beta + \psi$ for simplicity, where mutual trust depends on the interplay between one's personality, number of interactions, and the social norms that determine what constitutes propriety and impropriety.

With all the aforementioned considerations, we now proceed to a n-person game of assurance. Let *C(n+1)* and *D(n)* represent Pemba's payoff functions corresponding to strategies *C* (contribute to collective action) and *D* (do not contribute to collective action) respectively. When Pemba cooperates (i.e. *n+1* cooperators), we have:[61]

$$(2)\ C(n+1) = [(n+1)\alpha - 1]c + \frac{n}{N}\beta - \frac{(N-1-n)}{N}\psi;$$

$$(3)\ D(n) = n\alpha c + \frac{(N-1-n)}{N}\beta - \frac{n}{N}\psi.$$

Note that we replace z_s and z_o from (1) with $\frac{n}{N}$ and $\frac{(N-1-n)}{N}$ in equations (2) and (3) respectively. Also, it is assumed that the utility loss from anger and guilt are equal, and that utility gain from "getting even" (from both *C*-*C* and *D*-*D* strategies) are also equal. Figure 1 (in the manuscript) provides a graphical depiction of the n-person game

[60] As the number of repeated interactions increase, the magnitude of $|\beta + \psi|$ increase proportionately. This "common perception of relatively high values for β and ψ" has been characterized as reflecting mutual trust pertaining to others' motivations (Ferguson, 2013, p. 100).

[61] Social and material sanctions (*s*) can incorporated into the model through an addition of a sanction term (*s*) into equations (2) and (3) (For delineation on an expanded model with sanctions, refer to chapter 5 in Ferguson (2013)). The corresponding pay-off functions take the following forms:

$C(n+1) = [(n+1)\alpha - 1]c + \frac{n}{N}\beta - \frac{(N-1-n)}{N}(\psi - s) - s^2/\psi;$ $D(n) = n\alpha c + \frac{(N-1-n)}{N}\beta - \frac{n}{N}\psi - \frac{n}{N-n}s$

represented by equations (2) and (3). Note that the dotted lines correspond to a PD-game (with no norms of reciprocity), whereas the solid lines are payoffs associated with an assurance game (with norms of reciprocity).

In a game of assurance like the one depicted in Figure 1, for any value of n<n*, where n* is the point where curves *C(n+1)* and *D(n)* intersect, each participant has an incentive to choose not to participate in collective action as *D(n)> C(n+1)*, which means that the only stable Nash equilibrium (s-NE) in this region is at *n=0*. Similarly, in the n>n* region where *C(n+1)> D(n)*, the choice to participate dominates that of shirking, so another stable Nash equilibrium emerges at *n=N*. There is a third equilibrium in the game: at the point where *n=n**. This is, however, a highly unstable equilibrium (u-NE) because one participant's decision to flip leads to a landslide-effect pushing the final outcome to one of the end-point equilibria. This u-NE occurs when *D(n)=C(n+1)*, and the corresponding solution for *n** is:

$$(4)\ n* = \frac{N[(1-\alpha)c+\tau(p,t,SN)]-\tau(p,t,SN)}{2\tau(p,t,SN)}$$

Equation (4) has several implications. First, an increase in the cost of participation (*c*) pushes *n** further right; that is, it shrinks the n>n* region making the choice to contribute (*C*) less appealing. Second, as group size (*N*) increases, cooperative outcome becomes increasingly difficult to attain. However, high levels of mutual trust $\tau(p,t,SN)$ results in opposite effects; $\tau(p,t,SN)$ increases the likelihood of cooperative outcome (that is, contribution towards collective action). Moreover, once *C(n+1)> D(n)* emerges,

$\tau(p, t, SN)$ generates stability as its magnitude increases with repeated interaction (t)[62] (ibid., p.95).

2. Model Identification

Identification of structural equation models remains a major challenge that receives inadequate attention. Although structural modeling software provide identification tests, they simply rely on sample estimates of parameters (Bollen and Davis, 2009), which cannot sufficiently, at least not on theoretical grounds, establish identification. Because an unidentified model means that at least one parameter value is not unique, results can be misleading. In this section, we briefly discuss order (necessary) and rank (both necessary and sufficient) conditions for the identification of our model.

Order Condition:

To satisfy the order condition in a model of M simultaneous questions, for each equation, the number of predetermined (exogeneous) variables excluded from the equation must be equal to or more than the number of endogenous variables minus one in that equation (Gujarati, 2009). That is: K-k $\geq$ m-1 must hold, where K and k are numbers of predetermined variables in the model and the specific equation under consideration respectively, and m is the number of endogenous variables in the given equation. Block-independence implies that we can evaluate the two sets (blocks) of equations separately. The first equation is exactly identified (K-k= 6-3, m-1=3), the second equation is overidentified (K-k=6-1, m-1=2), the third and fourth equations are overidentified (K-

[62] Repeated interactions increase the degree of familiarity among players, which in turns increases the level of mutual trust and reciprocity: $|\frac{\partial \tau(p*SN;t)}{\partial t}| > 0$.

k=2, m-1=0). The second block comprising of the measurement part of the model only connects to the main SEM through equation 2 (T^*), which is overidentified. Each equation in the measurement model is exactly identified. The measurement model is equivalent to factor analysis, where the latent variable (T^*) captures the mutual variance or the extent to which the three indicators of trust (T_1, T_2, T_3) move together.

Rank Condition:

The order condition is necessary for identification, but the rank condition is both necessary and sufficient. To satisfy the rank condition in a model of M simultaneous equations (and M endogenous variables), each equation is identified if and only if one or more nonzero determinant of order (M-1) (M-1) can be constructed from the coefficients of the variables not included in that equation but included in other equations in the system (Gujarati, 2009), which is in fact the case for our model. Below is a step-wise demonstration of the rank condition compliance.

Step 1: First, we list all endogenous variables in the first row of a matrix

Step 2: For each equation in the SEM, a row is designated. In the row, each cell corresponding to a variable that is included in the equation, we code a value of 1, and 0 is the variable is missing. We now have the following M *x* K matrix of 1s and 0s.

CA	*T*	SC_{bond}	$SC_{brid-link}$	*CV*	X_1	X_2	X_3	X_4	Z_1
1	1	1	1	1	1	1	0	0	0
0	1	1	1	0	0	0	0	0	1
0	0	1	0	0	1	1	1	1	0
0	0	0	1	0	1	1	1	1	0

Step 3: Now, to check the rank condition for each equation (say equation *i*), we take columns corresponding to 0 in the i^{th} row (for equation *i*), exclude the specific row (i^{th}), and write out the remainder as follows:

Equation 1:

X_3	X_4	Z_1
0	0	1
1	1	0
1	1	0

Equation 2:

CA	*CV*	X_1	X_2	X_3	X_4
1	1	1	1	0	0
0	0	1	1	1	1
0	0	1	1	1	1

Equation 3:

CA	*T*	$SC_{brid-link}$	*CV*	Z_1
1	1	1	1	0
0	1	1	0	1
0	0	1	0	0

Equation 4:

CA	*T*	SC_{bond}	*CV*	Z_1
1	1	1	1	0
0	1	1	0	1
0	0	1	0	0

Step 4: Finally, we check to see if any row/column is present with all elements 0. In our case, no such row or column exists, which means each equation (and therefore the system of equations) is identifiable.

3. Sensitivity Analysis

A number of robustness checks were implemented to evaluate the sensitivity of our results to modeling approaches. As discussed in the main paper with reference to Table 2, we begin with various modeling approaches including ordinary least squares, two-stage least squares, three-stage least squares methods. When endogeneity is ignored (in the case of OLS), we find that the effects of social capital is overestimated whereas that of trust is underestimated. Nonetheless, results remain consistent (in terms of signs and significance) throughout. However, compared to our model of choice (Model 4), these models fail to illustrate different paths of influence, which are crucial for our analysis. Full parameter estimates for two stage regression models are provided in Appendix-3 (Table 8). Note, however, that these models do not address potential measurement issues concerning trust, and that an observed variable *Trust in people* (T_1) is used instead of the latent variable *Trust** in Table 3.

Another set of robustness checks include running SEM models with different variance covariance structures presented in Table A-5. If we assume no contemporaneous correlation across equations (Model 1), we are essentially estimating OLS (which we discussed before). The selected model (Table 3) allows for the joint estimation of equations for trust, and bonding and bridging/linking social capital. In Table A-5, Model 2 presents results from SEM that only allows for the joint estimation of equations for trust and bonding social capital; Model 3 allows simultaneity across two equations for social capital; And, Model 4 allows contemporaneous correlation across equations (2) and (3), and (3) and (4). Note that in a variance-covariance matrix corresponding to 2

equations (with 3 different elements), 7 var-cov structures are possible. The number quickly balloons up when we a system of 4 equations with 10 different elements (a triangular 4x4 matrix). We present results from a selected list of var-cov arrangements based on where one could plausibly suspect simultaneity. Our results remain robust throughout.

[Insert Table A-5]

Because of the ordinal (categorical) nature of our outcome variable, a case can be made that generalized structural equation model (GSEM) would be a better modeling approach to accommodate this non-linearity. We provide GSEM results (Table A-6) as a robustness check to show that our results remain consistent regardless. Ultimately, we deem that SEM is a better alternative because it serves our purpose best without adding unnecessary interpretative complexities.

[Insert Table A-6]

Finally, we also re-ran model with and without different contextual variables. We find that results are robust to different model specifications.

Table 2. 5A: SEM results with alternate variance-covariance structures for Robustness Checks

	Model 1 ($\sigma_{ij}=0 \; \forall \; i \neq j$)		Model 2 ($\sigma_{23} \neq 0$)		Model 3 ($\sigma_{34} \neq 0$)		Model 4 ($\sigma_{23} \neq 0; \; \sigma_{34} \neq 0$)	
VARIABLES	**Collective Action**	**Trust**	**Collective Action**	**Trust**	**Collective Action**	**Trust**	**Collective Action**	**Trust**
Trust	0.785***	-	0.775***	-	0.785***	-	0.774***	-
	(0.294)		(0.288)		(0.294)		(0.290)	
Bonding Social Capital	0.143***	0.0203**	0.143***	0.0786**	0.143***	0.0203**	0.144***	0.108**
	(0.0396)	(0.00973)	(0.0394)	(0.0345)	(0.0396)	(0.00973)	(0.0394)	(0.0451)
Bridging-Linking Social Capital	0.136***	0.0132*	0.136***	0.0108	0.136***	0.0132*	0.136***	-0.0195
	(0.0346)	(0.00748)	(0.0346)	(0.00741)	(0.0346)	(0.00748)	(0.0346)	(0.0165)
Family Abandonment (instrument)	-	-0.129***	-	-0.122***	-	-0.129***	-	-0.119***
		(0.0472)		(0.0458)		(0.0472)		(0.0451)
Log pseudo-likelihood	-13293.758		-13290.176		-13256.327		-13251.614	
Observations	506	506	506	506	506	506	506	506

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All control variables from Table 3 are included in Models 1-4. Full parameter estimates available upon request.

Table 2. 6A: GSEM Results

VARIABLES	(1) Collective Action	(2) Trust§	(3) Bonding SC	(4) Brid-Link SC	(5) Reciprocal ties	(6) Generalized trust	(7) Trust in People
Trust (T*)	1.655***	-	-	-	1	1.303***	3.044***
	(0.562)				(0)	(0.259)	(0.789)
SOCIAL CAPITAL							
Bonding	0.225***	0.0195**	-	-	-	-	-
	(0.0712)	(0.00955)					
Bridging-Linking	0.258***	0.0127*	-	-	-	-	-
	(0.0693)	(0.00741)					
CONTEXTUAL VARIABLES							
Community size	0.00818	-	-	-	-	-	-
	(0.107)						
Generations in commty.	0.0530	-	-	-	-	-	-
	(0.244)						
Health damage from EQ	-0.314	-	-	-	-	-	-
	(0.246)						
Propt. damage from EQ	0.0704	-	-	-	-	-	-
	(0.210)						
Next EQ (expected)	0.000682***	-	-	-	-	-	-
	(0.000248)						
Family Abandonment (Z_1)	-	-0.130**	-	-	-	-	-
		(0.0466)					
Household Demographics							
Female	-0.889***	-	-0.233*	-0.462**	-	-	-
	(0.211)		(0.124)	(0.144)			
Age	-0.0202**	-	0.00782	0.00101	-	-	-

	(0.00810)		(0.00520)	(0.00555)			
Married	-0.0876	-	0.174	-0.111	-	-	-
	(0.245)		(0.170)	(0.192)			
Family type-Joint	-0.0102	-	0.239*	-0.00371	-	-	-
	(0.186)		(0.125)	(0.144)			
Socioeconomic Factors							
Education	-0.00129	-	0.106**	0.199***	-	-	-
	(0.0799)		(0.0512)	(0.0617)			
Occupation-Agri	0.291	-	0.180	0.113	-	-	-
	(0.191)		(0.126)	(0.131)			
Cultural/Religious Factors							
Caste-Dalit	-	-	-0.349*	-0.429**	-	-	-
			(0.203)	(0.174)			
Caste-Janajati	-	-	-0.210	-0.0499	-	-	-
			(0.184)	(0.208)			
Religion-Hindu	-	-	0.624***	0.568***	-	-	-
			(0.171)	(0.184)			
Constant			-1.092**	-0.556	2.584***	0.560***	2.251***
			(0.441)	(0.507)	(0.029)	(0.022)	(0.032)
Observations	509	509	509	509	509	509	509

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Equations (3) and (4) are allowed to have contemporaneous correlation. §Trust is a latent variable measured by three indicator variables: reciprocal ties, generalized trust, subjective trust on people. Cut-points for equation (1) are (all significant) are omitted for presentational simplicity.

4. Principal Component Analysis for Social Capital

The 11 categories of community organizations include resource user groups (agriculture, water, and forest groups), finance groups (microfinance and credit groups), awareness groups (women's, and health groups), youth groups (sports group), religious groups, civic groups, and political groups. It should be noted that many of these groups (e.g. health, sports, religious) were loosely organized and did not adhere to strict participatory and/or membership guidelines. The inclusion of such group addresses concerns that the standard measures of social capital "do not map onto the empirical realities" of the developing world (Serra, 2001), while also adhering to the established measures of social capital (e.g. Coleman, 1988; Putnam et al., 1993; Woolcock, 2001). Because participatory variables (dummies) are prone to multicollinearity issues, and including all 11 variables into a multi-equation system adds unwarranted complexities, we conduct principal component analysis (PCA) with varimax rotation to reduce variables to a few orthogonal components.

When we exclude all components with factor loadings less than 0.40, we find that the civic, political, religious, and sports groups loads into the first component, whereas agricultural, forest, and water user groups nicely load into the second component. The third component captures variation in microfinance, credit, and women's group. Note that members of the same user groups tend to belong to similar socio-economic, cultural, ethnic, and religious backgrounds. This bond across homogeneous, like-minded individuals within a community has been identified in the literature as "bonding" social

capital (Storr and Haeffele-Balch, 2012; Woolcock, 2001). On the other hand, membership in civic and political groups often cross socio-economic, cultural, ethnic, and religious boundaries. Such memberships are not confined to a single community or ward, and can link individuals across entirely different social and regional settings. For instance, a member of the local Nepali Congress village or district committee can/will act as a local representative in the national convention of the Nepali Congress party. This "linking" social capital can be crucial in crises as it can connect impoverished/rural districts to the prosperous/urban ones or aid in lobbying efforts for resources (Chamlee-Wright and Storr, 2011; Storr and Haeffele-Balch, 2012). Finally, membership in religious and sports groups, which are conditional upon shared interests and values, brings individuals across heterogeneous groups together. Case in point, the local soccer team from Manebhanjyang (ward 9) may frequently play against another team from Bahunepati-chowk (ward 4), but their ties are weak owing to their heterogeneous ethnic backgrounds. This type of bond can be understood as "bridging" social capital (Storr and Haeffele-Balch, 2012). Our PCA analysis shows that memberships in bridging and linking types have a significant overlap, and separating them would engender multicollinearity issues. Based on these considerations, we rename the first and second PCA components as *bridging/linking* and *bonding* social capital respectively. The third component pertains to financial access and not to social capital, so we exclude it from our empirical models. For robustness purposes, we also include it in all our analysis, but see no significant illustrative gains from doing so (coefficients are not significant and original results remain robust). PCA results are included in Appendix 1(Table 7).

Appendix 1 (Table 2. 7A): Principal Component Analysis Results for Social Capital (Varimax rotation)

Variables	Component 1	Component 2	Component 3	Unexplained
Participation in:				
Microfinance group	--	--	0.5812	0.497
Agricultural user group	--	0.4332	--	0.4822
Forest user group	--	0.6583	--	0.2934
Water user group	--	0.5488	--	0.383
Women's group	--	--	0.5874	0.4327
Credit group	--	--	0.4459	0.5734
Civic group	0.4887	--	--	0.4271
Political group	0.4358	--	--	0.5092
Religious group	0.4101	--	--	0.525
Sports group	0.4842	--	--	0.5242
Health group	--	--	--	0.5504

Note: Empty cells (--) in the table denote factor loadings<0.4.

Appendix 5 (Table 2. 8): Full Parameter Estimates for Models in Table 2

	MODEL 1	Model 2		Model 3		Model 4	
	OLS	2SLS		3SLS (Full-information)		SEM (Full-information)	
VARIABLES	Collective Action	First-stage Trust in People (T_1)	2nd-Stage Collective Action	First-stage Trust in People (T_1)	2nd-stage Collective Action	Trust in People (T_1)	Collective Action
Trust in People (T_1)	0.167**	-	0.854*	-	0.854*	-	0.854*
	(0.0682)		(0.452)		(0.452)		(0.452)
SOCIAL CAPITAL							
Bonding	0.148***	0.0515**	0.108**	0.0515**	0.108**	0.0515**	0.108**
	(0.0397)	(0.0254)	(0.0502)	(0.0254)	(0.0502)	(0.0254)	(0.0502)
Bridging-Linking	0.139***	0.0533**	0.108**	0.0533**	0.108**	0.0533**	0.108**
	(0.0355)	(0.0228)	(0.0434)	(0.0228)	(0.0434)	(0.0228)	(0.0434)
CONTEXTUAL VARIABLES							
Community size	-0.0116	-0.0361	0.0130	-0.0361	0.0130	-0.0361	0.0130
	(0.0593)	(0.0380)	(0.0661)	(0.0380)	(0.0661)	(0.0380)	(0.0661)
Generations in commty.	0.0227	0.0110	0.0324	0.0110	0.0324	0.0110	0.0324
	(0.145)	(0.0936)	(0.157)	(0.0936)	(0.157)	(0.0936)	(0.157)
Health damage from EQ	-0.244	-0.00483	-0.217	-0.00483	-0.217	-0.00483	-0.217
	(0.151)	(0.0971)	(0.164)	(0.0971)	(0.164)	(0.0971)	(0.164)
Propt. damage from EQ	0.0289	0.0120	0.0316	0.0120	0.0316	0.0120	0.0316
	(0.119)	(0.0764)	(0.129)	(0.0764)	(0.129)	(0.0764)	(0.129)
Next EQ (expected)	0.000478***	0.000364***	0.000204	0.000364***	0.000204	0.000364***	0.000204
	(0.000179)	(0.000114)	(0.000263)	(0.000114)	(0.000263)	(0.000114)	(0.000263)
Family Abandonment	-	-0.345***	-	-0.345***	-	-0.345***	-
		(0.0926)		(0.0926)		(0.0926)	
Household Demographics							
Female	-0.502***	0.0126	-0.511***	0.0126	-0.511***	0.0126	-0.511***
	(0.110)	(0.0708)	(0.119)	(0.0708)	(0.119)	(0.0708)	(0.119)
Age	-0.0110**	0.00182	-0.0125***	0.00182	-0.0125***	0.00182	-0.0125***
	(0.00428)	(0.00275)	(0.00473)	(0.00275)	(0.00473)	(0.00275)	(0.00473)
Married	-0.104	0.00664	-0.0985	0.00664	-0.0985	0.00664	-0.0985
	(0.134)	(0.0864)	(0.146)	(0.0864)	(0.146)	(0.0864)	(0.146)
Family type-joint	0.00243	0.0931	-0.0744	0.0931	-0.0744	0.0931	-0.0744
	(0.105)	(0.0672)	(0.124)	(0.0672)	(0.124)	(0.0672)	(0.124)
Socioeconomic factors							
Education	0.0174	-0.00686	0.0216	-0.00686	0.0216	-0.00686	0.0216

	(0.0425)	(0.0273)	(0.0461)	(0.0273)	(0.0461)	(0.0273)	(0.0461)
Occupation-Agri	0.171	0.107	0.0852	0.107	0.0852	0.107	0.0852
	(0.106)	(0.0683)	(0.128)	(0.0683)	(0.128)	(0.0683)	(0.128)
Constant	2.648***	2.067***	1.252	2.067***	1.252	2.067***	1.252
	(0.409)	(0.247)	(1.009)	(0.247)	(1.009)	(0.247)	(1.009)
Observations	508	509	508	508	508	508	508
R-squared	0.206	0.096	0.043	0.098	0.043		

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Chapter 5

Appendix Tables:

Table 3. 8A: Logit Regression Results for Volunteering

VARIABLES	(1) volunteer	(2) volunteer	(3) volunteer	(4) volunteer
dist90	0.158	-0.0348		
	(0.182)	(0.170)		
dist120			0.0771	-0.112
			(0.366)	(0.367)
Constant	0.156+	-0.505	0.168	-0.438
	(0.0976)	(0.805)	(0.209)	(0.853)
Observations	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes
Controls	No	Yes	No	Yes
Log-likelihood	-348.1	-317.5	-348.4	-317.4

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Table 3. 9A: Average Marginal Effects for Volunteering

VARIABLES	(1) Marginal effects	(2) Marginal effects	(3) Marginal effects	(4) Marginal effects
dist90	0.0390	-0.00763		
	(0.0446)	(0.0373)		
dist120			0.0190	-0.0246
			(0.0901)	(0.0807)
Observations	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes
Controls	No	Yes	No	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Table 3. 10A: Ordered Logit Regression Results for Community Engagement

VARIABLES	(1) Comm Engag	(2) Comm Engag	(3) Comm Engag	(4) Comm Engag
dist90	0.0646	-0.253		
	(0.274)	(0.364)		
dist120			0.257	0.0184
			(0.294)	(0.309)
Constant cut1	0.156	0.199	0.300	0.340
	(0.154)	(0.596)	(0.244)	(0.655)
Constant cut2	1.642***	1.928***	1.790***	2.063***
	(0.115)	(0.635)	(0.258)	(0.700)
Observations	507	505	507	505
EQ Damage Variables	No	Yes	No	Yes
Controls	No	Yes	No	Yes
Log-likelihood	-504.4	-453.4	-503.4	-454.2

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, + p<0.15. Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, marital status, religion, occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.

Survey Instrument

1. Instructions for enumerators
2. Questionnaire-English
3. Questionnaire-Nepali

INSTRUCTIONS

Enumerator Mantra:

During the final survey, it is very important to ensure that the survey guidelines are followed.

1. Every day before going to the community for survey, make sure that:
    - you have marked household numbers in each survey booklet. Each enumerator is assigned to complete at least 102 surveys. First enumerator will be given numbers from 1 to 102, second will be given 103 to 204, third will be given 205 to 306, fourth will be given 307 to 408, fifth will be given 409 to 510 and so forth. will get numbers from
    - received random bids that I will supply and fill out the numbers in each survey booklet.
    - the survey pages are not missing and everything is legible.
    - you have all necessary materials (pens, water bottle, snacks).
    - you have gifts for the household (if applicable).
2. Before proceeding to ask survey questions, enumerators should:
    - Introduce themselves

      "We are working on a survey study project conducted by Nepal Study Center at the University of New Mexico (USA), facilitated by Kathmandu University Hospital. A group of UNM students have been working in Bahunepati right after the 2015 earthquake in the construction of a Women's Community Center.")
    - Explain the purpose of our study:
        - Assessment of the earthquake impacts in the wellbeing (wealth, health, food security, and perception) of Bahunepati households
        - Evaluate what helps in the long-run recovery of earthquakes and similar natural disaster shocks. What helps and what doesn't?

- Evaluate the feasibility of weather indexed micro-insurance program, effectiveness of women's community center programs.

3. During the survey,
    - You should have already developed a thorough understanding of the survey questionnaire. Examples of things that that enumerators should keep in mind:
        - Likert scale (e.g. you should be able to distinguish *very likely* from *likely* and be able to explain it well to the household representative. One way of doing that is to first explain them what these scales mean and them ask them for a number. That way, the likelihood of enumerator's influencing the survey is diminished)
        - For section C (Willingness to Pay for Weather-indexed Micro-insurance), make sure you understand the program/package very well and be able to explain it. Before proceeding to ask any questions about the micro-insurance, make sure that the respondent has a clear understanding of the coverage (items that are covered: paddy, cows, buffalos, etc), payoffs (how much households will receive), and how and when the payoffs will be disseminated (e.g. rainfall index).
        - Make sure to distinguish check box answers from fill in answers.
        - For each question, give them all the options. DO NOT just ask open ended questions when there are answer choices and pick the applicable boxes. Variation is important (e.g. if the answer is 'certain,' make sure to ask how certain: 'certain' versus 'highly certain.' This distinction is important.)
        - **Remember to map out the locations of your survey. Each chowk and route should be labeled. If the data shows major anomalies or confusion, this allows us to backtrack houses and confirm responses.**

4. After collecting data, make sure that you have handed in all survey booklets to the lead enumerator (Aashish). I will work with him in compiling data. My goal is to enter the data every day to ensure clarity and allow revisions and corrections.
5. Your primary goal is to collect **quality** data from the households, *do not assume information* about the households and fill it out on your own (unless it is too apparent like the type of roof, floor).
    - Be able to explain missing observations or anomalous ones. If you have any questions, please please call me right away (Veeshan: **9818687343**).
    - Respondents may find it difficult to answer some questions relating to income, loans, etc. Be polite and ask them to provide rough estimates if they are not sure. Do not pressure them to answer uncomfortable questions. Use your judgment.
6. Since missing observations can hinder research, try to be as thorough as possible. Be diplomatic and amicable.
7. Be respectful and neutral to all the respondents.
8. Do not influence respondents' answers; do not show any kind of verbal and non-verbal sign towards their response, and most importantly read the questions just the way it is and listen carefully.
9. Follow the protocol: especially the right-hand rule of randomization.
10. Be a team player. Collaborate, not compete!
11. **Communicate** with me and among each other. Share your numbers. Mine is **9818687343** (Veeshan).

6. Sample Selection

To facilitate a proper pre-post analysis, we stratify data collection process according to the following distribution based on the 2014 data as well as sample size computation rules. Compared to the 2014 data, we will oversample.

Ward no.	Sample size (Frequency)	2014 Sample size	Percent	Cumulative percent
1	30	20	5.68	5.68
2	91	65	18.47	24.15
3	36	25	7.10	31.25
4	70	49	13.92	45.17
5	70	49	13.92	59.09
6	48	34	9.66	68.75
7	30	20	5.68	74.43
8	51	36	10.23	84.66
9	77	54	15.34	100.00
Other	503	352	-	-

7. Random Route Sampling

In order to select households for the survey, we will employ a Random Route Sampling method using the conventional "right hand rule." Step-wise explanation of the process, based on EU-MIDIS (2009) is as follows:

1. From each ward (smallest population sub-administrative unit), we will select a specific percentage of houses (refer to section 6) and enumerate house numbers. The percent number is decided based on the population of each ward and our desired sample size. If possible, we will acquire this information from the local Village Development Committee office.
2. Record the GPS location of each house (or simply map out the survey area) chosen to be in the sample, based on simple proportional sampling. This will help speed up the data collection process.

3. Go to the main chowk (central town) of each ward. Pick a random point as a starting point. Stand facing one direction, say North, and start walking towards your right on the right side of the street/path without crossing the street. Pick your sampling houses from the same direction. In doing so, we record every 3rd house (then 6th, then 9th) or 2nd (then 5th, then 8th) and so on. Follow the process until you approach the end of the path. Then, turn and perform the process using the right-hand rule again.
4. If we fail to acquire required sample size in the first round, we walk back to the main chowk where we started. This time, we turn to a different direction, say South, and repeat the same process.

Survey Plan:

1. Hiring and Training enumerators

Five enumerators (including one lead enumerator who will coordinate the other four) will be hired and trained. The training will focus on two areas:

- Survey Details. The lead investigator will educate enumerators on the survey details covering:
    - Survey Introduction: objective, hypotheses and relevance
    - Survey Questions: Enumerators will be asked to interview (aloud) each other and fill out the survey. This will help them gain familiarity with the survey materials and eliminate any confusion or discrepancies that may exist.
- Survey Protocol: How should the enumerators proceed to conduct the survey? We will discuss the right-hand rule and randomization, and the risks associated with not following the rule.

- Discussions about accommodation and stipend for enumerators.

Materials Required:

1. Nepali survey- 6 copies
2. English survey- 6 copies
3. Survey protocol- 6 copies

Enumerators are

2. Focus Group

A group of 8-10 participants will be brought to a place for the focus group study. This will be a round table type discussion that will speak on the key issues of the survey. The lead investigator will guide the discussion, but the primary focus of this event will be to get appropriate feedback on the survey's general theme and our information elicitation approach. Three major points will be covered:

- 2015 earthquake shock and recovery (three dimensions-economic, health, psychosocial)
    - Are there other dimensions of wellbeing that are relevant?
    - Are the existing ones irrelevant?
    - Are they redundant?
- Coping Strategies
    - Are the coping strategies listed in the survey pertinent to the specific context of Sindhupalchowk and peripheral areas?
    - Are there other strategies that are more prevalent? More effective?
    - Is social capital enhancement an effective coping strategy?
- Pre-post-Earthquake Impact Study:
    - Impacts on health status, food security, domestic violence, social capital.

- Weather-indexed micro-insurance and willingness to pay
    - Familiarity with micro-insurance and applicability.
    - Is the scheme clear?
- Women's Community Center uses

Moreover, other questions that will be discussed are:

2. Are there other forms of social capital that exist in Bahunepati?

Based on the feedback from the survey, appropriate revisions will be made to the questionnaire. *The objective is to confirm if the issues that the survey tries to address align with the ground reality of the area.*

Note: Enumerators MUST attend the focus group discussion to ensure thorough understanding of the issues from the respondents' perspectives. The focus group discussion will last for approximately two hours.

Materials required:

3. Survey Questionnaire (6-8 copies)

3. Debriefing

Debriefing is conducted in one-to-one interview with household respondents. The purpose will be to reexamine the survey based on the outcomes of the focus group discussions and make necessary revisions to the survey questionnaire. If the findings from debriefing is contradictory to the focus group results, it will force us to go back to the drawing board and reconcile the differences. The debriefing can be formatted as an informal talk, which may include all the questions as well as the additional questions relating to the study. Same questions that were asked during the focus group discussions can be repeated. After repeatedly asking similar questions to

people at different locations, the final questionnaires can be finalized.

The first debriefing may be conducted back to back with focus group discussions or steps 2 and 3 may be combined into one.

Samrat's advice: Debriefing can be conducted by just reading each question out aloud slowly or asking people to look at the survey and read each question. This will give us an idea of how long the survey will take and whether (or not) people understand every question.

4. Pre-tests

Based on the feedback from 2 and 3, a final survey draft should be created. Then, a set of 30 households should be picked randomly to test the survey instruments. If the results reveal anomalous or lopsided results (everyone saying yes or no while expressing their preferences) or if they object to certain stipulation in the question, then a second round of debriefing should be done and some adjustments should be applied. Then, a second round of pretest should be conducted (~30 households). A final draft of the survey will be decided before sending out enumerators for the final survey.

5. Final survey.

Upon the successful completion of pre-tests and making necessary adjustments, enumerators will be sent out to conduct the final survey. Each enumerator is responsible for conducting at least six interviews per day (30-45 minutes per household).

Study Timeline

(This is a very exaggerated estimate. The actual survey may finish well within 28 days)

MM/YYYY	Activity Planned
	Pre-Survey
05/22/17	Survey Design: Finalize the survey questionnaire
5/29/17	Translation: A designated translator from UNM (Veeshan) along with a locally hired translator will translate the survey and other related documents to Nepali, the local vernacular.
05/30/17	Revision: Review of the translated materials prior to approval of the final draft
05/30/17	Meeting with survey coordinator, and enumerators. Go over the survey, question by question.
6/01/17	Focus Group with a small representative sub-sample: the goal is to test the relevance, clarity and appropriateness of the survey components before finalizing the questionnaire.
6/2/17	Debriefing: conduct one-to-one discussion with a few focus group participants to confirm the finalized questionnaire
6/3-4/17	Pre-test: 30 households (5 enumerators, 6 households each) are picked randomly and the pre-test survey is conducted
6/5/17	Pre-test data analysis
6/07/17	Pre-test – II (if necessary)
6/8/17	Pre-test-II data analysis (if necessary)
6/9-6/14/17	Data Collection (Week 1), 5 enumerators*6 days*6 households=180 observations
6/15/17	Data Entry and Evaluation
6/16-6/21/17	Data Collection (Week 2) 180 observations
6/22/17	Data Entry and Evaluation
6/23-6/27/17	Data Collection (Week 2) 150 observations
6/31/17	Data Entry and Compilation of a final deliverable dataset

QUESTIONNAIRE-ENGLISH

Determinants of Household Resilience Against Natural Disaster Shocks: Evidence from Bahunepati, Nepal

HOUSEHOLD SURVEY 2017

Namaskar, I am [Enumerator's name: .....] from the Nepal Study Center at the University of New Mexico, USA. We are conducting a survey with residents of Bahunepati to assess the immediate and long-run impacts of the 2015 mega-earthquake and to investigate the determinants of household resilience against natural disaster shocks. The survey will take approximately ____ minutes.

You have been randomly selected to participate in this survey, and your household was chosen using a random selection process from a list of households in this VDC. You will be asked a series of questions, most of which have Yes/No answers, designed to understand behaviors regarding the strategies you adopted to cope with climate change and natural disaster shocks. Some questions in this survey may cause you to feel slightly uncomfortable. In such cases, you may refuse to answer any individual question. Although this study will not benefit you personally, we hope that our results will add to the knowledge about how to enhance the ability to protect your household against climate change and natural disaster shocks.

All of your responses will be *anonymous.* Only the researchers involved in this study and those responsible for research oversight will have access to the information you provide. Your responses will be handwritten and stored securely at the research facility at Nepal Study Center in the University of New Mexico. Your responses will be numbered and coded, and your name will not be on any documents. The coding will be used on all your documents, but will not connect to your name. So, while we know from the record of your verbal consent that you participated in this research study, no data will be linked to you. The primary surveys will be stored in a locked safe until coding.

Participation in this study is completely voluntary. You are free to decline to participate, to end participation at any time for any reason, or, again, to refuse to answer any individual question. Refusing to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Thank you for participating in this study.

To be filled by enumerators

SURVEY VERSION: A

Date of Interview: _____ (dd/mm/yyyy)

Supervisor's Name: ..... Enumerator's Name: .....

Begin Time ..... End Time .....

About the respondent:

Full Name: Mr./Mrs./Miss.....

Respondent's Age ..... (MUST be 18+)

Address: ..... Contact no. .....

Name of village (VDC): .....

Ward number in VDC (1-9): ..... Name of the community (Tole): .....

Household Number (HHNO): .....

Household Latitude: .....

Household Longitude: .....

Relationship of the respondent to the household head[1]: .....

1 Relation of respondent to the household head. Head=1; Husband/wife=2; son/daughter=3; grandchild=4; father/mother=5; brother/sister=6; nephew/niece=7; son/daughter-in-law=8; brother/sister-in-law=9; father/mother-in-law=10; other family relative=11

Section A: Earthquake Impact, Coping Strategies, and Recovery

In this sub-section, I am going to ask you some questions about the **2015 earthquake**. Please note that some questions pertain to immediate impacts of the earthquake, while others concern the current level of recovery.
Your answers will help us assess the immediate impacts of the earthquake as well as evaluate the determinants of long-run recovery.

1. How much do you agree with the following statements? *Please indicate the number corresponding to your level of agreement (lowest to highest number) with each of the following statements by checking (✓) the appropriate number.*

		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
i-a	My family member was injured in the disaster.	☐	☐	☐	☐	☐
i-b	My family member has recovered from the injuries.	☐	☐	☐	☐	☐
ii-a	The place I was living in was destroyed to the point where I could not live in it.	☐	☐	☐	☐	☐
ii-b	I now have permanent housing.	☐	☐	☐	☐	☐
iii-a	Immediately after the disaster, I had adequate access to food.	☐	☐	☐	☐	☐
iii-b	I now have adequate access to food.	☐	☐	☐	☐	☐
iv-a	Immediately after the disaster, I had adequate access to clean drinking water.	☐	☐	☐	☐	☐
iv-b	I now have adequate access to clean drinking water.	☐	☐	☐	☐	☐
v-a	The disaster caused me to lose my ability to earn money.	☐	☐	☐	☐	☐
v-b	I now have a job or a source of income.	☐	☐	☐	☐	☐
vi-a	The disaster prevented me from moving about my community freely, such as visiting family, friends and neighbors.	☐	☐	☐	☐	☐
vi-b	I am now able to move about my community freely, such as visiting family, friends and neighbors.	☐	☐	☐	☐	☐
vii-a	The disaster destroyed some of my personal property such as home, auto, livestock, personal effects.	☐	☐	☐	☐	☐
vii-b	I have now recovered this property or its equivalent.	☐	☐	☐	☐	☐
viii-a	The disaster caused me emotional distress (e.g. made me feel more anxious/afraid, or depressed/sad).	☐	☐	☐	☐	☐
viii-b	I have recovered emotionally.	☐	☐	☐	☐	☐
ix-a	The disaster increased my experiences with violence (including physical, emotional or sexual abuse from a loved one or stranger.)	☐	☐	☐	☐	☐
ix-b	I am now free from such violence.	☐	☐	☐	☐	☐
x-a	Immediately after the disaster, I was not able to participate in disaster relief, recovery or future	☐	☐	☐	☐	☐

	community planning with neighbors, local leaders and/or local officials.	
x-b	I am now able to participate in disaster relief, recovery or future community planning with neighbors, local leaders and/or local officials.	☐ ☐ ☐ ☐ ☐

2. **Impact and Recovery Time:** Please indicate how long the earthquake impact lingered. *Please WRITE DOWN THE NUMBER of weeks, months, and years.*

	After the earthquake,	TIME				IF NOT RECOVERED YET, please indicate how long you expect the impact to linger.	
		Weeks	Months	Years		Months	Years
a.	We spent less on food for….						
b.	We spent less on other household goods for….						
c.	My children missed school for….						
d.	I missed work for…						
e.	Adults in my household took up extra labor for….						
f.	Children in my household worked for ….						
g.	My family was emotionally distressed for…..						
h.	My family recovered from injuries for…..						
i.	Household member left village for ….						
j.	Time to recover lost property or its equivalent for ….						
k.	Time to maintain the pre-earthquake level income for ….						

3. How did your household cope with the **2015 earthquake**? *Please check (✓) yes or no.*
   In what order did you adopt the strategies? Please rank accordingly. (1=first, 2=second, 3= third, 4= fourth, 5=fifth).

	Coping Strategy	**Yes (1)**	**No (2)**	**Order (1-5)**
a.	Sale/mortgage jewelry	☐	☐	
b.	Sale of utensils/appliances	☐	☐	
c.	Sale of crops	☐	☐	
d.	Sale of livestock	☐	☐	
e.	Sale of transport	☐	☐	

f.	Sale of agricultural tools	☐	☐	
g.	Sale of other items	☐	☐	
h.	Family/neighbor/patron help	☐	☐	
i.	Borrow money (from person or institution)	☐	☐	
j.	Advance labor	☐	☐	
k.	More family members in labor	☐	☐	
l.	Use of savings	☐	☐	
m.	Mobilize credit/Received loans	☐	☐	
n.	Government help	☐	☐	
o.	NGO help	☐	☐	
p.	Aid/Relief	☐	☐	
q.	Household members moved away	☐	☐	
r.	Received Remittance help	☐	☐	
s.	Other (please specify) _____	☐	☐	

4. If your household made any distress sale/mortgage, could you estimate the value of the distress sale/mortgage?

Rupees

5. After the earthquake, did you **TRY TO** borrow from someone outside the household or from an institution?

No, I did NOT TRY (1)	I tried but was turned down (2)	Yes, I borrowed (3)
☐	☐	☐

6. What was main reason for trying to obtain loan? (please check (✓) all that apply)

a.	Purchase food	☐	g.	Business startup or restart capital	☐
b.	Healthcare	☐	h.	Purchase of non-farm inputs	☐
c.	Purchase household assets	☐	i.	Purchase land	☐
d.	Purchase livestock	☐	j.	Other (please specify) _____	☐
e.	Purchase agricultural inputs	☐			
f.	Rebuild house	☐			

7. If you were able to obtain a loan, from whom or which institution? (please check (✓) all that apply)

a.	Relative	☐	f.	Non-governmental organization (NGO)	☐
b.	Neighbor	☐	g.	Formal lender (bank/financial institution)	☐
c.	Grocery/Local Merchant	☐	h.	Group-based microfinance	☐
d.	Employer	☐	i.	Other (please specify) _____	☐
e.	Religious institution	☐			

8. How much was the loan?

Rupees.

9. Is the loan repaid?

Yes (1)	No (2)
☐	☐

10. If yes, how many **months** after taking the loan did you pay it back? *Please write down the number.*

Months……

11. If not, approximately when do you expect to pay back the loan? (please check (✓) one box)

1	In a few months	☐
2	Within a year	☐
3	2-3 years	☐
4	3-5 years	☐
5	5-10 years	☐
6	I may not be able to pay in my lifetime	☐

Now, I will ask you questions regarding natural disaster and other shocks, **NOT including the 2015 earthquake**. These questions allow us to isolate the impact of the earthquake from that of other household level shocks as well as to conduct a separate evaluation of the impacts of idiosyncratic shocks. It is important that you answer these questions as accurately as possible.

12. Has the household experienced any of the following **natural disasters (NOT including the 2015 earthquake)** in the past five years? If you answer **YES**, also indicate how severe each disaster was.

	Natural Disaster	**Yes (1)**	**No (2)**	How severe was the impact? (1-4)	Severity Scale: 1: No impact 2. Low Impact 3. Medium Impact 4. High Impact
a.	Flood	☐	☐		
b.	Landslide	☐	☐		
c.	Heavy rainfall	☐	☐		
d.	Storm	☐	☐		
e.	Ice rain/snow	☐	☐		
f.	Drought	☐	☐		
g.	Extreme temperatures	☐	☐		
h.	Wildfires	☐	☐		
i.	River erosion	☐	☐		

j.	Other (please specify) _____	☐	☐		

13. Has the household experienced any of the following **shocks** in the past two years?

	Shock	**Yes (1)**	**No (2)**
a.	Loss of employment/business of the main earner	☐	☐
b.	Loss of employment of other members	☐	☐
c.	Death of the main earner	☐	☐
d.	Abandonment by the main earner	☐	☐
e.	Major illness	☐	☐
f.	Conflict/Violence	☐	☐
g.	Loss of house	☐	☐
h.	Loss of land	☐	☐
i.	Loss of durable assets (tractor, machines...)	☐	☐
j.	Loss of livestock/poultry	☐	☐
k.	Loss of crops	☐	☐
l.	Major pests	☐	☐
m.	Poor production	☐	☐
n.	Wedding/Funeral	☐	☐
n.	Other (please specify) _____	☐	☐

Section B: *Ex-ante* Risk Perception

In this section, we will ask you questions about your perception of earthquake and other natural disaster risks. There are no right or wrong answers. Please try your best to answer these questions as accurately as possible.

14. In general, how afraid are you of an earthquake? *(please check (✓) one box)*

1	Not afraid at all	☐
2	A little afraid	☐
3	Somewhat afraid	☐
4	Very afraid	☐
5	Extremely afraid	☐

15. In an event of a six magnitude earthquake, how much do you think your house will be threatened? *(please check (✓) one box)*

1	No damage	☐
2	Slightly damaged, livable after minor or no repairs	☐
3	Moderately damaged, livable after major repairs	☐
4	Severely damaged, not livable	☐
5	Totally destroyed	☐

16. In an event of a six-magnitude earthquake, how much do you think your property (livestock, crops, agricultural land, etc.) will be threatened? *(please check (✓) one box)*

1	No damage	☐
2	Slightly damaged	☐
3	Moderately damaged	☐
4	Severely damaged	☐
5	Totally damaged	☐

17. In how many years do you think the next big earthquake will occur? *Please write down the number.*

Number of years …….……. ☐☐

18. On a scale of 1 to 10, how certain are you of your answer to the previous question? (1=highly uncertain, 10=highly certain)

Degree of Certainty (1 to 10) …….……. ☐☐

19. In this area, how likely is it that the following natural disaster/ climate events will occur in the *next ten years*? *Please indicate the number corresponding to your*

level of perception (lowest to highest number) with each of the following natural disaster event by checking (✓) the appropriate number

	Natural Disaster	**Almost Certainly Not (1)**	**Unlikely (2)**	**Somewhat likely (3)**	**Highly likely (4)**	**Almost Certain (5)**
a.	Flood	☐	☐	☐	☐	☐
b.	Landslide	☐	☐	☐	☐	☐
c.	Heavy rainfall	☐	☐	☐	☐	☐
d.	Storm	☐	☐	☐	☐	☐
e.	Ice rain/snow	☐	☐	☐	☐	☐
f.	Drought	☐	☐	☐	☐	☐
g.	Extreme temperatures	☐	☐	☐	☐	☐
h.	Wildfire	☐	☐	☐	☐	☐
i.	River erosion	☐	☐	☐	☐	☐
j.	Other (please specify) _____ _____	☐	☐	☐	☐	☐

20. **CLIMATE CHANGE:** How likely do you think is climate change going to continue or worsen in the next 10 years if nothing is done to prevent it? *Please check (✓) one box.*

1	Not likely at all	☐
2	Somewhat likely	☐
3	Likely	☐
4	Highly likely	☐
99	I don't know	☐

21. **CLIMATE CHANGE IMPACT:** How much do you think climate change is likely to cause loss of assets and income in the next 10 years (e.g. the loss of agriculture, livestock, house, etc.) *Please check (✓) one box.*

1	No impact	☐
2	Low Impact	☐
3	Medium Impact	☐

4	High Impact ☐

22. **CLIMATE CHANGE CAUSES/ATTITUDE:** How much do you agree with the following statements? *Please check (✓) one box for each statement.*

		Strongly disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly agree (5)**
a.	Deforestation can cause climate change	☐	☐	☐	☐	☐
b.	Burning fossil fuel can cause climate change	☐	☐	☐	☐	☐
c.	Applying pesticide and chemical fertilizer in agriculture can lead to climate change.	☐	☐	☐	☐	☐
d.	Forest fire can cause climate change	☐	☐	☐	☐	☐
e.	Use of modern tools can cause climate change	☐	☐	☐	☐	☐
f.	Humans are responsible for climate change	☐	☐	☐	☐	☐
g.	We should do something to combat climate change.	☐	☐	☐	☐	☐
h.	Climate change is God's will.	☐	☐	☐	☐	☐

SECTION C: WILLINGNESS TO PAY FOR WEATHER-INDEXED INSURANCE

We would like to propose a hypothetical micro-insurance program designed to protect Bahunepati households from potential weather shocks. The weather-indexed insurance product is designed to protect farmers against deficient/excess cumulative rainfall during a cropping season.
In what follows, you will be asked how much you would be willing to pay for the insurance package. Note that you this is not a real insurance program, but please answer as if it was. Also pay careful attention to the payouts, coverage, and your willingness to pay value.

A description of the policy is provided below.

- **How does it work?**
  This policy protects farmers against deficient/excess cumulative rainfall during a cropping season. If there is continuous heavy rainfall for 10 days or continuous no rainfall/little rainfall for 30 days, during the crop vegetative phase (months *March* to *June* and *July* to *November* after sowing), a payout would be made to the farmers. In order to make the amount of rainfall more objective and easier to measure, the rainfall data is based on the record of the closest weather station to your village instead of the rainfall on your fields. (Standard: "if the rainfall for any 10 consecutive days is cumulatively above 120 millimeters or any 30 consecutive days is cumulatively below 10 millimeters")
- **What does it cover?**
  In additional to paddy, the insurance also covers livestock. In total, it covers paddy, buffaloes, cows, goats, chicken and ducks.
- **What is the payout?**
  NRs. 10000 per ropani insured, NRs. 8100 NPR per cow insured, NRs. 26000 per buffaloes insured, NRs. 3800 per goat insured, and NRs. 380 per poultry (including ducks and chicken) insured.
- **When will I get paid?**
  Payment would be made to farmers for paddy as long as the weather meets the requirement described in the coverage. As to livestock, payment would be made after evaluation of damage by experts from agriculture office. It's according to the number of dead livestock due to the bad weather.

23. Do you have any questions about the insurance package?

Yes (1)	No (2)
☐	☐

Enumerator: If the answer is **NO**, please make sure to explain the insurance package carefully AGAIN before proceeding.

Instructions to enumerator: The follow up question should be asked carefully.

- Pick the randomly generated bid value from the list provided. (Note: Before the survey, each enumerator will be asked to fill in randomly selected bid values in the survey).
- Ask **Question#24** with the random bid value.
- If the answer is YES, go to the next HIGHER bid value and ask Question#3.
- If the answer is NO, go to the next LOWER bid value and ask Question#3.

Here are the bid amounts (per year):

Nrs. _____ _____ _____ _____ _____ _____

Examples:

1) A respondent was asked if she would pay 200 Nrs for the insurance and she said **yes**. Then you should ask if she would pay 500 (the next higher amount).
2) A respondent was asked if they would pay 1000 Nrs for the insurance and he said **no**. Then you should ask if he would pay 500 (the next lower amount).

24. Would you be willing to pay NRs…….[Fill in a randomly generated bid amount] per year? *(please check (✓) one box)*

Yes (1)	No (2)
☐	☐

25. What if you were instead asked to pay NRs……[the next higher or lower bid amount]? Would you buy the weather-indexed insurance? *(please check (✓) one box)*

Yes (1)	No (2)
☐	☐

26. On a scale of 1 to 10, how certain are you of your answer to the previous question? (1=highly uncertain, 10=highly certain)

Degree of Certainty (1 to 10) …….☐☐

Section D: SOCIAL CAPITAL

In this section, we will ask you questions about your friends, relatives, neighbors, and your community participation. The questions in this section will allow us to generate a social capital measure and to examine its role in wellbeing. It is important that you answer these questions as accurately as possible.

Trust and Solidarity:

27. Which statement do you think is more accurate: (please check (✓) one box)

Most people can be trusted (1)	☐
You can't be too careful in dealing with people (2)	☐

28. Would you say that you can trust the following? (please check (✓) each item)

		A lot (1)	Some (2)	Only a little (3)	Not at all (4)
a.	People in your village				
b.	Strangers				
c.	The police				
d.	The army				
e.	Government officials				
f.	Politicians				
g.	News Media				

Interpersonal Relationship and Network:

29. How many close friends and relatives do you have whom you can freely share private matters, call on help, or borrow money? *Please write down the number*

No. of friends and relatives…… ☐☐

30. If you suddenly needed to borrow a small amount of money to pay for expenses for your household for one week, are there people beyond your immediate household and close relatives to whom you could turn and who would be willing and able to provide this money?

1	Definitely	☐
2	Probably	☐
3	Unsure	☐
4	Probably not	☐
5	Definitely not	☐

Neighborhood cohesion:

31. How many years have you been living in this community? (please check (✓) one box)

1	Less than 1 year	☐
2	1 to 5 years	☐
3	5 to 10 years	☐

4	More than 10 years	☐

32. How frequently do you visit your friends and relatives? (please check (✓) one box)

1	Just about every day	☐
2	Several times a week	☐
3	Several times a month	☐
4	Several times a year	☐
5	Once a year or less	☐
6	Never	☐

33. How frequently do your friends and relatives visit you? (please check (✓) one box)

1	Just about every day	☐
2	Several times a week	☐
3	Several times a month	☐
4	Several times a year	☐
5	Once a year or less	☐
6	Never	☐

Groups and Networks

34. Do you or anyone in your household participate in any of the following community groups, organizations or cooperatives? (please check (✓) all that apply)

	Organization/Group	**Yes (1)**	**No (2)**
a.	Microfinance group	☐	☐
b.	Agriculture group	☐	☐
c.	Forest group	☐	☐
d.	Water group (irrigation group)	☐	☐
e.	Women's group	☐	☐
f.	Credit group	☐	☐
g.	Civic group	☐	☐
h.	Political group	☐	☐

i.	Religious group	☐	☐
j.	Sports group	☐	☐
k.	Health/Sanitation group	☐	☐
l.	Other groups	☐	☐

35. How active would you say you are in your community, such as in local government or volunteer organizations? (please check (✓) one box)

1	Very inactive	☐
2	Somewhat inactive	☐
3	Neither active nor inactive	☐
4	Somewhat active	☐
5	Very active	☐

36. Did you vote in the last election? (please check (✓) one box)

Yes (1)	No (2)
☐	☐

Collective Action and Cooperation:

37. In the past 12 months, have you worked with others in your village/neighborhood to do
something for the benefit of the community? (please check (✓) one box)

Yes (1)	No (2)
☐	☐

38. Altogether, how many days in the past 12 months did you or anyone else in your household participate in community activities?

Number of times participated……☐☐

39. After the earthquake, how actively did you participate in any disaster recovery projects or programs in the community?

1	Very inactively	☐
2	Somewhat inactively	☐

3	Neither actively nor inactively	☐
4	Somewhat actively	☐
5	Very actively	☐

Section E: FOOD SECURITY

In this section, we will ask you about your food security situation. First, we will ask you about the specific food items your family has consumed in the past week. Subsequently, we want to examine the shortage of food that may be prevalent. This will allow us to understand the overall food security situation in the village.

40. Could you please tell me how many days in the past 7 days your household has eaten the following foods and what the source was (input 0 for items that were not eaten over the last 7 days).

	Food Item	a. No of days eaten the item in the last 7 days	b. Food source (write those all applied (code 1))	**Code 1: Food Source Codes:** 1=Own production (crops, animal) 2=hunting, fishing 3=gathering 4=borrowed 5=purchase with wages 6=exchange labor for food 7=exchange items for food 8=gift (food) from family relatives 9=food aid (NGOs etc.) 96=Other (specify: _____)
i.	Maize	( )	☐☐, ☐☐	
ii.	Rice/Paddy	( )	☐☐, ☐☐	
iii.	Millets	( )	☐☐, ☐☐	
iv.	Roots and tubers (potatoes, yam)	( )	☐☐, ☐☐	
v.	Wheat/Barley	( )	☐☐, ☐☐	
vi.	Fish	( )	☐☐, ☐☐	
vii.	White meat-poultry	( )	☐☐, ☐☐	
viii	Pork	( )	☐☐, ☐☐	
ix.	Red meat-goat, sheep	( )	☐☐, ☐☐	
x.	Red meat-Buffalo	( )	☐☐, ☐☐	
xi.	Eggs	( )	☐☐, ☐☐	
xii.	Pulses/Lentils	( )	☐☐, ☐☐	
xiii.	Vegetables	( )	☐☐, ☐☐	
xiv.	Oil/Ghee/Butter	( )	☐☐, ☐☐	
xv.	Fresh fruits	( )	☐☐, ☐☐	
xvi.	Sugar/Salt	( )	☐☐, ☐☐	
xvii.	Milk/Curd	( )	☐☐, ☐☐	

41. For the following questions, we would like to ask you how you cope with food shortage in the last 7 days. *(please check (✓) one box)*					
		Often (5 or more times) - (4)	From time to time (2 to 3 times) – (3)	Rarely (once) – (2)	Never – (1)
a.	In the past 12 months, how frequently did you worry that your household would not have enough food?	☐	☐	☐	☐
b.	In the past 12 months, how often were you or any household member not able to eat the kinds of food you/he preferred because of a lack of resource?	☐	☐	☐	☐
c.	In the past 12 months, how often did you or any household member have to eat a limited variety of foods due to a lack of resources?	☐	☐	☐	☐
d.	In the past 12 months, how often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	☐	☐	☐	☐
e.	In the past 12 months, how often did you or any household member eat fewer meals in a day because of resources to get food?	☐	☐	☐	☐
f.	In the past 12 months, how often was there with no food to eat of any kind in your household because of lack of resources to get food?	☐	☐	☐	☐

		Yes (1)	No (2)
g.	In the past 12 months, how often did you or any household member go to sleep at night hungry because there was not enough food?	☐	☐
h.	Has any member of your household received food aid in the last 6 months?	☐	☐

Section F: DEMOGRAPHIC INFORMATION

In order for us to perform a detailed study, we need to know about you and your family. This will help us know how different or similar our survey respondents are. In order to cater our project to fit the needs of this community, it is important that you answer these questions as accurately as possible.
All the survey information will be fully confidential. Your responses will be completely anonymous.

42. How many people currently live in your household? *Please write the numbers*

a.	Total number of household members	
b.	Number of children (0 to 5 years)	
c.	Number of children (6 to 18 years)	
d.	Number of adults (older than 18 years)	
e	Number of adult with earnings	

43. What is your gender? (please check (✓) one box)

Male (1)	Female (2)
☐	☐

44. How old are you? *Please write the number* ☐ years old.

45. How old is the head of your household? ☐ years old.

46. What is your current marital status? (please check (✓) one box)

1	Never Married	☐
2	Married	☐
3	Divorced	☐
4	Separated	☐
5	Widowed	☐

47. What type of family do you live in? (please check (✓) one box)

1	Nuclear	☐
2	Joint	☐

48. What is your family's primary religion? (please check (✓) one box)

1	Hinduism	☐
2	Buddhism	☐
3	Muslim	☐
4	Kirat	☐
5	Christian	☐
95	Other	☐
	If other, please specify: ……	

49. What caste do you belong to? (please check (✓) one box)

1	Brahmin	☐
2	Chhetri	☐
3	Newar	☐
4	Janajati	☐
5	Madhesi, Tharu, Musalman	☐
6	Pahadi Dalit	☐
7	Madhesi Dalit	☐
95	Other	☐
	If other, please specify: ……	

50. What is the highest level of education that you have attained? (please check (✓) one box)

1	No formal schooling	☐
2	Grades (1-5)	☐
3	Grades (6-8)	☐
4	Grades (9-10)	☐
5	Grades (10-12)	☐
6	Bachelors	☐
7	Masters or other professional degrees	☐
8	Vocational training	☐

51. What is the highest level of education that the head of your household has completed? (please check (✓) one box)

1	No formal schooling	☐
2	Grades (1-5)	☐
3	Grades (6-8)	☐
4	Grades (9-10)	☐
5	Grades (10-12)	☐
6	Bachelors	☐

7	Masters or other professional degrees	☐
8	Vocational training	☐

52. What is the primary occupation of your household head? (please check (✓) one box)

1	Unemployed	☐
2	Student	☐
3	Agriculture	☐
4	Daily labor	☐
5	Self-employed (small business)	☐
6	House work	☐
7	Administrative job (government, NGOs, private firms)	☐
8	Other	☐
	If other, please specify: ……	

53. Please state how long it takes you to get to the nearest [……. …] from your home. *Please write down the number of minutes and/or hours.*

		Hours	**Minutes**
a.	Road	☐	☐
b.	Market	☐	☐
c.	Hospital	☐	☐
d.	School	☐	☐
e.	Local administrative office	☐	☐
f.	Women's Community Center (UNM built)	☐	☐
g.	Giranchaur Namuna Basti	☐	☐

54. Does any member in your household own any of the following items? (please check (✓) yes or no)

	Items	Yes (1)	No (2)
a.	Radio	☐	☐
b.	TV	☐	☐
c.	Cellphone	☐	☐
d.	Telephone	☐	☐

e.	Bicycle	☐	☐
f.	Motorcycle/scooter	☐	☐
g.	Fan	☐	☐
h.	AC	☐	☐
i.	Sewing Machine	☐	☐
j.	Camera	☐	☐
k.	Car/motor vehicle	☐	☐
l.	Tractor	☐	☐
m.	Refrigerator	☐	☐
n.	Computer	☐	☐
o.	Inverter or solar for electricity	☐	☐
p.	Water pump	☐	☐

55. Does your household own any agricultural land? (please check (✓) one box)

Yes (1)	No (2)
☐	☐

56. How many ropani/bigha of agricultural land does your household own? *Please write down the number and choose* (✓) *the corresponding unit (1=ropani or 2=bigha).*

Ropani(1) ☐ Bigha (2) ☐

57. How many of the following animals does your household own? (Input 0 for if none owned)

a.	Goat	■
b.	Cow/Bull	■
c.	Sheep	■
d.	Buffalo	■
e.	Chicken	■
f.	Duck	■
g.	Pig	■
h.	Other (specify) _____	■

58. Is anyone in your household working abroad? (please check (✓) one box)

Yes (1)	No (2)
☐	☐

59. Did your household receive remittances in the past 12 months? (please check (✓) one box)

Yes (1)	No (2)
☐	☐

If yes (1), please indicate amount: ☐ **Rupees.**

60. What was your total household's average monthly income (in Rupees) last year? (Please check one)

1	Less than 2000 ☐
2	2001-4000 ☐
3	4001-6000 ☐
4	6001-8000 ☐
5	8001-10,000 ☐
6	10,001-15,000 ☐
7	15,001-20,000 ☐
8	20,001-30,000 ☐
9	More than 30,000 ☐
95	Do not know ☐
96	Refused to answer ☐
	If more than 100000, please specify: ……

61. What is the main material of the floor of the dwelling?

Earth/Sand (1) ☐
Dung (2) ☐
Wood/Planks (3) ☐
Palm/Bamboo (4) ☐
Parquet/Polished Wood (5) ☐
Vinyl or Asphalt Strips (6) ☐
Ceramic Tiles (7) ☐
Cement (8) ☐
Carpet (9) ☐
Other(10) ☐

62. What is the main material of the roof of the dwelling?

Earth/Sand (1)	☐
Galvanized Iron (2)	☐
Wood/Planks (3)	☐
Straw/Thatch (4)	☐
Concrete/Cement (5)	☐
Tiles/Slate (6)	☐
Other (7)	☐

Section G: Women's Community Center

University of New Mexico's team UNM4Nepal and Kathmandu University have built a Women's Community Center (WCC) next to the Bahunepati Clinic. In this section, we will ask you a few questions about the potential uses of WCC. These questions will help us restructure our future programs in this community.

63.	In what specific ways do you think WCC can better meet the needs of women of Bahunepati? *Be as specific as you can be.*	
64.	How often do you think you will visit the Women's Community Center? *(please check (✓) one box)*	More than once a week (1) ☐ Once a week (2) ☐ Every other week (3) ☐ Once a month (4) ☐ Once a year (5) ☐ Never (6) ☐
65.	From this list of the activities in the women's center, please rank highest (1) to lowest (6) the activities you find most beneficial to you. *Fill in the box with rank numbers.*	Microfinance meeting (1) ☐ Family Planning Meeting (2) ☐ Adult learning and educational classes (3) ☐ Political discussion Fair (4) ☐ Youth Club Activities (5) ☐ Others (6). Please specify…….. ☐

66.	The maintenance and the operation of the WCC will require some monthly expenses (electricity, water, cleaning, and repairs). How much are you willing to pay every month into a fund to operate this community center?	Rs. ..... ☐

Section H: HEALTH

In this section, we will ask you questions about your health and your perceived health status. The questions will help us analyze the health status of the individuals and how it is affected by different socio-economic measures. Please answer the questions as accurately as possible.

67.	Has a doctor ever diagnosed you with or confirmed that you had any chronic illness? *(please check (✓) one box)*	Yes (1) ☐ No (2) ☐
68.	Did you have any health problem during the past 6 months (including chronic illness)? *(please check (✓) one box)*	Yes (1) ☐ No (2) ☐
69.	How often did you go to doctor for the illnesses in the past 6 months? *(please check (✓) one box)*	Constantly (5) ☐ Frequently (4) ☐ Sometimes (3) ☐ Rarely (2) ☐ Never (1) ☐
70.	Overall, how do you rate your health during the past 12 month/past month/present health status? *(please check (✓) one box)*	Excellent (5) ☐ Very Good (4) ☐ Good (3) ☐ Fair (2) ☐ Poor (1) ☐

Mental Health

In this section, we would like to ask you questions about how you have been feeling during the **past 30 days**. Please answer the questions as accurately as possible.

		All of the time (5)	Most of the time (4)	Some of the time (3)	A little of the time (2)	None of the time (1)
71	During the past 30 days, about how often did you feel hopeless? *(please check (✓) one box)*	☐	☐	☐	☐	☐
72	During the past 30 days, how often did you feel so depressed that nothing could cheer you up? *(please check (✓) one box)*	☐	☐	☐	☐	☐
73	During the past 30 days, about how often did you feel restless or fidgety? *(please check (✓) one box)*	☐	☐	☐	☐	☐
74	During the past 30 days, about how often did you feel that everything was an effort? *(please check (✓) one box)*	☐	☐	☐	☐	☐
75	During the past 30 days, about how often did you feel worthless? *(please check (✓) one box)*	☐	☐	☐	☐	☐
76	During the past 30 days, about how often did you feel nervous? *(please check (✓) one box)*	☐	☐	☐	☐	☐

Section I: INTIMATE PARTNER VIOLENCE

Note: This section is only for female married respondents. If the respondent is male and female unmarried, please skip this section.

In this section, we will ask you questions whether you have experienced violence from your intimate partner. If you experienced, we would like to know the reason. You may refuse to answer the question. Please answer the questions as accurately as possible.

		Yes (1)	No (2)
77	Did your husband ever scold you? *(please check (✓) one box)*	☐	☐
78	Did your husband ever push, hit, kick, or slap you? *(please check (✓) one box)*	☐	☐

79	Did your husband ever force you to have sex when you didn't want to? *(please check (✓) one box)*	☐	☐
80	Did he ever hurt you physically because you were from a different caste? *(please check (✓) one box)*	☐	☐
81	Did he ever attack you with knife, gun, or other weapon? *(please check (✓) one box)*	☐	☐
82	Did he ever try to choke you or burn you? *(please check (✓) one box)*	☐	☐

QUESTIONNAIRE-NEPALI

गणकले भर्नु पर्ने

सर्भे ढाँचा: क

अर्न्तवार्ताको मिति : _____ (दिन/महिना/वर्ष)

निरिक्षकको नाम: ..... गणकको नाम: .....

शुरु समय..... अन्तिम समय.....

प्रतिक्रिया दिनेको

पुरा नाम : श्री/श्रीमती/सुश्री .....

प्रतिक्रिया दिनेको उमेर..... (१८ वर्ष पुरा भएकॊ हुनुपर्ने)

ठेगाना ..... संपर्क नं .....

गाँउको नाम -गा.वि.स) .....

वार्ड नं (१-९) ..... समुदायको नाम .....

घर नं .....

घरको अक्षांश: .....

घरको देशान्तर .....

घरको मुलीसँग प्रतिक्रिया दिनेको नाता १: .....

घरको मुलीसँग प्रतिक्रिया दिनेको नाता । मुली - १ ;श्रीमान/श्रीमती -२ ; छोरा/छोरी -३; नाति/ नातिनी-४; बाबु/आमा-५; दाजु/बहिनी-६, भदा-भदै/भान्जा- भान्जी-७; छोरा/बुहारी-८; देवर/ देवरानी-९; सासु/ससुरा-१०; अन्य नातेदार

खण्ड क: भुकम्पको प्रभाब, सामना गर्ने नीति र पुनर्प्राप्ति

यो खण्डमा म तपाईलाई २०१५ को भुकम्प बारे केहि प्रस्नहरु सोध्नेछु। कृपया ध्यान दिनु होला उल्लेखित प्रस्न मध्ये केहि भूकम्पका तत्कालिन प्रभाबसंग सम्बन्धित हुन सक्नेछन भने केहि प्रस्नले अहिले को पुनर्प्राप्तिका तहहरु जनाउने छन्। तपाईका उत्तरहरुले हामीलाई भूकम्पका तत्कालिन प्रभावहरु र त्यसको पुनर्प्राप्तिका कारकहरु खण्डन गर्न सहयोग गर्नेछन्।

१. तपाई तलका कथनहरु संग कत्तिको सहमत हुनुहुन्छ? (कृपया दिएका कोष्ट मध्ये आफुलाई उचित लाग्ने सहमति को तह जनाई कोष्ट मा ठिक चिन्ह लगाउनुहोस|)

		एकदमै सहमत छैन(१)	सहमत छैन (२)	निष्कृय छु (३)	सहमत छु (४)	एकदमै सहमत छु(५)
i-a	मेरो परिवारको कोहि सदस्य प्रकोपमा घाइते हुनु भएको थियो	☐	☐	☐	☐	☐
i-b	मेरो परिवारको सदस्यले चोट बाट पुन प्राप्ति गर्नु भयो |	☐	☐	☐	☐	☐
ii-a	मेरो बास स्थान भूकम्पले बस्न पनि नमिल्ने गरि ध्वस्त गरिदियो |	☐	☐	☐	☐	☐
ii-b	हाल मेरो स्थायी बास स्थान छ |	☐	☐	☐	☐	☐
iii-a	भूकम्पको तत्काल पश्चात मसंग पर्याप्त खाने कुराहरु थियो |	☐	☐	☐	☐	☐
iii-b	हाल मसंग पर्याप्त खाने कुराहरु छन् |	☐	☐	☐	☐	☐
iv-a	भूकम्पको तत्काल पश्चात मसंग पर्याप्त पिउने पानी थियो |	☐	☐	☐	☐	☐
iv-b	हाल मसंग पर्याप्त पिउने पानी छ |	☐	☐	☐	☐	☐
v-a	भुकम्प ले मेरो कमाउने सक्ने सामर्थ्य गुमाउन बाध्य बनायो |	☐	☐	☐	☐	☐
v-b	हाल मसंग काम वा आयको स्रोत छ|	☐	☐	☐	☐	☐
vi-a	भुकम्पले मलाई समाजमा खुल्ला हिडडुल गर्न रोक लगायो (जस्तै परिवार, साथीभाई र छरछिमेक संगको भेटघाटमा) |	☐	☐	☐	☐	☐
vi-b	हाल म समाजमा खुल्ला हिडडुल गर्न सक्षम छु|	☐	☐	☐	☐	☐
vii-a	भूकम्पले मेरो केहि व्यक्तिगत सम्पतिको नाश भयो (जस्तै घर, आफै, पशुपालन इत्यादि)	☐	☐	☐	☐	☐
vii-b	हाल ती क्षतिहरु वा ती बराबरको सम्पती पुन प्राप्ति गरिसकें |	☐	☐	☐	☐	☐
viii-a	भूकम्पले मलाई भावनात्मक दु:ख (जसतै डर/ त्रास, निराशा/ उदास) महशुस गरायो |	☐	☐	☐	☐	☐
viii-b	मैले भावनात्मक पुन प्राप्ति गरिसकें |	☐	☐	☐	☐	☐

ix-a	भूकम्पले मेरो द्वन्द-रूपी अनुभव बढाएको छ (जस्तै माया गर्ने तथा अन्जान व्यक्तिहरु द्वारा शारीरिक, भावनात्मक र यौन अपमान बेहोर्नु पर्ने, झगडा गर्ने)	☐	☐	☐	☐	☐
ix-b	म हाल ती द्वन्दहरुबाट मुक्त छु	☐	☐	☐	☐	☐
x-a	भुकम्प पश्चात म प्रकोप-मुक्ति, पुनर्प्राप्ति वा छिमेकी/ स्थानिय अगुवा/ आधिकारिक संग भविष्यका योजनाहरु छलफल गर्न सहभागी हुन सकिन ।	☐	☐	☐	☐	☐
x-b	म हाल प्रकोप मुक्ति, पुनर्प्राप्ति वा छिमेकी, स्थानिय अगुवा/ आधिकारिकसंगको भविष्य का योजनाहरु छलफल गर्न सहभागी जनाउन सक्छु ।	☐	☐	☐	☐	☐

२. **प्रभाव तथा पुन प्राप्ति को समय: भुकम्पको प्रभाव कति लामो समय संग रहिरहयो?**

	भुकम्प पश्चात	समय				यदि पुन प्राप्ति अहिले सम्म नभएको खण्डमा कति लामो समय सम्म मिल्ने आशा राख्नु भएको छ?	
		हप्ता	महिना	साल		महिना	साल
क	हामीले खाने कुराहरु कम खर्च गर्यौं						
ख	हामीले घरायसी सामाग्रीहरुमा कम खर्च गर्यौं						
ग	बालबालिकाहरुले स्कूल छुटाउनु पर्यो						
घ	मैले काम छुटाउनु पर्यो						
ङ	मेरो घर परिवारको युवाहरुले थप परिश्रम गर्नु पर्यो						
च	मेरो घर परिवारको बालबालिकाहरुले परिश्रम गर्नु पर्यो						
छ	मेरो परिवारले भावनात्मक दु:ख भोग्नु पर्यो						
ज	मेरो परिवारले शारीरिक चोट बाट पुन प्राप्ति गर्यो						
झ	घरायसी सदस्यहरु गाऊँ छोडेर हिंडे						
ञ	गुमाएको सम्पति वा त्यस बराबरको मूल्य आर्जन गर्न लागेको समय						
ट	भुकम्प अघिकै सरह आय (income) प्राप्ति गर्न लागेको समय						

३. २०१५ को भुकम्प तपाईको परिवारले कसरी सामना ग-यो ? कृपया हो वा होईनमा (✓) *लगाउनुहास ।* तपाईले कस्तो उपाय अपनाउनु भयो ?कुन तरिका पहिलो, दोश्रो, ...अपनाउनु भयो, त्यसको आधारमा कृपया तह छुट्टाउनुहास । (१- प्रथम, २-द्वितिय, ३- तृतिय, ४-चौथो, ५-पाचौ)

	सामना गर्ने तरिका	**छ (१)**	**छैन (२)**	**तह (१-५)**
१	गरगहना धितो/बिक्रि	☐	☐	

२	भाँडाकुडा विक्रि	▭	▭	
३	खाधान्य विक्रि	▭	▭	
४	गाईवस्तु विक्रि	▭	▭	
५	सवारी साधन विक्रि	▭	▭	
६	कृषिजन्य औजारको विक्रि	▭	▭	
७	अन्य सामाग्री विक्रि	▭	▭	
८	परिवार/ छिमेकी /नातेदारबाट सहयोग	▭	▭	
९	सापटी रकम - (व्यक्ति वा संस्थाबाट)	▭	▭	
१०	अग्रिम मजदुरी	▭	▭	
११	अन्य परिवारको सदस्यद्धारा मजदुरी	▭	▭	
१२	बचतको प्रयोग	▭	▭	
१३	ऋण लिएर	▭	▭	
१४	सरकारी सहयोग	▭	▭	
१५	गै. स.स को सहयोग	▭	▭	
१६	दान/सहयोग	▭	▭	
१७	परिवारको सदस्य अन्यत्र गएर	▭	▭	
१८	विप्रेशणद्धारा (रेमिट्यान्स)	▭	▭	
१९	अन्य (कृपया उल्लेख गर्नुहोस) _____	▭	▭	

४. यदि तपाईको परिवारले संकटको समय कुनै धितो/बिकी गरेको भए उक्त धितो/बिकीका अन्दाजी मुल्य कति रह्यो ?

							रुपया

५ . भुकम्प पछि के तपाईले कतै बाहिरी व्यक्तिबाट वा अन्य संस्थाबाट सापटी लिने कोशिस गर्नु भयो ?

मैले कोशिस गरिन (१)	मैले कोशिस गरे तर सहयोग पाईन (२)	मैले सापट लिए (३)
☐	☐	☐

६ . ऋण लिनु चाहनुको मुख्य कारण के थियो? (कृपया उपयुक्त सबैमा (✓) लगाउनुहोस।)

१	खानेकुरा किन्न	☐	७	व्यवसाय गर्न वा पुन लगानि गर्न	☐
२	उपचार गर्न	☐	८	कृषि वाहेकका सामाग्री किन्न	☐
३	घरायसी सामान किन्न	☐	९	जग्गा किन्न	☐
४	गाई बस्तु किन्न	☐	१०	अन्य (कृपया उल्लेख गर्नुहोस)	☐
५	कृषिजन्य सामाग्री किन्न	☐			
६	घर पुनः निर्माण गर्न	☐			

७ . यदि तपाईले ऋण पाउनु भएको भए को वा कुन स्रोतबाट पाउनु भयो? नपाउनु भएको भए को वा कुन स्रोतमा कोशिश गर्नुभयो?(कृपया उपयुक्त सबैमा (✓) लगाउनुहोस।)

१	नातेदार	☐	६	गैर(सरकारी संस्था	☐
२	छिमेकी	☐	७	औपचारिक ऋण दाता (वैंक, वित्तिय संस्था)	☐
३	स्थानिय साहु	☐	८	समुहमा आधारित लघु वित्त	☐
४	रोजगारदाता	☐	९	अन्य (कृपया उल्लेख गर्नुहोस)	☐
५	धार्मिक संस्था	☐			

८. ऋण प्राप्त गर्नु भएको भए, ऋण कति थियो?

☐☐☐☐☐☐☐ रुपैयाँ ।

९. के तपाईले ऋण तिरि सक्नुभयो?

छ (१)	छैन (२)
☐	☐

१०. यदि तिरि सक्नुभएको भए ऋण लिएको कति महिनापछि तिर्न सफल हुनुभयो? कृपया अंकमा लेख्नुहोस ।

महिना .....☐☐

११. यदि तिर्न सक्नु भएको छैन भने अब कति महिना सम्ममा तिरिसक्ने आशा राख्नु भएको छ?(कृपया एउटामा (✓) लगाउनुहोस।)

१	केहि महिना पछि	☐
२	एक वर्ष पछि	☐
३	२-३ वर्षमा	☐
४	३-५ वर्षमा	☐
५	५-१० वर्षमा	☐
६	म मेरो जीबनभर तिर्न सक्दिन ।	☐

१२. २०७२ सालको भुकम्प बाहेक घरपरिवारले यस्तो अन्य प्रकारको प्राकृतिक प्रकोप सामना गर्नु परेको थियो? यदि थियो भने कत्तिको दर्दानाक प्रकोप थियो?

	प्राकृतिक प्रकोप	**थियो** (१)	**थिएन** (२)	असर कति गहिरो थियो ? (१-४)	**असरको मात्रा** (१) असर नपरेको (२) निम्न असर (३) मध्यम असर (४) उच्च असर
क.	वाढि	☐	☐		
ख.	पहिरो	☐	☐		
ग.	भारी बर्षा	☐	☐		
घ.	आधी	☐	☐		
ङ.	असिना/हिउ	☐	☐		
च.	खडेरी	☐	☐		
छ.	उच्च तापमान	☐	☐		
ज.	आगलागी	☐	☐		
झ.	नदि कटान	☐	☐		
ञ.	अन्य (कृपया खुलाउनुहोस)	☐	☐		

१३. विगत २ बर्षमा तपाइको परिवारले अन्य निम्न आघात (shocks) महशुस गर्नुपरेको थियो?

	आघात	**छ** (१)	**छैन** (२)
१.	रोजगारी गुमाउनु/ मुख्य कमाउनेको व्यवसाय	☐	☐
२.	अन्य सदस्यको रोजगार गुम्नु	☐	☐
३.	अन्य कमाउने व्यक्तिको मृत्यु हुनु	☐	☐

४.	मुख्य कमाउने व्यक्तिले छोड्नु	☐	☐
५	ठुलो बिरामी हुनु	☐	☐
६	द्वन्द/ हिसां	☐	☐
७	घर भत्कनु	☐	☐
८	जग्गाको नोक्सानी	☐	☐
९	स्थायी सम्पतिको नोक्सानी (TV, ट्रयाक्टर, मेशिन)	☐	☐
१०	गाईबस्तु/ हाँस कुखुराको नोक्सानी	☐	☐
११	बालिको नोक्सानी	☐	☐
१२	मुख्य किटहरु (बालिमा लाग्ने किरा)	☐	☐
१३	कम उत्पादन (Low production)	☐	☐
१४	विबाह/अन्तिम संस्कार	☐	☐
१५	अन्य (कृपया खुलाउनुहोस) _____	☐	☐

खण्ड ख: जोखिमबारे धारणा

यस खण्डमा हामी तपाईलाई भुकम्प र भूकम्पसम्बन्धी तपाईको धाराणा सोध्ने छौं । यसमा सहि वा गलत जवाफ हुने छैनन । सके सम्म यसको उत्तर मिलाएर दिनुहोला ।

१४. सामान्यतया भुकम्पसंग तपाइलाई कति डर लाग्छ ? (कृपया एउटामा (✓) लगाउनुहोस।)

१	कुनै डर लाग्दैन	☐
२	अलि अलि डर लाग्छ	☐
३	डर लाग्छ	☐
४	एकदम डर लाग्छ	☐
५	ज्यादै डर लाग्छ	☐

१५. ६ रेक्टरको भुकम्प आएको खण्डमा तपाईलाई तपाईको घरको कति क्षति हुन्छ जस्तो लाग्छ ?(कृपया एउटामा (✓) लगाउनुहोस।)

१	केहि बिग्रदैन	☐
२	अलिकति बिग्रनेछ, सामान्य मर्मत पश्चात बस्न सकिनेछ	☐
३	मध्यम बिग्रनेछ, मुख्य मर्मत पश्चात बस्न सकिनेछ	☐

४	एकदमै बिग्रनेछ, सामान्यतया बस्न सकिदैन	☐
५	पूर्णतया नष्ट हुनेछ	☐

१६. ६ रेक्टरको भुकम्प आएको खण्डमा तपाईलाई तपाईको सम्पत्ति - गाईबस्तु, अन्न-बालि, कृषिजन्य जमिन आदिमा कति असर पर्छ जस्तो लाग्छ ?(कृपया एउटामा (✓) लगाउनुहोस।)

१	बिग्रनेछैन	☐
२	अलिकति बिग्रनेछ	☐
३	मध्यम बिग्रनेछ,	☐
४	एकदमै बिग्रनेछ,	☐
५	पूर्णतया नष्ट हुनेछ	☐

१७. तपाईलाई अबको कति वर्षमा अर्को ठूलो भुकम्प आउछ जस्तो लाग्छ ? कृपया अंक लेख्नुहोस ।

वर्षको संख्या ☐☐

१८. तपाई आफ्नो उत्तरदेखि कत्तिको विश्वस्त हुनुहुन्छ? १- १० को इकाईमा वर्णन गर्नुहोस्। (१ एकदमै विश्वस्त छैन, १० एकदमै विश्वस्त छु)

विश्वस्तताको तह (१ देखि १०) ☐☐

१९. यो छेत्रमा, आगामी दश वर्षमा तल उल्लेखित प्राकृतिक प्रकोप घट्ने वा जलवायु परिवर्तन हुने कत्तिको सम्भावना छ? तल दिएका कोष्ट मध्ये आफ्नो अनुभवले लागेको उल्लेखित प्राकृतिक प्रकोप संगमेल हुने गरी ठिक चिन्ह *(✓)*लगाउनुहोस|

	प्राकृतिक प्रकोप	निसन्देह घट्दैन (१)	घट्दैन (२)	घट्ला, यसै भन्न सकिन्न (३)	घट्छ (४)	निसन्देह घट्छ (५)
क	बाढी	☐	☐	☐	☐	☐
ख	पहिरो	☐	☐	☐	☐	☐
ग	भारी वर्षा	☐	☐	☐	☐	☐
घ	हुरी बतास	☐	☐	☐	☐	☐
ङ	असिना/ हिउँ पर्ने	☐	☐	☐	☐	☐
च	खडेरी	☐	☐	☐	☐	☐
छ	चर्को तापक्रम	☐	☐	☐	☐	☐
ज	डढेलो	☐	☐	☐	☐	☐
झ	नदी नाश	☐	☐	☐	☐	☐
ञ	अन्य (कृपया उल्लेख गर्नुहोस) _____	☐	☐	☐	☐	☐

२०. जलवायु परिवर्तन: यदि त्यसको रोकथाम नगरिएको खण्डमा, तपाईको विचारमा आगामी दश वर्षमा जलवायु परिवर्तन हुने वा झनै बिग्रने कत्तिको सम्भावना देख्नुहुन्छ? कृपया कोष्टमा *(✓)*चिन्हलगाउनुहोस |

१	कुनै सम्भावना छैन	☐
२	केहि सम्भावना छ	☐
३	सम्भावना छ	☐
४	एकदमै सम्भावना छ	☐
९९	थाहा छैन	☐

२१. जलवायु परिवर्तनको प्रभाव: तपाईको विचारमा आगामी दश वर्षमा जलवायु परिवर्तनले कत्तिको धनजनको क्षति वा सम्पतिको बिनाश गर्ने सम्भावना छ (जस्तै अन्नवालीको नोक्सान, पशुपालन, घर, इत्यादी) कृपया कोष्टमा *(✓)*चिन्हलगाउनुहोस

१	प्रभाव पार्ने छैन	☐
२	अलिकति प्रभावपार्न सक्छ	☐
३	केहि प्रभाव पार्न सक्छ	☐
४	निकै प्रभाव पार्न सक्छ	☐

२२. **जलवायु परिवर्तन का कारण / प्रवित्ती:** तल उल्लेखित कथनसंग कत्तिको सहमत हुनुहुन्छ कृपया कोष्टमा*(✓)*चिन्हलगाउनुहोस |

		एकदमै सहमत छैन (१)	सहमत छैन (२)	निष्कृय छु (३)	सहमत छु (४)	एकदमै सहमत छु(५)
क	वन विनास जलवायु परिवर्तनको कारक हो	☐	☐	☐	☐	☐
ख	जिवाश्म-इन्धनको प्रयोग जलवायु परिवर्तनको कारक हो	☐	☐	☐	☐	☐
ग	कृषिमा रसायनिक विष तथा मलको प्रयोगले जलबायु परिवर्तन गर्दछ	☐	☐	☐	☐	☐
घ	जंगल आगलागी जलबायु परिवर्तनको कारक हो	☐	☐	☐	☐	☐
ङ	आधुनिक औजारको प्रयोग जलबायु परिवर्तनको कारक हो	☐	☐	☐	☐	☐
च	मानव-जाति जलबायु परिवर्तनको लागि जिम्मेवार छन्	☐	☐	☐	☐	☐
छ	जलबायु परिवर्तनसंग जुध्न हामीले केहि गर्नुपर्छ	☐	☐	☐	☐	☐
ज	जलबायु परिवर्तन भगवानको इच्छा हो	☐	☐	☐	☐	☐

खण्ड ग: मौसम-निर्देशित बिमाको माग

हामी बाहुनेपाटीका घरहरुमा सम्भावत मौसमले हुने क्ष्यति रोकथाम गर्नको निमित्त काल्पनिक लघु बित्तिय बीमा योजना कार्यान्वयन गर्न गैरहेका छौ| मौसम निर्देशिका बीमाको निर्माणले पालुवा पलाउने मौसममा खडेरी / भारी वर्षाले किसानहरुमा पर्ने क्ष्यति रोक्न मदत गर्नेछ|

त्यसक्रममा, तपाई कति बराबरको बीमा रकम तिर्न इच्छुक हुनुहुन्छ भन्ने विषयमा प्रश्नहरु सोधिनेछ | यो चाहि वास्तविक बीमा कार्यक्रम योजना नभए तापनि वास्तविक हो भनि कृपया उत्तर दिनुहोला | कृपया भरपाई, coverage र बीमा तिर्न इच्छुकता बारे ध्यान दिनुहोला |

बीमा सम्बन्धित जानकारीहरु तल उल्लेखित छन् |

- **यसले कसरी कार्य गर्दछ?**
  यसले खडेरी वा भारी वर्षाको कारणले किसानले बेहोर्ने क्षयति कम गर्न मदत पुर्याउनेछ| यदि पालुवा पलाउने याममा १० दिन सम्म भारी वर्षा भएको वा ३० दिन सम्म लगातार वर्षा नभएको खण्डमा किसानहरुलाई भर्पाई दिईनेछ | वर्षा भएको वा नभएको जानकारीको निमित्त गाउँ नजिकैको मौसम सूचक केन्द्रको रेकर्ड हेर्नेछौ, जसले वर्षाको मात्रा सजिलै परिमार्जान गर्न मदत पुर्याउनेछ | (यदि १० दिन सम्म लगातार १२० मिलिमिटर भन्दा बढी पानी परेको वा ३० दिन सम्म लगातार १० मिलिमिटर भन्दा कम पानी परेको खण्डमा)
- **यसले के के ढाक्छ?**
  बालीको क्षतिका साथै यसले पशुहरुको क्षति पनि ढाक्नेछ | जम्माजम्मी यसले बालीनाली, गाई, वस्तु इत्यादि को क्ष्यति ढाक्नेछ
- **भर्पाइ कति गरिन्छ त ?**
  एक रोपनी जग्गा बराबर रु. १०,००० को बीमा, एक गाई बराबर रु. ८,१०० को बीमा, एक भैंसी बराबर रु. २६,००० को बीमा, एक बाख्रा बराबर रु. ३,८००० को बीमा,एक हाँस वा कुखुरा बराबर रु. ३८० को बीमा पूर्ति गरिनेछ |
- **तपाईले कहिले रकम पाउनु हुनेछ?**
  मौसम अवस्थाको परिमार्जन पश्च्यात यदि तोकिए बमोजिम जानकार भएको खण्डमा किसानहरुलाई बालीमा बेहोर्नु पर्ने क्ष्यतिको भर्पाई गरिनेछ | तर पशु पालनको खण्डमा, कृषि विभागका विशेषज्ञद्वारा गरिएको क्षति सम्बन्धि छानविन पश्चात मात्र भर्पाई दिईनेछ| यस क्रममा मौसमको खराबीको कारण भएको पशुहरुको क्ष्यति भर्पाई गरिनेछ |

२३. तपाईलाई बीमाको प्याकेज सम्बन्धि केहि प्रश्नहरु सोध्नुछ?

छ(१)	छैन (२)
☐	☐

गणक: यदि उत्तर(छैन) आएमा अरु प्रश्नहरु सोध्नु अघि कृपया बीमा योजनाको बारे ध्यान पुर्वक बुझाउनुहोला|

गणकलाइ निर्देशन: पुन: प्रश्नहरु ध्यान पुर्बक सोध्नु पर्नेछ?

- गोलाप्रथाद्वारा निर्धारित रकम छान्नु होला| (नोट: सर्भेअघि सबैलाई क्रमरहित ढंगले रकम छान्न लगाइनेछ)
- प्रश्न न. २४ मा क्रमरहित ढंगले रकम राखेर प्रश्न सोध्नुहोला
- यदि उत्तर 'छ' आएमा रकम बढाएर प्रश्न सोध्नुहोला
- यदि उत्तर ' छैन' आएमा रकम घटाएर प्रश्न सोध्नुहोला

तल लिलामी रकम उल्लेखित छन् (वार्षिक) **रु.**

.....

उदाहरण

- 'तपाई यो बिमाको लागि २०० रुपया तिर्न तयार हुनुहुन्छ?' भन्ने प्रश्नमा 'तिर्छु' भन्ने उत्तर आएमा 'तपाई यो बिमाको लागि ५०० रुपया (२०० पछिको ठुलो संख्या) तिर्न तयार हुनुहुन्छ?' भनेर सोध्नुहोला |
- 'तपाई यो बिमाको लागि १००० रुपया तिर्न तयार हुनुहुन्छ?' भन्ने प्रश्नमा 'तिर्दिन' भन्ने उत्तर आएमा 'तपाई यो बिमाको लागि ५०० रुपया (१००० अघिको सानो संख्या) तिर्न तयार हुनुहुन्छ?' भनेर सोध्नुहोला |

२४ के तपाई माथि उल्लेखित बिमाको लागि एक वर्षको रु.....तिर्न तयार हुनुहुन्छ ?[गोला प्रथामा उत्पन्न लिलामी पुर्नाराशी भर्नुहोस्] कृपया कोष्टमा*(✓)*चिन्ह लगाउनुहोस|

छ (१)	छैन (२)
☐	☐

२५ यदी एक वर्षको तपाईलाई रु..... तिर्न भनिएमा (उच्च वा कम रकम) के तपाई मौसम निर्देशित बीमा गर्न इच्छुक हुनुहुन्छ? कृपया कोष्टमा*(✓)*चिन्हलगाउनुहोस

छ (१)	छैन (२)
☐	☐

२६ तपाई माथि उल्लेखित प्रश्नमा कतिको विश्वस्थ हुनुहुन्छ? (१- धेरै विश्वस्थ नभएको, १०- धेरै विश्वस्थ भएको)

विश्वस्थको तह (१देखि१०) ..... ☐☐

खण्ड घ: सामाजिक-पूंजी

विश्वास र सौहार्दता

२७ तल उल्लेखित कथन मध्ये तपाईलाई कुन सटिक लाग्छ: कृपया कोष्टमा*(✓)*चिन्हलगाउनुहोस

धेरै मानिसहरुलाई विश्वास गर्न सकिन्छ (१)	☐
म धेरै मानिसहरुलाई विश्वास गर्न सक्दिन (२)	☐

२८ तपाई तल उल्लेखित मध्ये कसलाई विस्वास गर्नुहुन्छ? (कृपया कोष्टमा*(✓)*चिन्ह लगाउनुहोस)

		एकदमै (१)	अलि (२)	निकै कम (३)	सुन्य (४)
क	गाउँका मानिस				
ख	अन्जान व्यक्ति				
ग	प्रहरी				
घ	आर्मी				
ङ	सरकारी कर्माचार्य				
च	राजनीतिज्ञ				
छ	समाचार संचार माध्यम				

आन्तरिक सम्बन्ध र संजाल

२९ तपाई संग कति जना मिल्ने साथीहरु वा नातेदारहरु छन् जोसंग तपाई आफ्नो गोप्य कुराहरु खुलेर गर्न सक्नुहुन्छ सहयोग माग्नु हुन्छ या पैसाको लेनदेन गर्नसक्नुहुन्छ? *कृपया संख्या उल्लेख गर्नुहोस*

साथी र नातेदार हरुको संख्या.....☐☐

३० यदी तपाईलाई अपर्झट कुनै आपत परे सानो रकम (आफ्नो घर कर्जा एक हप्ता भित्र तिर्नुपर्ने हुँदा) आफन्त र नातेदार मध्ये कसैले आफूखुसी सहयोग गर्नुहुन्छ भन्ने लाग्छ?

१	अवश्य गर्छन	☐
२	सम्भावना छ	☐
३	थाहा छैन	☐
४	सम्भावना छैन	☐
५	अवस्य गर्दैनन्	☐

छिमेकी-एकता र सदवाभ

३१ तपाई यस समुदायमा कहिले देखि बस्दै आउनु भएको छ ?(कृपया एउटामा (✓) लगाउनुहोस।)

१	एक बर्ष भन्दा कम	☐
२	१ देखी ५ बर्ष सम्म	☐
३	५ देखी १० बर्ष सम्म	☐
४	१० बर्ष भन्दा वढी	☐

३२ तपाई आफन्त र साथीहरुकोमा कत्तिको जानुहुन्छ ?(कृपया एउटामा (✓) लगाउनुहोस।)

१	प्रत्यक दिन	☐
२	हप्तामा धेरै दिन	☐
३	महिनामा धेरै दिन	☐
४	वर्षमा धेरै दिन	☐
५	वर्षको एकचोटी वा कम	☐
६	कहिल्लैपनि	☐

३३ तपाईको आफन्त र साथीहरु तपाईकोमा कत्तिको आउछन ? (कृपया एउटामा (✓) लगाउनुहोस।)

१	प्रत्यक दिन	☐
२	हप्तामा धेरै दिन	☐
३	महिनामा धेरै दिन	☐
४	वर्षमा धेरै दिन	☐
५	वर्षको एकचोटी वा कम	☐
६	कहिल्लैपनि	☐

समुह र सामाजिक संजाल

३४ तपाई वा तपाईको परिवारको कुनै सदस्य निम्न समुदाय, समुह, संस्था वा कोअपेरेटिभ संग संलग्न हुनुहुन्छ ?(कृपया एउटामा (✓) लगाउनुहोस।)

	संगठन/समुह	छ (१)	छैन (२)
क.	लघुवित्त समुह (आय आर्जन समुह)	☐	☐
ख.	कृषि समुह	☐	☐
ग.	वन समुह	☐	☐
घ.	पानी समुह (सिंचाई समुह)	☐	☐
ङ.	महिला समुह	☐	☐
च.	ऋणी समुह	☐	☐
छ.	नागरिक समुह	☐	☐
ज.	राजनैतिक समुह	☐	☐
झ.	धार्मिक समुह	☐	☐
ञ.	खेलकुद समुह	☐	☐
ट.	स्वास्थ्य समुह	☐	☐
ठ.	अन्य समुहहरु	☐	☐

३५ तपाई आफ्नो समुदायमा कत्तिको सकृय हुनुहुन्छ ? (जस्तै स्थानिय सरकार वा स्वयमसेवक संस्थाहरु) (कृपया एउटामा (✓) लगाउनुहोस।)

१	ज्यादै निष्क्रिय	☐
२	केहि निष्क्रिय	☐
३	न सक्रिय न निष्क्रिय	☐
४	केहि सक्रिय	☐

५	ज्यादै सक्रिय ☐

३६ तपाइले अस्तिको चुनावमा भोट हाल्नुभयो? (कृपया एउटामा (✓) लगाउनुहोस)

छ (१)	छैन (२)
☐	☐

सामुहिक कार्य र आपसी सहयोग

३७ बितेको १२ महिनामा तपाईले तपाईको गाउ/ छिमेकमा अरुसंग मिलेर समुदायको फाईदाको लागि काम गर्नु भयो ?(कृपया एउटामा (✓) लगाउनुहोस।)

छ (१)	छैन (२)
☐	☐

३८ बितेको १२ महिनामा तपाई वा तपाईको घरको सदस्यले अहिलेसम्म समुदायिक कार्यमा कति पटक सहभागिता जनाउनुभयो ?(कृपया एउटामा (✓) लगाउनुहोस।)

सहभागिता जनाएको संख्या ..... ☐☐

३९ भुकम्प पछि दैविक प्रकोप पुननिर्माण कार्य योजना वा कार्यक्रममा तपाईको समुदायमा कति सक्रिय भएर लाग्नुभयो ?

१	ज्यादै निष्क्रिय ☐
२	केहि निष्क्रिय ☐
३	न सक्रिय न निष्क्रिय ☐
४	केहि सक्रिय ☐
५	ज्यादै सक्रिय ☐

खण्ड ङ : खाद्य शुरक्षा

यस खण्डमा हामी खाद्य शुरक्षाको अवस्था बारे सोध्नेछौ । पहिला हामी तपाईको परिवारले बितेको हप्तामा उपभोग गर्नु भएको खाद्य प्रकारको वारेमा सोध्ने छौ। त्यस्तै हामी खाद्यन्नको अभावको वारेमा कुरा गर्नेछौ । यसले हामीलाई गाउको समग्र खाद्य शुरक्षा को वारेमा बुझ्नसजिलो बनाउनेछ ।

४०. बितेको ७ दिनमा तपाईको परिवारले निम्ज खानेकुराहरु कति पटक खानुभयो भन्न सक्नुहुन्छ र तिनिहरुको स्रोत के थिए ? ७ दिन सम्म नखाएको कुराहरु भए ० राख्नुहोस ।

	खानेकुराको प्रकार	क. बितेको ७ दिनमा खाएका दिनहरु	ख. खानेकुराको स्रोत (सबै उल्लेख गर्नुहोस) (कोड १)	(कोड १) खानेकुराको स्रोत कोण: १. आपःनै उत्पादन(बालि, जनावार) २. शिकार, माछापालन ३. जम्मा गरेको
१	मकै	( )	☐ ,☐ ,☐	
२	धन	( )	☐ ,☐ ,☐	
३	कोदो	( )	☐ ,☐ ,☐	

४	जरा र कन्दमुल (आलु , तरुल)	( )	☐☐, ☐☐, ☐☐	४.सापटी लिएको ५. किनेको ६. बालिको लागि खेतला ७. खानेकुरा साटेको ८. (उपाहर) परिवार तथा नातेदार बाट ९. खानेकुरा सहयोग (गै.स.स बाट) १०. अन्य (खुलाउनुहोस)
५	गहुँ /जौ	( )	☐☐, ☐☐, ☐☐	
६	माछा	( )	☐☐, ☐☐, ☐☐	
७	सेतो मासु- पोल्ट्री (chicken)	( )	☐☐, ☐☐, ☐☐	
८	बंगुर	( )	☐☐, ☐☐, ☐☐	
९	रातो मासु- बाख्रा, भेडा	( )	☐☐, ☐☐, ☐☐	
१०	रातो मासु - भैसी	( )	☐☐, ☐☐, ☐☐	
११	अण्डा	( )	☐☐, ☐☐, ☐☐	
१२	गहत/दाल	( )	☐☐, ☐☐, ☐☐	
१३	तरकारी	( )	☐☐, ☐☐, ☐☐	
१४	तेल/घ्यु/मखन	( )	☐☐, ☐☐, ☐☐	
१५	ताजा फलफुल	( )	☐☐, ☐☐, ☐☐	
१६	चिनी/नुन	( )	☐☐, ☐☐, ☐☐	
१७	दुध/ दही	( )	☐☐, ☐☐, ☐☐	

४१. तलका प्रश्नहरुमा हामी वितेको एक बर्समा खाद्य संकटलाई तपाईले कसरी सामना गर्नु भयो भनेर सोध्नेछौ । (कृपया एउटामा (✓) लगाउनुहोस)

		बारम्बार (५ वा बढि पटक) (४)	समय समयमा (२ देखि ३ पटक) (३)	बिरलै - एकपटक) (२)	कहिल्लैपनि (१)
१	बितेको १२ महिनामा तपाईको परिवारसंग प्रशस्त खाद्यन्न हुदैन भनेर चिन्तित हुनुभयो ?	☐	☐	☐	☐
२	बितेको १२ महिनामा तपाई वा तपाईको परिवारले खाद्य संकटको कारणले खान मन लागेको कुरा कति पटक खाना पाउनु भएन ?	☐	☐	☐	☐
३	बितेको १२ महिनामा तपाई वा तपाईको परिवारले खाद्य संकटको कारणले खान मन लागेको कुरा सिमित मात्रमा मात्र कति खानुभयो ?	☐	☐	☐	☐
४	बितेको १२ महिनामा तपाई वा तपाईको परिवारको सदस्यले खाद्य संकटको कारणले कति दिन नियमितभन्दा सानो छाक खान खानुभयो? (size/proportion of meals)	☐	☐	☐	☐
५	बितेको १२ महिनामा तपाई वा तपाईको परिवारको सदस्यले खाद्य संकटको कारणले आफुलाई आवश्यक पर्ने भन्दा कम छाक खाना खानुभयो ? (Number of meals)	☐	☐	☐	☐
६	बितेको १२ महिनामो खाद्य संकटको कारणले तपाईको परिवारमा खानेकुरा थिएन ?	☐	☐	☐	☐

		छ (१)	छैन (२)
७	बितेको १२ महिनामा तपाई वा तपाईको परिवारले खाद्य संकटको कारणले भाकभोकै सुत्न जानुभयो?	☐	☐

८	बितेको ६ महिनामा तपाई वा तपाईको परिवारले सहयोग स्वरुप खाद्यन्न पाउनुभयो ?	☐	☐

खण्ड ञ : जनसांख्यिकीय जानकारी

हामीलाई अध्ययन गर्नको लागि तपाईको परिवारको बारेमा जान्नु पर्ने हुन्छ । यसले हामीलाई प्रतिक्रिया दिनेहरु कति समान वा फरक छन भनेर बुझ्न सजिलो हुनेछ । हाम्रा भाबी योजनाहरु यस समुदायको आवस्यकता अनुसार निर्माण गर्न तपाइले दिनु भएका जबाफहरुले मद्दत पुर्याउने छन् । **सर्भेका सबै सूचनाहरु गोप्य रहनेछन । तपाईका प्रतिक्रियाहरु बेनामी हुनेछन ।**

४२. तपाईको घरमा हाल कति जना सदस्य हुनुहुन्छ? कृपया अंकमा उल्लेख गर्नुहोस।

१	जम्मा परिवार सदस्य	■
२	वालवच्चाको संख्या (०-५ वर्ष)	■
३	वालवच्चाको संख्या (६-१८ वर्ष)	■
४	वयस्कको संख्या (१८ वर्ष माथीको)	■
५	आम्दानी भएको वयस्कको संख्या	■

४३. तपाईको लिंग कुन हो ? (कृपया एउटामा (✓) लगाउनुहोस।)

पुरुष (१)	महिला (२)
☐	☐

४४. तपाई कति वर्षको हुनु भयो ? कृपया अंकमा लेख्नुहोस । ☐ वर्ष

४५. तपाईको घरको मुली कति वर्षको हुनु भयो ? ☐ वर्ष

४६. तपाईको वर्तमान वैबाहिक अवस्था के छ? (कृपया एउटामा (✓) लगाउनुहोस।)

१	अबिबाहित	☐
२	बिबाहित	☐
३	संबन्ध बिच्छेद भएको	☐
४	छुट्टिएको	☐
५	बिधवा	☐

४७. तपाई कस्तो प्रकारको परिवारमा बस्नु हुन्छ? (कृपया एउटामा (✓) लगाउनुहोस ।)

१	एकल	☐
२	संयुक्त	☐

४८. तपाईको परिवारको मुख्य धर्म के हो ? (कृपया एउटामा (✓) लगाउनुहोस ।)

१	हिन्दु	☐
२	बुद्धिस्थ	☐
३	मुस्लिम	☐
४	किराँत	☐
५	क्रिस्चियन	☐
६	अन्य	☐
	अन्य भए, उल्लेख गर्नुहोस	

४९. तपाई कुन जातको हुनुहुन्छ ? (कृपया एउटामा (✓) लगाउनुहोस ।)

१	बाहुन	☐
२	छेत्री	☐
३	नेवार	☐
४	जनजाती	☐
५	मधेशी, थारु, मुसलमान	☐
६	पहाडी दलित	☐
७	मधेशी दलित	☐
८	ऋन्य	☐
	अन्य भए, उल्लेख गर्नुहोस	

५०. तपाईले प्राप्त गर्नु भएको उच्च शिक्षा कति हो ? (कृपया एउटामा (✓) लगाउनुहोस ।

१	औपचारिक शिक्षा नलिएको	☐
२	कक्षा (१-५)	☐
३	कक्षा (६-८)	☐
४	कक्षा (९-१०)	☐
५	कक्षा (१०-१२)	☐
६	स्नातक	☐
७	स्नाकोत्तर वा अन्य व्यवसायिक शिक्षा	☐
८	व्यवसायिक तालिम	☐

५१. तपाईले घरको मुल व्यक्तिले प्राप्त गर्नु भएको उच्च शिक्षा कति हो ?(कृपया एउटामा (✓) लगाउनुहोस ।

१	औपचारिक शिक्षा नलिएको	☐
२	कक्षा (१-५)	☐
३	कक्षा (६-८)	☐
४	कक्षा (९-१०)	☐
५	कक्षा (१०-१२)	☐
६	स्नातक	☐
७	स्नाकोत्तर वा अन्य व्यवसायिक शिक्षा	☐

८	व्यवसायिक तालिम	☐

५२. तपाईले घरको मुल व्यक्तिको प्रमुख पेशा के हो ? (कृपया एउटामा (✓) लगाउनुहोस ।

१	बेरोजगार	☐
२	बिद्यार्थी	☐
३	कृषि	☐
४	दैनिक ज्यालादारी	☐
५	स्वरोजगार (साना व्यवसाय)	☐
६	घरको काम	☐
७	प्रशाशनिक रोजगार (सरकारी, एन.जि.ओ, निजी फर्म	☐
८	ऋन्य	☐
	अन्य भए, उल्लेख गर्नुहोस.....	

५३. तपाईको घरबाट सबैभन्दा नजिकको [..... ...] कति समय लाग्दछ ? *कृपया घण्टा र मिनेटमा उल्लेख गर्नहोस ।*

		घण्टा	**मिनेट**
क.	सडक बाटो	☐	☐
ख.	बजार	☐	☐
ग.	हस्पिटल	☐	☐
घ.	बिद्यालय	☐	☐
ङ.	स्थानिय प्रशाशकिय कार्यालय, गाबिस वडा कार्यालय	☐	☐
च.	महिला सामुदायिक केन्द्र (बाहुनीपाटी क्लिनिक KUद्वारा संचालित)	☐	☐

५४. तपाइको परिवारको कुनै सदस्यसंग निम्न मध्ये कुन कुन सामग्री छन् ?(कृपया हो वा होईन एउटामा (✓) लगाउनुहोस ।

	नमुनाहरू	हो (१)	होइन (२)
क.	रेडियो	☐	☐
ख.	टि. भी.	☐	☐
ग.	मोबाइल	☐	☐
घ.	टेलिफोन	☐	☐
ङ.	साईकल	☐	☐
च.	मोटरसाईकल/ स्कुटर	☐	☐
छ.	पंखा	☐	☐
ज.	ए. सि.	☐	☐

झ.	सिलाउने मेशिन	☐	☐
ञ.	क्यामेरा	☐	☐
ट.	कार/मोटर गाडी	☐	☐
ठ.	ट्रयाक्टर	☐	☐
ड.	रेफ्रिजेरेटर	☐	☐
ढ.	कम्प्युटर	☐	☐
ण.	ईन्भर्टर वा बिजुलीको लागि सोलार	☐	☐
त.	पानी तान्ने मेशिन	☐	☐

५५. तपाइको परिवारको कुनै कृषि जन्य जग्गा छ ?(कृपया एउटामा (✓) लगाउनुहोस ।

छ (१)	छैन (२)
☐	☐

५६. तपाइको परिवारसंग कति रोपनी र बिगाह कृषि जन्य जग्गा रहेको छ ? कृपया अंकमा उल्लेख गर्नुहोस र त्यसै अनुरुपको ईकाइमा (✓) लगाउनुहोस ।) *(१- रोपनी वा २- बिगाह)*

	रोपनी (१)	☐	बिगाह (२) ☐

५७. तपाइको परिवारसंग कति जनावारहरु रहेका छन ? (नभएको भए ० उल्लेख गर्नुहोस)

क.	बाख्रा	■
ख.	गाई/ गोरू	■
ग.	भेडा	■
घ.	भैसी	■
ङ.	कुखुरा	■
च.	हाँस	■
छ.	सुंगुर	■
ज.	अन्य (खुलाउनुहोस) _____	■

५८. तपाइको परिवारका कोहि बिदेशमा काम गर्नुहुन्छ ? (कृपया एउटामा (✓) लगाउनुहोस ।

छ (१)	छैन(२)
☐	☐

५९. तपाइको परिवारले बितेको १२ महिनामा रेमिटेन्स प्राप्त गर्नु भएको छ ? (कृपया एउटामा (✓) लगाउनुहोस ।

छ(१)	छैन(२)
☐	☐

यदि छ भने कृपया रकम उल्लेख गर्नुहोस : ☐ रुपैया ।

६० . सामान्यतया तपाइको परिवारको औषत मासिक आम्दावी (रुपयामा) कति हुन्छ? (कृपया एउटामा (✓) लगाउनुहोस ।

१	२००० भन्दा कम	☐
२	२००१-४०००	☐
३	४००१-६०००	☐
४	६००१-८०००	☐
५	८००१-१०,०००	☐
६	१०,००१-१५,०००	☐
७	१५,००१-२०,०००	☐
८	२०,००१-३०,०००	☐
९	३०,००० भन्दा वढि	☐
१०	थाहा नभएको	☐
११	उत्तर अस्विकार गरिएको	☐
	यदि १००००० भन्दा वढि भए कृपया खुलाउनुहोस :	

६१. तपाइको घरको भुईमा कुन सामाग्री प्रयोग गरिएको छ ?

माटो/ बालुवा (१)	☐
गोबर (२)	☐
काठ /साँघु (३)	☐
नियालो /बाँस (४)	☐
पार्केट/ पालिस गरिएको काठ (५)	☐
भिनाईल वा अलकत्रा (६)	☐
सेरामिक टाईल (७)	☐
सिमेन्ट (८)	☐
कार्पेट (९)	☐
अन्य (१०)	☐

६२. तपाइको आवासको भान्छामा कुन सामाग्री प्रयोग गरिएको छ ?

माटो/ वालुवा (१)	☐
जस्तापाता (२)	☐

काठ /साँघु (३)	☐
पराल/खर (४)	☐
कंकृट/ सिमेन्ट (५)	☐
टाईल/स्लेट (६)	☐
अन्य (७)	☐

खण्ड च: महिला केन्द्र

न्यु मेक्सिको बिस्वबिध्यालयको UMN4NEPALले काठमाडौँ बिस्वबिध्यालयको सहकार्यमा महिला सामुदायिक केन्द्रको स्थापना गरेको छ | यहि सन्दर्भमा हामी तपाईलाई केहि प्रश्नहरु सोध्न गैरहेका छौं| यी प्रश्नावलीले हामीलाई हाम्रा भाबी सामुदायिक कार्यक्रम निर्धारण गर्न मद्दत गर्नेछन|

६३	तपाईको बिचारमा बाहुनेपाटी समुदायका महिलाको आधारभूत आवश्यकता पुरा गर्न के-के कार्यक्रमले मदत गर्दछ? (सटिक उत्तर दिनुहोस्)	
६४	तपाईको बिचारमा स्थापनापस्चात तपाईले महिला सामुदायिक केन्द्र (Women's Community Center) को भ्रमण कतिको गर्नुहुनेछ?	हप्तामा एक चोटी भन्दा बढी (१) ☐ हप्तामा एक पटक मात्र (२) ☐ प्रत्येक हप्ता (३) ☐ एक महिनामा (४) ☐ एक बर्षमा (५) ☐ कहिले पनि होइन (६) ☐
६५	यी कार्यक्रममध्ये तपाईलाई कुन कुन कार्यक्रम फाइदाजनक लाग्छ, क्रमबद्ध रुपमा एक (१- माथिल्लो श्रेणी) देखि छ (६- तल्लो श्रेणी) अंक (Rank) दिनुहोस् |	लघुवित्तीय भेटघाट (१) ☐ परिवार नियोजन भेटघाट (२) ☐ बयस्क शिक्षा र कक्षा (३) ☐ राजनीतिक बहस (४) ☐ युवा क्लब कार्यक्रमहरु (५) ☐ अन्य (६) उल्लेख गर्नुहोस् ..... ☐
६६	महिला सामुदायिक केन्द्रको नियमित मर्मत-संहार गर्न र कार्यक्रम संचालन गर्न मासिक केहि खर्च लाग्नेछ (बिधुत, पानी, सरसफाई र मर्मत) | के तपाई यस सामुदायिक केन्द्रलाई प्रत्येक महिना आफूखुशी केहि सानो रकम तिर्न तयार हुनुहुन्छ? हुनुहुन्छ भने कति सम्म तिर्न सक्नुहुन्छ, अनुमान लगाउनुस् |	रु..... ☐

खण्ड छ: स्वास्थ्य

यस खण्डमा हामी तपाइहरुलाई तपाईको वास्तविक र अनुमानित स्वास्थ्यबारे प्रश्नहरु सोध्न गैरहेकाछौं	यी प्रश्नहरुले हामीलाई तपाईको स्वास्थ्य अवस्थाबारे बुझ्न सहयोग गर्छ, साथै सामाजिक तथा आर्थिक असरहरु पत्ता लगाउन मदत पुर्याउछ	कृपया प्रश्नहरुको उत्तर सकेसम्म ठिक दिनुहोला	
६७	के तपाईलाई डाक्टरले दीर्घकालीन रोग छ भनेर भन्नु भएको छ? *कृपया एउटा कोठामा (✓) चिन्ह लगाउनुहोला*	**छ** (१) ☐ **छैन** (२) ☐
६८	गएको छ महिना भित्र तपाईलाई स्वास्थ्य सम्बन्धि कुनै समस्या परेको छ (दीर्घकालीनरोग)? *कृपया एउटा कोठामा (✓) चिन्ह लगाउनुहोला*	**छ** (१) ☐ **छैन** (२) ☐
६९	गएको छ महिना भित्र तपाई कति पटक स्वास्थ्य प्रदायकमा जानुभएको छ? *कृपया एउटा कोठामा (✓) चिन्ह लगाउनुहोला*	एकनास (५) ☐ लगातार (४) ☐ कहिलेकाही (३) ☐ विरलै (२) ☐ कहिले पनि छैन (१) ☐
७०	गएको१२महिनामा आफ्नो स्वास्थ्यको औसत अवस्थालाई कसरी निर्धारण/ मापन गर्नुहुन्छ? *कृपया एउटा कोठामा (✓) चिन्ह लगाउनुहोला*	उत्कृस्ट (५) ☐ धेरैराम्रो (४) ☐ राम्रो (३) ☐ ठिकै (२) ☐ नराम्रो (१) ☐

मानसिक स्वास्थ्य

यस खण्डमा हामी तपाइहरुलाइ तीस दिनभित्र कस्तो महसुस गर्नुभएको छ, बुझ्न खोज्दै छौ उत्तरहरु सहि दिने प्रयास गर्नुहोला

		सधैँ (५)	प्राय जसो (४)	कहिले काही (३)	क्षण-भर (२)	कहिल्यै छैन (१)
७१	गएको तीस दिन भित्र तपाई कतिको हरेस खाएको अनुभव गर्नुभयो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐
७२	गएको तीस दिन भित्र तपाई कति चोटि निरास भई खुसिहुन नसक्नुभएको छ? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐
७३	गएको तीस दिन भित्र कति पटक थकित महसुस गर्नुभएको छ? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐

७४	गएको तीस दिन भित्र तपाइले हरेक कामलाई कठिन ठान्नुभएको छ ? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐
७५	गएको तीस दिन भित्र तपाइले आफुलाई कतिको बेकार भएको महसुस गर्नुभयो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐
७६	गएको तीस दिन भित्र तपाई कतिको आत्तिनु भएको महसुस गर्नुभयो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐	☐	☐	☐

खण्ड झ: आत्मिय-साथी द्वन्द

नोट: यस खण्ड विवाहित महिलालाई मात्र सोध्नु होला| यदी सहभागी पुरुष वा अविवाहित महिला हो भने यस खण्डलाई छोड्नुहोस् |

यस खण्डमा हामी तपाईको घरेलु हिंशा सम्बन्धि प्रस्नहरु सोध्नेछौ	प्रस्न अलि संबेदनशील भएकोले संयमताका साथ् जबाफ दिनुहोला		
		छ (१)	छैन (२)
७७	के तपाईको श्रीमानले कहिले तपाईलाई गालि गर्नु भएको छ? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐
७८	के तपाईको श्रीमानले कहिले तपाईलाई धकल्ने, हान्ने, पिट्ने गर्नुहुन्थ्यो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐
७९	के तपाईको श्रीमानले इच्छ्या विपरित तपाईलाई जबर्जस्ति करनी गर्नुभएको थियो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐
८०	के तपाई अर्को जाती भएर तपाईको श्रीमानले कहिले शारीरिक पिडा दिने काम गर्नुभएको थियो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐
८१	के उहाँले तपाईलाई कहिले चक्कु, बन्दुक अथवा धारिलो हतियारले आक्रमण गर्नुभएको थियो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐
८२	के उहाँले तपाईलाई कहिले घाटी न्याकेको वा जिउदै जलाउने प्रयास गर्नुभएको थियो? *कृपया एउटा कोठामा (✓) मात्र चिन्ह लगाउनुहोला*	☐	☐

STATA CODES

```
****************************************************************************************************
**********************CHAPTER 2: COPING STRATEGIES PAPER ONLY*******************************
*****************************(REGRESSION RESULTS ONLY)***************************************
****************************************************************************************************

*******************************************************************************************************
********Table 6.1: Impact of Coping Strategy Diversification on Recovery Rate (N=510)************
*******************************************************************************************************

cd "/Users/veeshan/OneDrive/CHAPTER 1/Data Analysis/Only chapter 1/"
use 2017_Bahunepati_forreg.dta, clear
*save 2017_Bahunepati_forreg.dta, replace


***Determinants of Coping Strategies: dissaving, borrowing, labor adjustment, Private Transfers
local coping Cope12_saving CopS1_distsale CopS2_borrow Cope11_morlabor Cope10_advlabor Cope8_pershelp
Cope18_remit  remit
foreach x in Cope12_saving CopS1_distsale CopS2_borrow Cope11_morlabor Cope10_advlabor Cope8_pershelp remit  {
		oprobit `x' i.housedamage i.proptdamage i.healthdamage householdsize hhdage headEduc i.married i.hindu
i.BrahminChhetri i.occu_agri asset, vce(cluster WARD_RESPONDENT)
		outreg2 using oprobbitresults.rtf, append label  keep(i.housedamage i.proptdamage i.healthdamage) ///
				title(Table: Ordered Probit Regression Results for various coping strategies)addtext(Controls, Yes)
alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
				addnote("Note: Controls included in the model are age of household head, education level of household
head, Marital Status, Religion, Occupation of household head, household assets")
		}

sum Cope12_saving CopS1_distsale CopS2_borrow Cope11_morlabor Cope10_advlabor Cope8_pershelp Cope18_remit
*******************************************************************************************************
*******
*******************************************************************************************************
*******
//Dependent variable: Resilience
//Economic Resilience: income, house, household assets, consumption
//Psychosocial Resilience: emotional, violence, mobility, community participation


gen recov_econ=recov_inc+recov_propt+recov_food+recov_house
gen resilience_econ=0 if recov_econ<=4
replace resilience_econ=1 if recov_econ>4&recov_econ<=8
replace resilience_econ=2 if recov_econ>8&recov_econ<=12
replace resilience_econ=3 if recov_econ>12&recov_econ<=16
replace resilience_econ=4 if recov_econ>16&recov_econ<=20


global recov_economic recov_inc recov_propt recov_food recov_house
pca $recov_economic, blanks(0.4)
predict incomerec assetrec, score


****************************************************************************************************
****************PCA for Coping Strategies****************************************************

global allcoping Cope1_saleJewelry Cope2_saleutensils Cope3_salecrops Cope4_livestock Cope5_saletransp ///
		Cope6_agtool Cope7_saleothr Cope8_pershelp Cope9_borrow Cope10_advlabor Cope11_morlabor Cope12_saving
///
		Cope13_credit Cope14_govhelp Cope15_ngohelp Cope16_reliefaid Cope17_migrate remit

pca $allcoping
screeplot, yline(1)
pca $allcoping, mineigen(1) //will estimate components with eigenvalues higher than 1 only
pca $allcoping, comp(8) blanks(.3) //I used 0.36 to discard lower loadings. The usual threshold is 0.3
```

```
predict pc1 pc2 pc3 pc4 pc5 pc6 pc7 pc8, score

rename (pc1 pc2 pc3 pc4 pc5) (Borrowing Labor_adjust Extern_help Dissaving Migr_remit)
label var Borrowing "Borrowing_pca"
label var Labor_adjust "Labor adjustment_pca"
label var Extern_help "External help (government or NGOs)"
label var Dissaving "Dissaving: use of savings or selling liquid assets"
label var Migr_remit "Private Transfer through Migration/Remittance"

local copingmechanism Borrowing Labor_adjust Extern_help Dissaving Migr_remit

*HH coping strategy diversification index
global allcoping Cope1_saleJewelry Cope2_saleutensils Cope3_salecrops Cope4_livestock Cope5_saletransp ///
        Cope6_agtool Cope7_saleothr Cope12_saving Cope9_borrow Cope13_credit Cope10_advlabor Cope11_morlabor
///
        Cope14_govhelp Cope15_ngohelp Cope16_reliefaid Cope8_pershelp Cope17_migrate remit

gen
n1_distsale=Cope1_saleJewelry+Cope2_saleutensils+Cope3_salecrops+Cope4_livestock+Cope5_saletransp+Cope6_agtool+
Cope7_saleothr
gen n2_usesaving=Cope12_saving
gen n3_borrow=Cope9_borrow+Cope13_credit
gen n4_labor=Cope10_advlabor+Cope11_morlabor
gen n5_pvttran=Cope8_pershelp+remit
gen n6_exter=Cope14_govhelp+Cope15_ngohelp+Cope16_reliefaid
gen CopDiv=1-((n1_distsale*(n1_distsale-1)+n2_usesaving*(n2_usesaving-1)+n3_borrow*(n3_borrow-
1)+n4_labor*(n4_labor-1)+n5_pvttran*(n5_pvttran-1) /*+n6_exter*(n6_exter-1)*/)/(9*8))



gen CopDiv1=.
replace CopDiv1=1 if CopDiv<0.95
replace CopDiv1=2 if CopDiv>=0.95&CopDiv<=0.99
replace CopDiv1=3 if CopDiv>0.99
recode CopDiv1 (1=0)(2=0)(3=1)

***Coping Strategies: dissaving, borrowing, labor adjustment, Private Transfers
local copingmechanism Borrowing Labor_adjust Extern_help Dissaving Migr_remit



foreach x in pc1 pc3 pc5 pc8 {
        ologit resilience_econ `x' i.housedamage i.proptdamage i.healthdamage householdsize hhdage hhdeduc i.married
i.hindu i.caste i.hhdprimocc, vce(cluster WARD_RESPONDENT)
        *outreg2 using output2.rtf, append
        }

label var recov_econ "Economic Resilience"
label var recov_psysoc "Psychosocial Resilience"
label var Distsale "Sale of assets"
label var Borrow "Borrowing"
label var LaborAdj "Labor Adjustment"
label var PrivateT "Private Transfers"
label var Extern "External help (Govt, NGOs)"
label var householdsize "Household size"
label var hhdage "Age of household head"
label var Female "Female"
label var headEduc "HH Head Education"
label var married "Marital Status-married"
label var hindu "Religion-Hindu"
label var BrahminChhetri "Caste-Brahmin/Chhetri"
label var occu_agri "Occupation-Agriculture"
label var asset "Asset"

label define DamageLevel1 0 "No major damage" 1 "Major Damage"
label var housedamage "Major House Damage"
```

```
label var proptdamage "Major Property Damage"
label var healthdamage "Major Health Damage"
label values housedamage DamageLevel1
label values proptdamage DamageLevel1
label values healthdamage DamageLevel1



gen
Distsale=Cope1_saleJewelry==1|Cope2_saleutensils==1|Cope3_salecrops==1|Cope4_livestock==1|Cope5_saletransp==1|Cop
e6_agtool==1|Cope7_saleothr==1
//Cope12_saving
gen Borrow=Cope9_borrow==1|Cope13_credit==1
gen LaborAdj=Cope10_advlabor==1|Cope11_morlabor==1
gen PrivateT=Cope8_pershelp==1|remit==1
gen Extern=Cope14_govhelp==1|Cope15_ngohelp==1|Cope16_reliefaid==1

*************************************************************************************************
//Composite:
//ER
cmp (recov_econ=FinCoping householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp.xls, replace label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp
remit) ///
        title(Table: Mixed Process Regression Results for Economic Resilience)addtext(Controls, Yes) alpha(0.01, 0.05,
0.1, 0.15) symbol(***, **, *, +) eform ///
        addnote("Controls included in the model are: age of household head, education level of household head, Marital
Status, Religion, Occupation of household head, household assets")

cmp (recov_econ=FinCoping i.LaborAdjustmentY householdsize hhdage Female headEduc i.married i.hindu
i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp
remit)

cmp (recov_econ=FinCoping i.LaborAdjustmentY Cope14_govhelp householdsize hhdage Female headEduc i.married i.hindu
i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp
remit)

cmp (recov_econ=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp
remit)

cmp (recov_econ=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
```

```
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp
remit)


//PR

cmp (recov_psysoc=FinCoping householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp02.xls, replace label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit) ///
        title(Table: Mixed Process Regression Results for Psychosocial Resilience)addtext(Controls, Yes) alpha(0.01, 0.05,
0.1, 0.15) symbol(***, **, *, +) ///
        addnote("Controls included in the model are: age of household head, education level of household head, Marital
Status, Religion, Occupation of household head, household assets")

cmp (recov_psysoc=FinCoping i.LaborAdjustmentY householdsize hhdage Female headEduc i.married i.hindu
i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp02.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit)

cmp (recov_psysoc=FinCoping i.LaborAdjustmentY Cope14_govhelp householdsize hhdage Female headEduc i.married
i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp02.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit)

cmp (recov_psysoc=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp02.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit)

cmp (recov_psysoc=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp02.xls, append label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit)



**********************************************ER BREAKDOWN************************************

*Financial Coping Strategies
```

```
cmp (recov_econ=Distsale i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Distsale=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp04.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_econ=Borrow i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Borrow=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp04.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_econ=Cope12_saving i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Cope12_saving=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize
hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp04.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

*labor adjustment Coping Strategies

cmp (recov_econ=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp05.xls, replace label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit) ///
        title(Table: Simultaneous Equation Model Results for Economic Resilience) addtext(Controls, Yes) ///
        addnote("First stage results are omitted for presentational simplicity. Controls included in the model are: age of
household head, education level of household head, Marital Status, Religion, Occupation of household head, household
assets")

cmp (recov_econ=FinCoping Cope11_morlabor Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Cope11_morlabor=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp05.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_econ=FinCoping Cope10_advlabor Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Cope10_advlabor=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp05.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)
```

```
cmp (recov_econ=FinCoping Cope17_migrate Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Cope17_migrate=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp05.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)


**********PSYCHOSOCIAL RESILIENCE BREAKDOWN**********


*Financial Coping Strategies
cmp (recov_psysoc=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp06.xls, replace label keep(FinCoping i.LaborAdjustmentY Cope14_govhelp
Cope15_ngohelp remit) ///
        title(Table: Simultaneous Equation Model Results for Economic Resilience) addtext(Controls, Yes) ///
        addnote("First stage results are omitted for presentational simplicity. Controls included in the model are: age of
household head, education level of household head, Marital Status, Religion, Occupation of household head, household
assets")

cmp (recov_psysoc=Distsale i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Distsale=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp06.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_psysoc=Borrow i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Borrow=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp06.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_psysoc=Cope12_saving i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (Cope12_saving=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize
hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
        ind($cmp_cont $cmp_probit $cmp_probit) vce(cluster WARD_RESPONDENT)
        outreg2 using Rescomp06.xls, append label keep(FinCoping Distsale Borrow Cope12_saving i.LaborAdjustmentY
Cope14_govhelp Cope15_ngohelp remit)

*labor adjustment Coping Strategies

cmp (recov_psysoc=FinCoping i.LaborAdjustmentY Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
        (FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
```

```
	(LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using Rescomp07.xls, replace label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit) ///
	title(Table: Simultaneous Equation Model Results for Psychosocial Resilience) addtext(Controls, Yes) ///
	addnote("First stage results are omitted for presentational simplicity. Controls included in the model are: age of
household head, education level of household head, Marital Status, Religion, Occupation of household head, household
assets")

cmp (recov_psysoc=FinCoping Cope11_morlabor Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(Cope11_morlabor=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using Rescomp07.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_psysoc=FinCoping Cope10_advlabor Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(Cope10_advlabor=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using Rescomp07.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)

cmp (recov_psysoc=FinCoping Cope17_migrate Cope14_govhelp Cope15_ngohelp remit householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(Cope17_migrate=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using Rescomp07.xls, append label keep(FinCoping i.LaborAdjustmentY Cope11_morlabor
Cope10_advlabor Cope17_migrate Cope14_govhelp Cope15_ngohelp remit)


**********ECONOMIC RESILIENCE**********
//Distress Sale
cmp (recov_econ=Distsale householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
	(Distsale=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
	ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using cmpeconomic.xls, replace label ///
	title(Table: Conditional Mixed Process Regression Results for Economic Resilience)addtext(Controls, Yes)
alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///

//Use of Savings
cmp (recov_econ=Cope12_saving householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri
asset) ///
	(Cope12_saving=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
	ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using cmpeconomic.xls, append label

//Borrowing
cmp (recov_econ=Borrow householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
	(Borrow=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
	ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
	outreg2 using cmpeconomic.xls, append label
```

```
//Labor Adjustment
cmp (recov_econ=LaborAdj householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(LaborAdj=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmpeconomic.xls, append label

//Private Transfers
cmp (recov_econ=PrivateT householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(PrivateT=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmpeconomic.xls, append label

//External Help
cmp (recov_econ=Extern householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(Extern=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmpeconomic.xls, append label

**********PSYCHOSOCIAL RESILIENCE**********
//Distress Sale
cmp (recov_psysoc=Distsale householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(Distsale=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmppsysoc.xls, replace label dec(3) ///
		title(Table: Mixed Process Regression Results for Psychosocial Resilience)addtext(Controls, Yes)  alpha(0.01, 0.05,
0.1, 0.15) symbol(***, **, *, +) ///

//Use of Savings
cmp (recov_psysoc=Cope12_saving householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri
asset) ///
		(Cope12_saving=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmppsysoc.xls, append label dec(3)

//Borrowing
cmp (recov_psysoc=Borrow householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(Borrow=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmppsysoc.xls, append label dec(3)

//Labor Adjustment
cmp (recov_psysoc=LaborAdj householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset)
///
		(LaborAdj=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmppsysoc.xls, append label dec(3)

//Private Transfers
cmp (recov_psysoc=PrivateT householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(PrivateT=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
		outreg2 using cmppsysoc.xls, append label dec(3)

//External Help
cmp (recov_psysoc=Extern householdsize hhdage Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri asset) ///
		(Extern=i.housedamage i.proptdamage i.healthdamage partn_microf householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri asset), ///
		ind($cmp_cont $cmp_probit) vce(cluster WARD_RESPONDENT)
```

```
	outreg2 using cmppsysoc.xls, append label dec(3)

*****************************************************************************************
*****************************************************************************************

cmp (recov_psysoc=FinCoping Cope14_govhelp Cope15_ngohelp remit i.LaborAdjustmentY householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_probit $cmp_cont) vce(cluster WARD_RESPONDENT)



cmp (recov_psysoc=FinCoping Cope14_govhelp Cope15_ngohelp remit LaborAdjustmentY householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(FinCoping=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri) ///
	(LaborAdjustmentY=i.housedamage i.proptdamage i.healthdamage asset partn_microf householdsize hhdage
Female headEduc i.married i.hindu i.BrahminChhetri i.occu_agri), ///
	ind($cmp_cont $cmp_probit $cmp_cont) vce(cluster WARD_RESPONDENT) robust
	outreg2 using Rescomp.xls, append label

drop FinCoping
gen FinCoping=Distsale+Borrow+Cope12_saving
gen Transfers=Cope14_govhelp+Cope15_ngohelp+Cope16_reliefaid
gen LaborAdjustment=Cope17_migrate+Cope11_morlabor+Cope10_advlabor



**SUMMARY STAT TABLE**

estpost tabstat recov_econ recov_inc recov_propt recov_house recov_food /// Economic Resilience
	recov_psysoc recov_emot recov_violence recov_mobil recov_disasreliefp /// Psychosocial Resilience
	Distsale Cope12_saving Borrow LaborAdj PrivateT Extern /// Coping Mechanisms
	housedamage proptdamage healthdamage /// Disaster Damages
	partn_microf householdsize hhdage Female headEduc married hindu BrahminChhetri occu_agri asset, ///
Household Characteristics
	statistics(mean sd min max count) columns(statistics)

	esttab using "SummaryTable1.rtf", replace ///
	main(mean) aux(sd) nostar unstack ///
	title(Table 1: Descriptive Statistics of Variables) ///
	label ///
		nonote nonumber wide
*****************************************************************************************



//COping variables: CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr
COPS_any COPS_exclaid
sum CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr resilience_econ
i.housedamage i.proptdamage i.healthdamage householdsize hhdage hhdeduc i.married i.hindu i.caste i.hhdprimocc, detail

foreach x in CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr {
	ologit resilience_econ `x' i.housedamage i.proptdamage i.healthdamage householdsize hhdage hhdeduc i.married
i.hindu i.caste i.hhdprimocc, vce(cluster WARD_RESPONDENT)
	*outreg2 using output2.rtf, append
	}


foreach x in CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr COPS_any
COPS_exclaid{
```

```
reg recov_econ `x' housedamage proptdamage healthdamage hhdage i.marital_status i.caste hhdeduc i.hhdprimocc i.religion
}

**********REMITTANCE ONLY**********
global demog householdsize hhdage Female headEduc gender i.married i.hindu i.BrahminChhetri i.occu_agri

//Economic Resilience
ologit resilience_econ remit, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, replace label  ///
        title(Table: Ordered Logit Regression Results for Economic Resilience)addtext(Controls, No)  alpha(0.01, 0.05, 0.1,
0.15) symbol(***, **, *, +)

ologit resilience_econ remit i.housedamage i.proptdamage i.healthdamage, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label   ///
        title(Table: Ordered Logit Regression Results for Economic Resilience for various coping
strategies)addtext(Controls, Yes)  alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +)

ologit resilience_econ remit i.housedamage i.proptdamage i.healthdamage asset, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label   ///
        title(Table: Ordered Logit Regression Results for Economic Resilience for various coping
strategies)addtext(Controls, Yes)  alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +)

ologit resilience_econ remit i.housedamage i.proptdamage i.healthdamage asset partn_microf, vce(cluster
WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label  ///
        title(Table: Ordered Logit Regression Results for Economic Resilience for various coping
strategies)addtext(Controls, Yes)  alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +)

ologit resilience_econ remit i.housedamage i.proptdamage i.healthdamage asset partn_microf $demog, vce(cluster
WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label  ///
        title(Table: Ordered Logit Regression Results for Economic Resilience for various coping
strategies)addtext(Controls, Yes)  alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +)



**IVPROBIT
ivprobit resilience_econ ( i.housedamage i.proptdamage i.healthdamage asset partn_microf $demog, vce(cluster
WARD_RESPONDENT)

//Psycho-social Resilience
ologit resilience_psysoc remit, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, replace label  ///
        title(Table: Ordered Logit Regression Results for Psychosocial Resilience) addtext(Controls, No)  alpha(0.01, 0.05,
0.1, 0.15) symbol(***, **, *, +)
ologit resilience_psysoc remit i.housedamage i.proptdamage i.healthdamage, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label addtext(Controls, No)

ologit resilience_psysoc remit i.housedamage i.proptdamage i.healthdamage asset, vce(cluster WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label addtext(Controls, Yes)

ologit resilience_psysoc remit i.housedamage i.proptdamage i.healthdamage asset $demog, vce(cluster
WARD_RESPONDENT)
outreg2 using ologitresultsremit.rtf, append label addtext(Controls, Yes)

**********REMITTANCE ONLY**********

gen recov_psysoc=recov_emot+recov_violence+recov_mobil+recov_disasreliefp

drop resilience_psysoc
gen resilience_psysoc=0 if recov_psysoc<=4
replace resilience_psysoc=1 if recov_psysoc>4&recov_psysoc<=8
replace resilience_psysoc=2 if recov_psysoc>8&recov_psysoc<=12
replace resilience_psysoc=3 if recov_psysoc>12&recov_psysoc<=16
replace resilience_psysoc=4 if recov_psysoc>16&recov_psysoc<=20
egen clustervar=group(ward)
```

```
//variables CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr COPS_any
COPS_exclaid
foreach x in CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr {
        quietly ologit resilience_psysoc `x' housedamage proptdamage healthdamage hhdage i.marital_status i.caste
hhdeduc i.hhdprimocc i.religion
        outreg2 using output.rtf, append
        }


***Determinants of Coping Strategies: The first one
foreach x in CopS01_dissave CopS2_borrow CopS03_laboradj CopS04_reducCons CopS05_pvttr CopS06_pubtr {
        quietly oprobit resilience_psysoc `x' housedamage proptdamage healthdamage hhdage i.marital_status i.caste
hhdeduc i.occu_agri i.religion
        outreg2 using output.rtf, append
        }
```

```
*************************************************************************************************
****************CHAPTER 4: Determinants of Post-disaster Collective Action******************
******************(REGRESSION RESULTS ONLY, N=510)**********************************
*************************************************************************************************


cd "/Users/veeshanrayamajhee/OneDrive/Dissertation_Ch2/0_Data Analysis"
use 2017_Bahunepati_forreg.dta, clear
*save 2017_Bahunepati_forreg.dta, replace

*************************************************************************************************
**********CONTROL VARIABLES ADJUSTMENT************************************

//Other Social Capital variables

global SocCapital Trust_gen trust_ppl trust_stranger trust_police trust_army trust_govt trust_polit trust_news num_friends
frndhelp yrsincommty ///
        visitfrnd frendvisitu partn_microf partn_agr partn_forest partn_water partn_women partn_cred partn_civic
partn_polit partn_relg ///
        partn_sport partn_health active_comty votey


//heterogeneity variable
gen hetero_caste=38 if WARD_RESPONDENT==1
replace hetero_caste=67 if WARD_RESPONDENT==2
replace hetero_caste=83 if WARD_RESPONDENT==3
replace hetero_caste=89 if WARD_RESPONDENT==4
replace hetero_caste=73 if WARD_RESPONDENT==5

gen Dalit_Janajati=caste==4|caste==6|caste==8
gen Dalit=caste==6


recode postEQactiv (2=1)(3=1)(4=2)(5=3)
recode headEduc (1=0)(2=1)(3=1) //formal schooling

gen reciprocity=frndhelp
recode reciprocity (3=5)(4=5)(1=3)(5=1)
recode reciprocity (5=1)

gen Trust_general=Trust_gen
recode Trust_general (2=0)

recode NextEQ (.=140)

gen Communitysize=1 if
WARD_RESPONDENT==1|WARD_RESPONDENT==7|WARD_RESPONDENT==3|WARD_RESPONDENT==6|WARD
_RESPONDENT==8
replace Communitysize=2 if WARD_RESPONDENT==5|WARD_RESPONDENT==4
replace Communitysize=3 if WARD_RESPONDENT==9|WARD_RESPONDENT==2
recode Communitysize (.=2)

gen family_joint=typefamily==1

//Instrument for Trust
shock_left

*************************************************************************************************
****************PCA for Social Capital*************************************************

global Participation partn_microf partn_agr partn_forest partn_water partn_women partn_cred partn_civic partn_polit
partn_relg partn_sport partn_health
pca $Participation, mineigen(1)
rotate, varimax kaiser blanks(0.4)
predict sc_civicpolitic sc_users sc_financial, score
```

```
//pca for trust variables:  Trust_general Trust_people Trust_str Trust_polic Trust_arm Trust_gov Trust_poli Trust_media

gen Trust_people=trust_ppl
recode Trust_people (1=13)(2=12)(3=11)(4=10)
recode Trust_people (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_str=trust_stranger
recode Trust_str (1=13)(2=12)(3=11)(4=10)
recode Trust_str (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_polic=trust_police
recode Trust_polic (1=13)(2=12)(3=11)(4=10)
recode Trust_polic (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_arm=trust_army
recode Trust_arm (1=13)(2=12)(3=11)(4=10)
recode Trust_arm (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_gov=trust_govt
recode Trust_gov (1=13)(2=12)(3=11)(4=10)
recode Trust_gov (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_poli=trust_polit
recode Trust_poli (1=13)(2=12)(3=11)(4=10)
recode Trust_poli (10=0)(11=1)(12=2)(13=3)(.=1)

gen Trust_media=trust_news
recode Trust_media (1=13)(2=12)(3=11)(4=10)
recode Trust_media (10=0)(11=1)(12=2)(13=3)(.=1)

global Trustvars Trust_general Trust_people Trust_str Trust_polic Trust_arm Trust_gov Trust_poli Trust_media
pca $Trustvars, mineigen(1) blanks(0.4)
rotate, varimax kaiser blanks(0.4)
predict Trust_armforc Trust_public Trust_politi, score

drop postEQColAct
gen postEQColAct=postEQactiv
recode postEQColAct (1=11)(.=11) (2=11)(3=11)(4=12)(5=13)
recode postEQColAct (11=1)(12=2) (13=3)

drop postEQColAct1
gen postEQColAct1=postEQactiv==4|postEQactiv==5

recode postEQColAct (2=10)(3=11)(4=12)(5=13)
recode postEQColAct (10=0)(11=1)(12=2)(13=3)


//Histogram of Collective Action

//by Gender
histogram postEQactiv2 if Female==1, discrete width(0.5) percent fcolor(black) xtitle(Collective Action) title(Female)
graph save CA_female.gph, replace
histogram postEQactiv2 if Female==0, discrete width(0.5) percent fcolor(gray) xtitle(Collective Action) title(Male)
graph save CA_male.gph, replace

//by Dalit
histogram postEQactiv2 if Dalit==1, discrete width(0.5) percent fcolor(black) xtitle(Collective Action) title(Dalit)
graph save CA_dalit.gph, replace
histogram postEQactiv2 if Dalit==0, discrete width(0.5) percent fcolor(gray) xtitle(Collective Action) title(Non-Dalit)
graph save CA_nondalit.gph, replace

//by Janajati
histogram postEQactiv2 if Janajati==1, discrete width(0.5) percent fcolor(black) xtitle(Collective Action) title(Janajati)
graph save CA_Janajati.gph, replace
histogram postEQactiv2 if Janajati==0, discrete width(0.5) percent fcolor(gray) xtitle(Collective Action) title(Non-Janajati)
graph save CA_nonJanajati.gph, replace
```

```
//by Occuptation
histogram postEQactiv2 if occu_agri==1, discrete width(0.5) percent fcolor(black) xtitle(Collective Action) title(Occupation: Agriculture)
graph save CA_agri.gph, replace
histogram postEQactiv2 if occu_agri==0, discrete width(0.5) percent fcolor(gray) xtitle(Collective Action) title(Occupation: Non-agriculture)
graph save CA_nonagri.gph, replace


//combine caste
gr combine CA_dalit.gph CA_nondalit.gph CA_Janajati.gph CA_nonJanajati.gph, iscale(*0.8) cols(2) ycommon /*xtitle(Collective Action)*/ title(Participation in Post-Earthquake Collective Action Efforts) subtitle((1-very inactive..4-very active))

//combine gender and occupation
gr combine CA_male.gph CA_female.gph CA_agri.gph CA_nonagri.gph, iscale(*0.8) cols(2) ycommon /*xtitle(Collective Action)*/ title(Participation in Post-Earthquake Collective Action Efforts) subtitle((1-very inactive..4-very active)) /*note("Source: Nepal Study Center")*/

histogram postEQactiv2 , discrete width(0.5) freq fcolor(black) xtitle(Collective Action) title(Participation in Post-Earthquake Collective Action Efforts) subtitle((1-very inactive..4-very active))



//Dependent variable: Collective Action (postEQactiv; days_volun; volunteer)

**********************************************************************************************
**********************************BEST MODELS*****************************************

ologit postEQactiv Trust_general sc_civicpolitic sc_users sc_financial Communitysize reciprocity active_comty votey housedamage proptdamage healthdamage NextEQ Female hhdage married Dalit hindu headEduc occu_agri, vce(robust)

drop postEQactiv1
gen postEQactiv1=postEQactiv==4|postEQactiv==5
gen trust_ppl1=trust_ppl==1|trust_ppl==2

medeff (regress Trust_people2 sc_civicpolitic sc_users reciprocity) ///
                (regress postEQactiv Trust_people2 sc_civicpolitic sc_users sc_users reciprocity), treat(sc_users) mediate(Trust_people2) sims(200) level(95)

//sc_users 8.8 percent mediation (indirect) effect, significant at 95% confidence interval
medeff (regress Trust_people1 sc_users) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(sc_users) mediate(Trust_people1) sims(1000) level(95) vce(robust)

medsens (regress Trust_people1 sc_users) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(sc_users) mediate(Trust_people1) sims(1000) level(95)

twoway rarea _med_updelta0 _med_lodelta0 _med_rho, bcolor(gs14) || line _med_delta0 _med_rho, lcolor(black) ytitle("ACME") title("ACME({&rho})") xtitle("Sensitivity parameter: {&rho}") legend(off) scheme(sj)
//Interpretation: ACME > 0 as long as the error correlation is less than 0.39 (0.30 with 95% CI)

//reciprocal ties 16.09% percent mediation (indirect) effect, significant at 95% confidence interval
medeff (regress Trust_people1 reciprocity) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(reciprocity) mediate(Trust_people1) sims(1000) level(95) vce(robust)

medsens (regress Trust_people1 reciprocity) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(reciprocity) mediate(Trust_people1) sims(1000) level(95)

twoway rarea _med_updelta0 _med_lodelta0 _med_rho, bcolor(gs14) || line _med_delta0 _med_rho, lcolor(black) ytitle("ACME") title("ACME({&rho})") xtitle("Sensitivity parameter: {&rho}") legend(off) scheme(sj)
```

```
//sc_civicpolitic ties 5.5% percent mediation (indirect) effect, significant at 95% confidence interval
medeff (regress Trust_people1 sc_civicpolitic) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(sc_civicpolitic)
mediate(Trust_people1) sims(1000) level(95) vce(robust)

//Rho at which ACME = 0  is .0881
medsens (regress Trust_people1 sc_civicpolitic) ///
                (regress postEQactiv Trust_people1 sc_civicpolitic sc_users reciprocity), treat(sc_civicpolitic)
mediate(Trust_people1) sims(1000) level(80)

twoway rarea _med_updelta0 _med_lodelta0 _med_rho, bcolor(gs14) || line _med_delta0 _med_rho, lcolor(black)
ytitle("ACME") title("ACME({&rho})") xtitle("Sensitivity parameter: {&rho}") legend(off) scheme(sj)
//ACME > 0 as long as the error correlation is less than 0.09 (0.08 with 95% CI)



medeff (regress Trust_public sc_users) ///
                (logit postEQactiv1 Trust_public sc_civicpolitic sc_users sc_financial Communitysize ///
                reciprocity active_comty votey housedamage proptdamage healthdamage NextEQ Female hhdage
married Dalit hindu headEduc occu_agri), treat(sc_users) mediate(Trust_public) sims(1000) level(90)


medsens (regress Trust_public sc_users) ///
                (logit postEQactiv1 Trust_public sc_civicpolitic sc_users sc_financial Communitysize ///
                reciprocity active_comty votey housedamage proptdamage healthdamage NextEQ Female hhdage
married Dalit hindu headEduc occu_agri), treat(sc_users) mediate(Trust_public) sims(1000) level(90)


twoway rarea _med_updelta0 _med_lodelta0 _med_rho, bcolor(gs14) || line _med_delta0 _med_rho, lcolor(black)
ytitle("ACME") title("ACME({&rho})") xtitle("Sensitivity parameter: {&rho}") legend(off) scheme(sj)

        ********************************************************************************************
*

//Generalized Structural Equation Model (GSEM)


gsem (Communitysize -> postEQactiv2, family(ordinal) link(logit)) (generations -> postEQactiv2, family(ordinal) link(logit))
///
        (healthdamage -> postEQactiv2, family(ordinal) link(logit)) (proptdamage -> postEQactiv2, family(ordinal)
link(logit)) ///
        (NextEQ -> postEQactiv2, family(ordinal) link(logit)) (Female -> sc_users, ) (Female -> sc_civicpolitic, ) ///
        (Female -> postEQactiv2, family(ordinal) link(logit)) (age -> sc_users, ) (age -> sc_civicpolitic, ) ///
        (age -> postEQactiv2, family(ordinal) link(logit)) (married -> sc_users, ) (married -> sc_civicpolitic, ) ///
        (married -> postEQactiv2, family(ordinal) link(logit)) (Dalit -> sc_users, ) (Dalit -> sc_civicpolitic, ) ///
        (Dalit -> postEQactiv2, family(ordinal) link(logit)) (Janajati -> sc_users, ) (Janajati -> sc_civicpolitic, ) ///
        (Janajati -> postEQactiv2, family(ordinal) link(logit)) (hindu -> sc_users, ) (hindu -> sc_civicpolitic, ) ///
        (hindu -> postEQactiv2, family(ordinal) link(logit)) (Trust -> Trust_general, family(bernoulli) link(probit)) ///
        (Trust -> Trust_people1, family(ordinal) link(logit)) (Trust -> postEQactiv2, family(ordinal) link(logit)) ///
        (Trust@1 -> reciprocity, family(ordinal) link(logit)) (sc_users -> Trust, ) (sc_users -> postEQactiv2, family(ordinal)
link(logit)) ///
        (sc_civicpolitic -> Trust, ) (sc_civicpolitic -> postEQactiv2, family(ordinal) link(logit)) (Education -> sc_users, ) ///
        (Education -> sc_civicpolitic, ) (Education -> postEQactiv2, family(ordinal) link(logit)) (occu_agri -> sc_users, ) ///
        (occu_agri -> sc_civicpolitic, ) (occu_agri -> postEQactiv2, family(ordinal) link(logit)) (shock_left -> Trust, ) ///
        (family_joint -> sc_users, ) (family_joint -> sc_civicpolitic, ) (family_joint -> postEQactiv2, family(ordinal)
link(logit)), ///
        vce(robust) latent(Trust ) cov( e.sc_users*e.sc_civicpolitic) nocapslatent

outreg2 using sem07.xls, replace title(Table 1: General Structural Equation Model Results)

//after sem
estat teffects, compact
```

```
*********************************************************************************************
**********************************EXTRA*****************************************
ologit postEQactiv /*sc1*/ sc2 sc3 sc4 sc5 i.housedamage i.proptdamage i.healthdamage asset householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri, robust
ologit volunteer sc1 sc2 sc3 sc4 sc5 i.housedamage i.proptdamage i.healthdamage asset householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri, robust
ologit days_volun sc1 sc2 sc3 sc4 sc5 i.housedamage i.proptdamage i.healthdamage asset householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri, robust

ologit postEQactiv sc1 sc2 sc3 sc4 sc5 i.housedamage i.proptdamage i.healthdamage asset householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri, robust


ologit postEQactiv Trust_gen trust_ppl trust_stranger trust_police trust_army trust_govt trust_polit trust_news

ologit postEQactiv visitfrnd frendvisitu partn_microf partn_agr partn_forest
Trust_gen trust_ppl trust_stranger trust_police trust_army trust_govt trust_polit trust_news num_friends frndhelp
yrsincommty
 ///
        visitfrnd frendvisitu partn_microf partn_agr partn_forest partn_water partn_women partn_cred partn_civic
partn_polit partn_relg ///
        partn_sport partn_health active_comty votey
*********************************************************************************************



*********************************************************************************************
//Alternative Models

cmp (postEQactiv2=Trust_people1 sc_users sc_civicpolitic reciprocity Communitysize generations healthdamage
proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri, iia) ///
        (Trust_people1=sc_users sc_civicpolitic reciprocity Communitysize generations, iia) ///
        (sc_users=Female age married Dalit Janajati hindu Education occu_agri, iia) ///
        (sc_civicpolitic=Female age married Dalit Janajati hindu Education occu_agri, iia), ind($cmp_oprobit
$cmp_oprobit $cmp_cont $cmp_cont) vce(robust)

        ///
        *(sc_users=Female age married Dalit Janajati hindu Education occu_agri) ///
        *(sc_civicpolitic=Female age married Dalit Janajati hindu Education occu_agri), ///
        ind($cmp_oprobit $cmp_oprobit) vce(robust)

        outreg2 using cmpresults.xls, replace ///
        title(Table A2: Simultaneous Equation Model Results) addtext(Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +) eform ///
        addnote("Controls included in the model are: age of household head, education level of household head, Marital
Status, Religion, Occupation of household head, household assets")

//Instrumental variable approach. Problems: Weak instruments, fails overidentification test and ignored binary/ordinal
outcomes.


*(1) oprobit ignores endogeneity
oprobit postEQactiv2 Trust_people1 Communitysize generations healthdamage proptdamage NextEQ Female age married
Dalit Janajati hindu Education occu_agri, vce(robust)
outreg2 using twosls.xls, cttop(oprobit) replace

oprobit postEQactiv2 Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ
Female age married Dalit Janajati hindu Education occu_agri, vce(robust)
outreg2 using twosls.xls, cttop(oprobit1) append

oprobit postEQactiv2 Trust_people1 sc_users sc_civicpolitic reciprocity Communitysize generations healthdamage
proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri, vce(robust)
outreg2 using twosls.xls, cttop(oprobit2) append
```

```
*(2) IV-LPM (not appropriate)

ivregress2 2sls postEQactiv2 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit
Janajati hindu Education occu_agri (Trust_people1= sc_users sc_civicpolitic reciprocity), vce(robust) first
est restore first
outreg2 using twosls.xls, cttop(tslsfirst) append

ivregress 2sls postEQactiv2 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit
Janajati hindu Education occu_agri (Trust_people1= sc_users sc_civicpolitic reciprocity), small vce(robust) first
outreg2 using twosls.xls, cttop(tslssecond)append


*(3) IV-GMM (not appropriate)
ivregress2 gmm postEQactiv2 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit
Janajati hindu Education occu_agri (Trust_people1= sc_users sc_civicpolitic reciprocity), small vce(robust) first
est restore first
outreg2 using twosls.xls, cttop(ivgmmfirst) append

ivregress gmm postEQactiv2 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit
Janajati hindu Education occu_agri (Trust_people1= sc_users sc_civicpolitic reciprocity), small vce(robust) first
outreg2 using twosls.xls, cttop(ivgmmsecond)append


*CREATE TABLES FOR ivprobit and control function method
*(4) ivprobit (for continuous endogeneous variables, not appropriate)
//two-step
ivprobit postEQactiv1 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit Janajati
hindu Education occu_agri (Trust_people1 = sc_users sc_civicpolitic reciprocity), twostep first
ivprobit postEQactiv1 Communitysize generations healthdamage proptdamage NextEQ Female age married Dalit Janajati
hindu Education occu_agri (Trust_people1 = sc_users sc_civicpolitic reciprocity), vce(robust) first
outreg2 using ivprobnCF.xls, cttop(ivprobit) replace


//CONTROL FUNCTION METHOD: Note that the trust variable is turned into binary (0 and 1)
*STEP 1: Run first stage regression (and store results)
probit Trust_people2 sc_users sc_civicpolitic reciprocity, vce(robust)
*outreg2 using ivprobnCF.xls, cttop(First-CF) append
estimates store firststage_trust
*STEP 2: Calculate generalized residuals
predict trustprob
predict trustxb, xb
gen pdfoprobit=normalden(trustxb)
gen cdfoprobit=normal(trustxb)
gen IMR1=pdfoprobit/cdfoprobit
*gen generalisedresid=Trust_people2*IMR1-(1-Trust_people2)*(pdfoprobit/(1-cdfoprobit))
gen generalisedresid=cond(Trust_people2==1,pdfoprobit/cdfoprobit, -pdfoprobit/(1-cdfoprobit))
*STEP 3: Run second stage regression with generlized residuals as a predictor
oprobit postEQactiv2 Trust_people2 generalisedresid Communitysize generations healthdamage proptdamage NextEQ Female
age married Dalit Janajati hindu Education occu_agri, vce(robust)
outreg2 using ivprobnCF.xls, cttop(Second-CF) append
*oprobit postEQactiv2 Trust_people2 Communitysize generations healthdamage proptdamage NextEQ Female age married
Dalit Janajati hindu Education occu_agri, vce(robust)
//NOT WORKING CURRENTLY
*(5) Special regression
sspecialreg D3 postEQactiv2, endog(Trust_people1) iv(sc_users sc_civicpolitic reciprocity) [ exog(Communitysize
generations healthdamage proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri) /*hetero
hetv(varlist) kdens trim(real) winsor bs bsreps(integer)*/ ]

sspecialreg postEQactiv2 Trust_people1, endog(Trust_people) iv(sc_users sc_civicpolitic reciprocity) exog(Communitysize
generations healthdamage)

//Works but I dont know what 'special regressor' means
sspecialreg postEQactiv2 NextEQ, endog(Trust_people1) iv(sc_users sc_civicpolitic reciprocity) exog(Communitysize
generations healthdamage proptdamage) hetero
```

```
ivreg2h postEQactiv2 Communitysize generations healthdamage (Trust_people1 = sc_users sc_civicpolitic reciprocity), small robust


*Marginal effects after gsem

margins, dydx(Trust_people1 sc_users sc_civicpolitic reciprocity) force // this works..Takes hours but converges

//NOW try this:
//Run GSEM model
margins, dydx(Trust_people1 sc_users sc_civicpolitic reciprocity) force post
outreg2 using marginaleff2.xls, replace


margins, dydx(Trust_people1) predict(mu fixedonly) force // works but makes no sense
margins, dydx(Trust_people1) atmeans predict (mu fixedonly)
///force //works but makes no sense
mfx, predict(outcome(1))
mfx, predict(outcome(2))
mfx, predict(outcome(3))
mfx, predict(outcome(4))

*MEDIATION ANALYSIS after GSEM:
gsem, coeflegend

*sc_users
//Indirect effect:
nlcom  _b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users]
//Total effect:
nlcom   _b[postEQactiv2:sc_users]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users]
*Percent mediated: 16.186
nlcom
(_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users])*100/(_b[postEQactiv2:sc_users]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users])
//significant at 90%
nlcom
(_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users])*100/(_b[postEQactiv2:sc_users]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_users]), level(91)


*sc_civicpolitic
//Indirect effect:
nlcom  _b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_civicpolitic]
//Total effect:
nlcom   _b[postEQactiv2:sc_civicpolitic]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_civicpolitic]
*Percent mediated: 6.41%
nlcom
(_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_civicpolitic])*100/(_b[postEQactiv2:sc_civicpolitic]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:sc_civicpolitic])
//Note; comma level() sets confidence interval

*reciprocal ties
//Indirect effect:
nlcom  _b[postEQactiv2:Trust_people1]*_b[Trust_people1:reciprocity]
//total effect:
nlcom  _b[postEQactiv2:reciprocity]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:reciprocity]
*Percent mediated: 42%
nlcom
(_b[postEQactiv2:Trust_people1]*_b[Trust_people1:reciprocity])*100/(_b[postEQactiv2:reciprocity]+_b[postEQactiv2:Trust_people1]*_b[Trust_people1:reciprocity])

**********Marginsplot**********

marginsplot, horizontal xline(0)  yscale(reverse) recast(scatter)
```

```
//COMPARE MODELS (PANEL A): Limited Information IV versus SEM (with contemporaneous correlation across equations) give same results

ivregress2 2sls postEQactiv2 (Trust_people1= sc_users) Communitysize generations healthdamage  proptdamage NextEQ Female age married ///
                                        Dalit Janajati hindu Education occu_agri, vce(robust) first

est restore first
outreg2 using modelcompare.xls, cttop(first2sls) replace

ivregress 2sls postEQactiv2 (Trust_people1= sc_users) Communitysize generations healthdamage  proptdamage NextEQ Female age married ///
                                        Dalit Janajati hindu Education occu_agri, vce(robust) first
outreg2 using modelcompare.xls, cttop(second2sls) append

//2sls using reg3
reg3 (Trust_people1 = sc_users Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri) ///
        (postEQactiv2 = Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri), 2sls
outreg2 using modelcompare.xls, cttop(Twoslsreg3) append

sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (Communitysize -> Trust_people1, ) (Communitysize -> postEQactiv2, ) ///
        (generations -> Trust_people1, ) (generations -> postEQactiv2, ) (Female -> Trust_people1, ) (Female -> postEQactiv2, ) (age -> Trust_people1, ) ///
        (age -> postEQactiv2, ) (Education -> Trust_people1, ) (Education -> postEQactiv2, ) (occu_agri -> Trust_people1, ) (occu_agri -> postEQactiv2, ) ///
        (Janajati -> Trust_people1, ) (Janajati -> postEQactiv2, ) (married -> Trust_people1, ) (married -> postEQactiv2, ) (hindu -> Trust_people1, ) ///
        (hindu -> postEQactiv2, ) (healthdamage -> Trust_people1, ) (healthdamage -> postEQactiv2, ) (proptdamage -> Trust_people1, ) (proptdamage -> postEQactiv2, ) ///
        (NextEQ -> Trust_people1, ) (NextEQ -> postEQactiv2, ) (Dalit -> Trust_people1, ) (Dalit -> postEQactiv2, ), vce(robust)  cov( e.Trust_people1*e.postEQactiv2) nocapslatent

outreg2 using modelcompare.xls, cttop(SEM) append

//3sls
reg3 (Trust_people1 = sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri) ///
        (sc_users=)
        (postEQactiv2 = Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri), 3sls
outreg2 using modelcompare.xls, cttop(Threesls) append


*********************************************************************************************
************COMPARE MODELS (TABLE 7): Full Information IV (3sls) versus SEM (FullInf) ********
******(with contemporaneous correlation across equations) should give same results************
*********************************************************************************************
reg3  (postEQactiv2 = Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri) ///
        (Trust_people1 = sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit Janajati hindu Education occu_agri) ///
        (sc_civicpolitic=partn_civic partn_polit partn_relg partn_sport) ///
        (sc_users=partn_agr partn_forest partn_water), ireg3 //ireg3 uses iterative gls

outreg2 using modelcompare4Full.xls, cttop(Threesls) replace

//Run SEM_ModelComparison4eq with non(robust) errors instead of the code below

sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (sc_civicpolitic -> Trust_people1, ) (partn_civic -> sc_civicpolitic, ) ///
        (Communitysize -> Trust_people1, ) (Communitysize -> postEQactiv2, ) (generations -> Trust_people1, ) (generations -> postEQactiv2, ) ///
```

```
	(Female -> Trust_people1, ) (Female -> postEQactiv2, ) (age -> Trust_people1, ) (age -> postEQactiv2, )
(Education -> Trust_people1, ) ///
	(Education -> postEQactiv2, ) (occu_agri -> Trust_people1, ) (occu_agri -> postEQactiv2, ) (Janajati ->
Trust_people1, ) (Janajati -> postEQactiv2, ) ///
	(married -> Trust_people1, ) (married -> postEQactiv2, ) (hindu -> Trust_people1, ) (hindu -> postEQactiv2, )
(healthdamage -> Trust_people1, ) ///
	(healthdamage -> postEQactiv2, ) (proptdamage -> Trust_people1, ) (proptdamage -> postEQactiv2, ) (NextEQ ->
Trust_people1, ) (NextEQ -> postEQactiv2, ) ///
	(Dalit -> Trust_people1, ) (Dalit -> postEQactiv2, ) (partn_polit -> sc_civicpolitic, ) (partn_relg -> sc_civicpolitic, )
///
	(partn_sport  -> sc_civicpolitic, ) (partn_agr -> sc_users, ) (partn_forest -> sc_users, ) (partn_water -> sc_users, ), ///
	cov( e.Trust_people1*e.sc_users e.Trust_people1*e.sc_civicpolitic e.Trust_people1*e.postEQactiv2
e.sc_users*e.sc_civicpolitic ///
	e.sc_users*e.postEQactiv2 e.sc_civicpolitic*e.postEQactiv2) nocapslatent //maximum likelihood

outreg2 using modelcompare4Full.xls, cttop(SEM) append

*********************************************************************************************
**********************************FOR REFERENCE ONLY*****************************************

//SEM Comparison (Full information vs limited information)

sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (sc_civicpolitic -> Trust_people1, ) (partn_civic ->
sc_civicpolitic, ) ///
	(Communitysize -> Trust_people1, ) (Communitysize -> postEQactiv2, ) (generations -> Trust_people1, )
(generations -> postEQactiv2, ) ///
	(Female -> Trust_people1, ) (Female -> postEQactiv2, ) (age -> Trust_people1, ) (age -> postEQactiv2, )
(Education -> Trust_people1, ) ///
	(Education -> postEQactiv2, ) (occu_agri -> Trust_people1, ) (occu_agri -> postEQactiv2, ) (Janajati ->
Trust_people1, ) (Janajati -> postEQactiv2, ) ///
	(married -> Trust_people1, ) (married -> postEQactiv2, ) (hindu -> Trust_people1, ) (hindu -> postEQactiv2, )
(healthdamage -> Trust_people1, ) ///
	(healthdamage -> postEQactiv2, ) (proptdamage -> Trust_people1, ) (proptdamage -> postEQactiv2, ) (NextEQ ->
Trust_people1, ) (NextEQ -> postEQactiv2, ) ///
	(Dalit -> Trust_people1, ) (Dalit -> postEQactiv2, ) (partn_polit -> sc_civicpolitic, ) (partn_relg -> sc_civicpolitic, )
///
	(partn_sport  -> sc_civicpolitic, ) (partn_agr -> sc_users, ) (partn_forest -> sc_users, ) (partn_water -> sc_users, ), ///
	cov( e.Trust_people1*e.sc_users e.Trust_people1*e.sc_civicpolitic e.Trust_people1*e.postEQactiv2
e.sc_users*e.sc_civicpolitic ///
	e.sc_users*e.postEQactiv2 e.sc_civicpolitic*e.postEQactiv2) nocapslatent

outreg2 using modelcompareSEM.xls, cttop(SEMfull) replace


sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (sc_civicpolitic -> Trust_people1, ) (partn_civic ->
sc_civicpolitic, ) ///
	(Communitysize -> Trust_people1, ) (Communitysize -> postEQactiv2, ) (generations -> Trust_people1, )
(generations -> postEQactiv2, ) ///
	(Female -> Trust_people1, ) (Female -> postEQactiv2, ) (age -> Trust_people1, ) (age -> postEQactiv2, )
(Education -> Trust_people1, ) ///
	(Education -> postEQactiv2, ) (occu_agri -> Trust_people1, ) (occu_agri -> postEQactiv2, ) (Janajati ->
Trust_people1, ) (Janajati -> postEQactiv2, ) ///
	(married -> Trust_people1, ) (married -> postEQactiv2, ) (hindu -> Trust_people1, ) (hindu -> postEQactiv2, )
(healthdamage -> Trust_people1, ) ///
	(healthdamage -> postEQactiv2, ) (proptdamage -> Trust_people1, ) (proptdamage -> postEQactiv2, ) (NextEQ ->
Trust_people1, ) (NextEQ -> postEQactiv2, ) ///
	(Dalit -> Trust_people1, ) (Dalit -> postEQactiv2, ) (partn_polit -> sc_civicpolitic, ) (partn_relg -> sc_civicpolitic, )
///
	(partn_sport  -> sc_civicpolitic, ) (partn_agr -> sc_users, ) (partn_forest -> sc_users, ) (partn_water -> sc_users, ), ///
	cov( e.Trust_people1*e.sc_users@0 e.Trust_people1*e.sc_civicpolitic@0 e.Trust_people1*e.postEQactiv2@0
e.sc_users*e.sc_civicpolitic@0 ///
	e.sc_users*e.postEQactiv2@0 e.sc_civicpolitic*e.postEQactiv2@0) nocapslatent

outreg2 using modelcompareSEM.xls, cttop(SEMlimited) append

*********************************************************************************************
```

```
*********************************************************************************************

//COMPARE MODELS (PANEL B1): Limited Information IV (2sls) versus SEM should give same results
reg3  (postEQactiv2 = Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age married
Dalit Janajati hindu Education occu_agri) ///
        (Trust_people1 = sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ Female
age married Dalit Janajati hindu Education occu_agri), ireg3
outreg2 using modelcompare2EQ.xls, cttop(Twosls) replace

sem (Trust_people1 <- sc_users Communitysize generations healthdamage  proptdamage NextEQ Female age married Dalit
Janajati hindu Education occu_agri,) ///
        (postEQactiv2 <- Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age
married Dalit Janajati hindu Education occu_agri,) ///

outreg2 using modelcompare2EQ.xls, cttop(SEM) append


*********************************************************************************************
************COMPARE MODELS (TABLE 5): LIMITED Information IV (2sls) versus SEM (FullInf) ********
******(NO contemporaneous correlation across equations) should give same results************
*********************************************************************************************

ivregress liml postEQactiv2 (Trust_people1 = sc_users sc_civicpolitic) ///
                (sc_civicpolitic=partn_civic partn_polit partn_relg partn_sport) ///
                (sc_users=partn_agr partn_forest partn_water) Communitysize generations healthdamage  proptdamage
NextEQ Female age married ///
                                        Dalit Janajati hindu Education occu_agri, first

reg3  (postEQactiv2 = Trust_people1 Communitysize generations healthdamage  proptdamage NextEQ Female age married
Dalit Janajati hindu Education occu_agri) ///
        (Trust_people1 = sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ Female
age married Dalit Janajati hindu Education occu_agri), 2sls ireg3


reg postEQactiv2 Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ
Female age married Dalit Janajati hindu Education occu_agri
reg Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage  proptdamage NextEQ Female age
married Dalit Janajati hindu Education occu_agri

*********RUN
//2sls
ivregress2 2sls postEQactiv2 (Trust_people1 = sc_users sc_civicpolitic) Communitysize generations healthdamage
proptdamage NextEQ Female age married ///
                                        Dalit Janajati hindu Education occu_agri, first
est restore first
outreg2 using modelcompare2Limited.xls, cttop(TWOsls-first) replace

ivregress 2sls postEQactiv2 (Trust_people1 = sc_users sc_civicpolitic) Communitysize generations healthdamage
proptdamage NextEQ Female age married ///
                                        Dalit Janajati hindu Education occu_agri, first
outreg2 using modelcompare2Limited.xls, cttop(TWOsls-second) append

//Run SEM_ModelComparison2eq with non(robust) errors instead of the code below
//SEM (limited) default cov()=0
sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (sc_civicpolitic -> Trust_people1, ) (Communitysize ->
Trust_people1, ) ///
        (Communitysize -> postEQactiv2, ) (generations -> Trust_people1, ) (generations -> postEQactiv2, ) (Female ->
Trust_people1, ) (Female -> postEQactiv2, ) ///
        (age -> Trust_people1, ) (age -> postEQactiv2, ) (Education -> Trust_people1, ) (Education -> postEQactiv2, )
(occu_agri -> Trust_people1, ) ///
        (occu_agri -> postEQactiv2, ) (Janajati -> Trust_people1, ) (Janajati -> postEQactiv2, ) (married -> Trust_people1,
) (married -> postEQactiv2, ) ///
        (hindu -> Trust_people1, ) (hindu -> postEQactiv2, ) (healthdamage -> Trust_people1, ) (healthdamage ->
postEQactiv2, ) (proptdamage -> Trust_people1, ) ///
        (proptdamage -> postEQactiv2, ) (NextEQ -> Trust_people1, ) (NextEQ -> postEQactiv2, ) (Dalit ->
Trust_people1, ) (Dalit -> postEQactiv2, ), nocapslatent
```

```
outreg2 using modelcompare2Limited.xls, cttop(SEMcov0) append

//SEM (full) default cov()!=0
sem (Trust_people1 -> postEQactiv2, ) (sc_users -> Trust_people1, ) (sc_civicpolitic -> Trust_people1, ) (Communitysize -> Trust_people1, ) ///
        (Communitysize -> postEQactiv2, ) (generations -> Trust_people1, ) (generations -> postEQactiv2, ) (Female -> Trust_people1, ) (Female -> postEQactiv2, ) ///
        (age -> Trust_people1, ) (age -> postEQactiv2, ) (Education -> Trust_people1, ) (Education -> postEQactiv2, ) (occu_agri -> Trust_people1, ) ///
        (occu_agri -> postEQactiv2, ) (Janajati -> Trust_people1, ) (Janajati -> postEQactiv2, ) (married -> Trust_people1, ) (married -> postEQactiv2, ) ///
        (hindu -> Trust_people1, ) (hindu -> postEQactiv2, ) (healthdamage -> Trust_people1, ) (healthdamage -> postEQactiv2, ) (proptdamage -> Trust_people1, ) ///
        (proptdamage -> postEQactiv2, ) (NextEQ -> Trust_people1, ) (NextEQ -> postEQactiv2, ) (Dalit -> Trust_people1, ) (Dalit -> postEQactiv2, ), ///
        cov(e.Trust_people1*e.postEQactiv2) nocapslatent

outreg2 using modelcompare2Limited.xls, cttop(SEMcovNOT0) append


****NEW TABLE 2 MODEL Comparison: ols, 2sls, 3sls, SEM
//Trust variables: Trust_people1 Trust_general reciprocity

//COLUMN 1: Ordinary Least Squares

reg postEQactiv2 Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Educ occu_agri
outreg2 using ModelCompare.xls, cttop(OLS) replace

//COLUMN 2: Two-stage least squares
*To outreg first-stage results, I just run ols
reg Trust_people1 shock_left sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri
outreg2 using ModelCompare.xls, cttop(first-stage) append

ivregress 2sls postEQactiv2 (Trust_people1 = shock_left) sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri, first
outreg2 using ModelCompare.xls, cttop(Second-stage Results) append


//COLUMN 3: Three-stage Least Sqaures


reg3 (postEQactiv2 = Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri) ///
        (Trust_people1 = shock_left sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri), ireg3 //ireg3 uses iterative gls

outreg2 using ModelCompare.xls, cttop(Three-stage Results) append

//COLUMN 4: SEM with full information

sem (postEQactiv2<-Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri) ///
        (Trust_people1<-shock_left sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Education occu_agri), cov(e.Trust_people1*e.postEQactiv2) nocapslatent

outreg2 using ModelCompare.xls, cttop(SEM) append



reg postEQactiv2 Trust_people1 sc_users sc_civicpolitic Communitysize generations healthdamage proptdamage NextEQ Female age married family_joint Educ occu_agri
outreg2 using OLS.xls, cttop(OLS) replace
```

```
*Alternate to using ivregress 2sls
ivreg2 postEQactiv2 (Trust_people1 = shock_left) sc_users sc_civicpolitic Communitysize generations healthdamage
proptdamage NextEQ Female age married family_joint Education occu_agri, robust savefirst
```

```
*********************************************************************************************
**********************CHAPTER 5: DHURMUS-SUNTALI PAPER ONLY*******************************
*******************************(REGRESSION RESULTS ONLY)*************************************
*********************************************************************************************

cd "/Users/veeshan/OneDrive/CHAPTER 3 - Social Entrepreneur/Data Work/"

use 2017_Bahunepati_forreg.dta, clear
*save 2017_Bahunepati_forreg.dta, replace



*********************************************************************************************
********Table 1: Volunteering  (N=510)************
*********************************************************************************************

*Independent Variables: dist10, dist30, dist60, distsquare
gen dist0=DhurmusDist<5
gen dist10=DhurmusDist<=10
gen dist30=DhurmusDist<=30
gen dist60=DhurmusDist<60
gen dist90=DhurmusDist<=90
gen dist120=DhurmusDist<=120


gen distsquare=DhurmusDist*DhurmusDist

*Controls
global controls i.housedamage i.proptdamage i.healthdamage asset partn_microf dist_market householdsize hhdage Female
headEduc i.married i.hindu i.BrahminChhetri i.occu_agri

logit volunteer dist0, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, replace keep(dist0) ///
        title(Table: Logit Regression Results for Volunteering) addstat(Log-likelihood, e(ll)) addtext(EQ Damage
Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head,
household assets. EQ damage variables incude health damage (injury/death), home damage, property damage)")

logit volunteer dist0 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist0) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls,
Yes)


logit volunteer dist10, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist10) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls,
No)

logit volunteer dist10 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist10) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls,
Yes)


logit volunteer dist30, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist30) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls,
No)

logit volunteer dist30 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist30) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls,
Yes)

logit volunteer dist60, cluster(WARD_RESPONDENT)
outreg2 using CH3T1.xls, append keep(dist60) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls,
No)

logit volunteer dist60 $controls, cluster(WARD_RESPONDENT)
```

```
outreg2 using CH3T1.xls, append keep(dist60) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes)



*hetprob volunteer dist0 $controls, het(i.housedamage householdsize) vce(robust)

*Appendix Table
logit volunteer dist90, cluster(WARD_RESPONDENT)
outreg2 using CH3TA1.xls, replace keep(dist90) ///
        title(Table: Logit Regression Results for Volunteering) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables incude health damage (injury/death), home damage, property damage)")

logit volunteer dist90 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3TA1.xls, append keep(dist90) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes)


logit volunteer dist120, cluster(WARD_RESPONDENT)
outreg2 using CH3TA1.xls, append keep(dist120) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No)

logit volunteer dist120 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3TA1.xls, append keep(dist120) addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes)



******************************Table 2: Marginal Effects (N=510)*******************************
*************************************************************************************************

logit volunteer dist0, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, replace keep(dist0) ///
        title(Table: Average Marginal Effects for Volunteering) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Marginal effects) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head, household assets. EQ damage variables include health damage (injury/death), home damage, property damage.")

logit volunteer dist0 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist0) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Marginal effects)


logit volunteer dist10, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist10) ///
        addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Marginal effects)

logit volunteer dist10 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist10) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Marginal effects)


logit volunteer dist30, cluster(WARD_RESPONDENT)
margins, dydx(*) post
```

```
outreg2 using CH3T2ME.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)

logit volunteer dist30 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)

logit volunteer dist60, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)

logit volunteer dist60 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3T2ME.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)

*Appendix Table

logit volunteer dist90, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3TA2.xls, replace keep(dist90) ///
            title(Table: Average Marginal Effects for Volunteering) addtext(EQ Damage Variables, No, Controls, No)
alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects) ///
            addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, Marital Status, Religion, Occupation of household head,
household assets. EQ damage variables include health damage (injury/death), home damage, property damage.")

logit volunteer dist90 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3TA2.xls, append keep(dist90) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)


logit volunteer dist120, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3TA2.xls, append keep(dist120) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)

logit volunteer dist120 $controls, cluster(WARD_RESPONDENT)
margins, dydx(*) post
outreg2 using CH3TA2.xls, append keep(dist120) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(Marginal effects)




********Table 3: Community Engagement (local politics, community events  (N=510)****************
*************************************************************************************************


recode active_comty (2=1) (3=1)
recode active_comty (4=2)
recode active_comty (5=3)


ologit active_comty dist0, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, replace keep(dist0) ///
```

```
        title(Table: Ordered Logit Regression Results for Community Engagement) addstat(Log-likelihood, e(ll))
addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Comm Engag) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, marital status, religion, occupation of household head,
household assets. EQ damage variables include health damage (injury/death), home damage, property damage")

ologit active_comty dist0 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist0) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)


ologit active_comty dist10, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist10) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)

ologit active_comty dist10 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist10) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)

ologit active_comty dist30, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist30) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)

ologit active_comty dist30 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist30) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)


ologit active_comty dist60, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist60) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)


ologit active_comty dist60 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3T3.xls, append keep(dist60) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)



*Appendix Table


ologit active_comty dist90, cluster(WARD_RESPONDENT)
outreg2 using CH3TA3.xls, replace keep(dist90) ///
        title(Table: Ordered Logit Regression Results for Community Engagement) addstat(Log-likelihood, e(ll))
addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(Comm Engag) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, marital status, religion, occupation of household head,
household assets. EQ damage variables include health damage (injury/death), home damage, property damage")

ologit active_comty dist90 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3TA3.xls, append keep(dist90) ctitle(Comm Engag) ///
        addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)


ologit active_comty dist120, cluster(WARD_RESPONDENT)
```

```
outreg2 using CH3TA3.xls, append keep(dist120) ctitle(Comm Engag) ///
	addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)

ologit active_comty dist120 $controls, cluster(WARD_RESPONDENT)
outreg2 using CH3TA3.xls, append keep(dist120) ctitle(Comm Engag) ///
	addstat(Log-likelihood, e(ll)) addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15)
symbol(***, **, *, +)



**********Table 4: Marginal Effects (N=510)**********
****************************************************************************************************

*Distance 0 minutes
ologit active_comty dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, replace keep(dist0) ///
	title(Table: Average Marginal Effects for Community Engagement) addtext(EQ Damage Variables, No, Controls,
No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-1) ///
	addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, marital status, religion, occupation of household head,
household assets. EQ damage variables include health damage (injury/death), home damage, property damage.")

ologit active_comty dist0 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist0) ///
	addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-1)


ologit active_comty dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist0) ///
	addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-2)

ologit active_comty dist0 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist0) ///
	addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-2)


ologit active_comty dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist0) ///
	addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-3)

ologit active_comty dist0 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist0) ///
	addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D0ME-3)


*Distance Under 10 minutes
ologit active_comty dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
	addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
	ctitle(D10ME-1)

ologit active_comty dist10 $controls, cluster(WARD_RESPONDENT)
```

```
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D10ME-1)


ologit active_comty dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D10ME-2)

ologit active_comty dist10 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D10ME-2)


ologit active_comty dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D10ME-3)

ologit active_comty dist10 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist10) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D10ME-3)


*Distance Under 30 minutes
ologit active_comty dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-1)

ologit active_comty dist30 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-1)


ologit active_comty dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-2)

ologit active_comty dist30 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-2)


ologit active_comty dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-3)

ologit active_comty dist30 $controls, cluster(WARD_RESPONDENT)
```

```
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist30) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D30ME-3)



*Distance Under 60 minutes
ologit active_comty dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-1)

ologit active_comty dist60 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-1)


ologit active_comty dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-2)

ologit active_comty dist60 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-2)


ologit active_comty dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-3)

ologit active_comty dist60 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist60) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D60ME-3)

*Distance Under 90 minutes
ologit active_comty dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D90ME-1)

ologit active_comty dist90 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
            addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D90ME-1)


ologit active_comty dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
            addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
            ctitle(D90ME-2)
```

```
ologit active_comty dist90 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D90ME-2)


ologit active_comty dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
        addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D90ME-3)

ologit active_comty dist90 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist90) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D90ME-3)

*Distance Under 120 minutes
ologit active_comty dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-1)

ologit active_comty dist120 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-1)


ologit active_comty dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-2)

ologit active_comty dist120 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-2)


ologit active_comty dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, No, Controls, No) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-3)

ologit active_comty dist120 $controls, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T4ME0.xls, append keep(dist120) ///
        addtext(EQ Damage Variables, Yes, Controls, Yes) alpha(0.01, 0.05, 0.1, 0.15) symbol(***, **, *, +) ///
        ctitle(D120ME-3)


**********Table 5: Participation in Post-disaster Relief Activities (N=510)**********
*************************************************************************************

gen postdisrecons=1 if recov_disasreliefp==1|recov_disasreliefp==2|recov_disasreliefp==3
replace postdisrecons=2 if recov_disasreliefp==4
replace postdisrecons=3 if recov_disasreliefp==5
```

```
*Controls
global controls1 i.housedamage i.proptdamage asset partn_microf dist_market householdsize hhdage Female headEduc
i.married i.hindu i.BrahminChhetri i.occu_agri


ologit postdisrecons dist0, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, replace keep(dist0) ///
        title(Table: Ordered Logit Regression Results for Post-disaster reconstruction efforts-PDRE) addstat(Log-
likelihood, e(ll)) addtext(Controls, No) alpha(0.01, 0.05, 0.1) symbol(***, **, *) ///
        ctitle(PDRE) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, marital status, religion, occupation of household head,
household assets, and EQ damage variables.")


ologit postdisrecons dist0 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist0) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)

ologit postdisrecons dist10, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist10) addstat(Log-likelihood, e(ll)) addtext(Controls, No) ctitle(PDRE)
ologit postdisrecons dist10 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist10) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)

ologit postdisrecons dist30, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist30) addstat(Log-likelihood, e(ll)) addtext(Controls, No) ctitle(PDRE)
ologit postdisrecons dist30 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist30) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)

ologit postdisrecons dist60, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist60) addstat(Log-likelihood, e(ll)) addtext(Controls, No) ctitle(PDRE)
ologit postdisrecons dist60 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist60) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)

ologit postdisrecons dist90, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist90) addstat(Log-likelihood, e(ll)) addtext(Controls, No) ctitle(PDRE)
ologit postdisrecons dist90 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist90) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)

ologit postdisrecons dist120, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist120) addstat(Log-likelihood, e(ll)) addtext(Controls, No) ctitle(PDRE)
ologit postdisrecons dist120 $controls1, cluster(WARD_RESPONDENT)
outreg2 using CH3T5.xls, append label keep(dist120) addstat(Log-likelihood, e(ll)) addtext(Controls, Yes) ctitle(PDRE)


**********Table 4: Marginal Effects for PDRE (N=510)**********
*******************************************************************************************

*Distance 0 minutes

ologit postdisrecons dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, replace keep(dist0) ///
        title(Table: Average Marginal Effects for Participation in Post-disaster Reconstruction Efforts) addtext(Controls,
No) alpha(0.01, 0.05, 0.1) symbol(***, **, *) ///
        ctitle(D0ME-1) ///
        addnote("Controls included in the model are: participation in microfinance groups, distance to nearest market
center, age of household head, education level of household head, marital status, religion, occupation of household head,
household assets, and EQ damage variables.")

ologit postdisrecons dist0 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist0) ///
        addtext(Controls, Yes) ///
        ctitle(D0ME-1)
```

```
ologit postdisrecons dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist0) ///
            addtext(Controls, No) ///
            ctitle(D0ME-2)

ologit postdisrecons dist0 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist0) ///
            addtext(Controls, Yes) ///
            ctitle(D0ME-2)


ologit postdisrecons dist0, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist0) ///
            addtext(Controls, No) ///
            ctitle(D0ME-3)

ologit postdisrecons dist0 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist0) ///
            addtext(Controls, Yes)  ///
            ctitle(D0ME-3)


*Distance 10 minutes

ologit postdisrecons dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, No)  ///
            ctitle(D10ME-1)

ologit postdisrecons dist10 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, Yes) ///
            ctitle(D10ME-1)


ologit postdisrecons dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, No) ///
            ctitle(D10ME-2)

ologit postdisrecons dist10 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, Yes) ///
            ctitle(D10ME-2)


ologit postdisrecons dist10, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, No) ///
            ctitle(D10ME-3)

ologit postdisrecons dist10 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist10) ///
            addtext(Controls, Yes)  ///
            ctitle(D10ME-3)
```

```
*Distance 30 minutes

ologit postdisrecons dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, No)  ///
            ctitle(D30ME-1)

ologit postdisrecons dist30 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, Yes) ///
            ctitle(D30ME-1)


ologit postdisrecons dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, No) ///
            ctitle(D30ME-2)

ologit postdisrecons dist30 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, Yes) ///
            ctitle(D30ME-2)


ologit postdisrecons dist30, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, No) ///
            ctitle(D30ME-3)

ologit postdisrecons dist30 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist30) ///
            addtext(Controls, Yes)  ///
            ctitle(D30ME-3)

*Distance 60 minutes

ologit postdisrecons dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
            addtext(Controls, No)  ///
            ctitle(D60ME-1)

ologit postdisrecons dist60 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
            addtext(Controls, Yes) ///
            ctitle(D60ME-1)


ologit postdisrecons dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
            addtext(Controls, No) ///
            ctitle(D60ME-2)

ologit postdisrecons dist60 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
```

```
        addtext(Controls, Yes) ///
        ctitle(D60ME-2)


ologit postdisrecons dist60, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
        addtext(Controls, No) ///
        ctitle(D60ME-3)

ologit postdisrecons dist60 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist60) ///
        addtext(Controls, Yes)  ///
        ctitle(D60ME-3)


*Distance 90 minutes

ologit postdisrecons dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, No)  ///
        ctitle(D90ME-1)

ologit postdisrecons dist90 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, Yes) ///
        ctitle(D90ME-1)


ologit postdisrecons dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, No) ///
        ctitle(D90ME-2)

ologit postdisrecons dist90 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, Yes) ///
        ctitle(D90ME-2)


ologit postdisrecons dist90, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, No) ///
        ctitle(D90ME-3)

ologit postdisrecons dist90 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist90) ///
        addtext(Controls, Yes)  ///
        ctitle(D90ME-3)


*Distance 120 minutes

ologit postdisrecons dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, No)  ///
        ctitle(D120ME-1)
```

```
ologit postdisrecons dist120 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(1)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, Yes) ///
        ctitle(D120ME-1)


ologit postdisrecons dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, No) ///
        ctitle(D120ME-2)

ologit postdisrecons dist120 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(2)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, Yes) ///
        ctitle(D120ME-2)


ologit postdisrecons dist120, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, No) ///
        ctitle(D120ME-3)

ologit postdisrecons dist120 $controls1, cluster(WARD_RESPONDENT)
margins, predict(outcome(3)) dydx(*) post
outreg2 using CH3T5ME.xls, append keep(dist120) ///
        addtext(Controls, Yes)  ///
        ctitle(D120ME-3)



global controls housedamage proptdamage healthdamage asset partn_microf dist_market householdsize hhdage Female
headEduc married hindu BrahminChhetri occu_agri


*Comparison across groups

foreach var in partn_microf dist_market rate_health headEduc occu_agri agriland_valuer householdsize hhdage Female
married hindu BrahminChhetri housedamage proptdamage injuries {
        sum `var'
        ttest `var', by(dist0)
        }

foreach var in partn_microf dist_market rate_health headEduc occu_agri agriland_valuer householdsize hhdage Female
married hindu BrahminChhetri housedamage proptdamage injuries {
        sum `var'
        ttest `var', by(dist10)
        }
```

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[Chapter 6]

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