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Nepal Resilience Research Report – Final

May 4, 2017

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Acknowledgements

We would first and foremost like to thank FFP and the Center for Resilience for the opportunity to conduct this study and their invaluable guidance over the course of its implementation. In particular, Arif Rashid, Tiffany Griffin, Mara Mordini, and Chung Lai, who provided insightful comments.

We would also like to express our appreciation to Mercy Corps, Save the Children, and the USAID Mission Nepal, including Olga Petryniak, Mark Pommerville, Rebecca Goldman, Rajesh Dhungel, and all those that reviewed and contributed important suggestions for improving the analysis and presentation of study findings. These contributions immensely improved the quality of this report.

Finally, we would like to acknowledge ICF Macro who implemented the initial baseline study on behalf of USAID and FFP. Without their high-quality data collection, data conditioning, analysis, and implementation of the initial Baseline Study, this study would not have been possible.

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Acronyms

2sls	Two-stage least squares
CSI	Coping Strategy Index
EA	Enumeration area
FFP	Food for Peace
HDDS	Household dietary diversity score
HH	Household
ICF	ICF International
IV probit	Instrumental variable probit
NGO	Non-governmental organization
NRM	Natural resource management
OLS	Ordinary least squares
USAID	United States Agency for International Development
WASH	Water, Sanitation, and Hygiene

Executive Summary

The objective of this research is to provide implementing partners, Food for Peace (FFP) and the United States Agency for International Development (USAID) with insights into factors that strengthen household and community resilience in Nepal. This report complements the Baseline Study implemented by ICF Macro in Fiscal Year 2016. The research examines factors, in the context of resilience and mitigation of the negative effects of shocks and stresses on well-being, which can serve as the foundation for an evidence base for improving resilience programming in the SABAL and PAHAL project areas.

The April 2015 earthquake was a catastrophic shock experienced almost universally across the combined project areas. Over 90 percent (91.7 percent) of all households reported experiencing the shock. While nearly all households reported experiencing earthquake, there were differential levels of impact. Nearly half of those experiencing earthquake reported no direct negative impacts from the event. The overwhelming majority reporting no direct impact from the earthquake were located in the PAHAL region, which is relatively distant from the epi-center near Kathmandu than the SABAL project area. Regardless of the level of direct impact experienced from the earthquake, households that reported experiencing the earthquake were more likely to experience follow-on shocks, particularly market price fluctuations, and to a lesser extent landslides/floods. Additionally, households that reported experiencing negative impacts from shocks, specifically from the earthquake, more often reported a household member falling seriously ill. Concurrent, yet independent of the earthquake, nearly 70 percent of households reported drought and insufficient rainfall, and nearly 40 percent reported experiencing crop disease and pests. Overall, households reported experiencing a significant amount of external stress, between 3 and 4 shocks, over the course of the previous 12 months. Households experiencing a greater number of shocks, controlling for other factors, were less likely to recover from all their shocks and were more likely to experience severe or moderate hunger at the time of the household survey.

By the time of the ICF Baseline Study household survey in December of 2015, well-being as measured by food security, dietary diversity, and the utilization of negative food coping strategies indicate that many households were well on their way to recovering from any negative food security impacts of shocks experienced in the past year. The prevalence of severe to moderate hunger ranged between 0 and 6 percent (across caste). The utilization of negative food coping strategies was virtually non-existent, and household diets were relatively diversified, ranging from 6.0 to 7.4 food groups. However, poverty remains a persistent problem, particularly when viewed across caste groups. The prevalence of poverty at the time of the survey, was over 15 percent in Janajati and Brahmin/Chhetri households. Nearly one-quarter (23.6 percent) of Dalit households reported living under the poverty line, while in contrast just 3 percent of Newar households were poor.

Levels of household resilience capacity, namely absorptive and adaptive capacity, differ significantly across caste. In particular, Newar households have higher levels of absorptive capacity (39.0 out of 100) compared to all other castes (ranging from 30.2 in Dalit households to 32.9 in Brahmin/Chhetri households). Differences in absorptive capacity are mainly driven by differential rates of household savings and accumulation of household assets, which represent a proxy for wealth. Newar households own more assets (4.2 vs. 2.5 to 3.0) and are more likely to report households savings (80.2 percent vs. 60.0 to 65.6 percent) compared to other castes.

Newar households also have higher levels of adaptive capacity (43.7 out of 100) than other caste households, in particular compared to Janajati (36.7) and Dalit households (35.1). Adaptive capacity of Brahmin/Chhetri households (40.7) is similar, but slightly lower, than that of Newar households.

Education, wealth (assets), and linking social capital explain this differential across castes. Over three quarters of Newar (76.9 percent) and Brahmin/Chhetri (76.7 percent) households report a household adult with primary education or higher. In contrast, the percentages of Janajati and Dalit households with an educated adult are 66.1 percent and 59.1 percent, respectively. Linking social capital, while generally low across all castes, is highest in Brahmin/Chhetri households (1.4 out of 6). This compares to averages ranging from 0.9 to 1.0 for other castes. Thus, Brahmin/Chhetri households enjoy an increased ability to source valuable support from government or non-governmental organization (NGO) sources. As noted above, Newar households, on average, have higher household assets than other castes, helping to contribute to both higher absorptive and adaptive capacities.

Newar households have average levels of transformative capacity (38.7 out of 100) higher than any other caste. Average levels of transformative capacity of households of other castes fall in a lower range of 31.7 percent in Janajati households and 34.0 percent in Brahmin/Chhetri households. There were few differences in the underlying components in the transformative index across castes. However, nearly one-third of Newar households (29 percent) benefit from access to agricultural extension, compared to rates ranging between 16 percent (Janajati) and 20 percent (Dalit) for other castes.

Farming and livestock production/sales are the predominant livelihoods across both project areas. Nearly all households engage in crop production and sales, while 78 percent of all households engage in livestock production. Agricultural wage labor (within the respondents' communities) is also reported as an important source of income and food across the two project areas. Over 15 percent of all households practice this livelihood. Additionally, both non-agricultural wage labor (34.5 percent of PAHAL and 27.5 percent of SABAL households) and remittances also play a role. Notably, households whose only livelihood activity stems from agriculture have generally lower levels of absorptive, adaptive, and transformative capacities than households that engage in at least one non-agricultural livelihood activity, have access to remittances, or have access to a livelihood activity outside their respective community.

KEY FINDINGS

Households with higher absorptive and/or adaptive capacity are less likely to be poor, are more likely to earn higher incomes, have diets that are more diverse, are less likely to be hungry, and are more likely to recover from shock. This is true (controlling) for any level of shock. Absorptive and adaptive capacities exhibit particularly strong relationship with reductions in poverty and recovery from shock. A movement from levels of absorptive and adaptive capacity seen in the sample population from the bottom quarter to the top quarter predicts a 7 to 9 percent absolute reduction in the level of poverty and a 4-4.5 percent better chance of recovery from shock. Similar increases in absorptive and adaptive capacity lead to an estimated 6 percent increase in income, a 0.5 increase in the average number of food groups consumed, and a 2 percent lower likelihood of hunger.

Transformative capacity, as measured in this study, does not have as strong of an influence on improvements in well-being. Transformative capacity is weakly associated with reductions in poverty, higher income, and higher dietary diversity. Movements from levels of transformative capacity, observed in the sample, from the bottom quarter to the top quarter estimate a 2 percent reduction in poverty, a 2.5 percent increase in income, and a 0.1 increase in number of food groups consumed. The weak relationship between transformative capacity and outcomes could be a reflection of the inability to capture salient dimensions of transformative capacity, such as quality of infrastructure and services and equitable distribution of services.

When considering household response to shock, households that utilized savings, as well as, those that could rely on remittances were more likely to recover from shock. Households that reported relying on savings or remittances to recover from shock were 7-8 percent more likely to recover. This is consistent with results suggesting that access to savings is particularly effective at increasing absorptive capacity, in this Nepal context, and that access to savings has a strong, direct influence in promoting recovery. Remittances, whether sourced from inside or outside the country, also help households recover from shock.

Alternatively, households that relied on others (informal social networks) or received formal assistance were less likely to recover as of the time of the survey, approximately eight months following the earthquake. Households utilizing either of these two coping strategies were 8 to 9 percent less likely to recover from shock, when controlling for other factors.

Improved WASH and agricultural practices *do not* directly support household recovery from shock; but alternatively, these outputs lead to higher absorptive and adaptive capacity, that in turn, promote improved recovery from shock. WASH and agricultural practices exhibit little to no direct relationship with recovery from shock. However, these behaviors, practices, and characteristics do strongly support

adaptive and absorptive capacities. Statistical evidence links improved WASH and agricultural practices to increases in adaptive and absorptive capacity and, consequently, better overall recovery outcomes.

Of these characteristics, the four most influential determinants of absorptive and adaptive capacity are utilization of an agricultural financial service, use of correct water treatment practices, adoption of a portfolio of 3-5 improved agricultural practices, and cessation of the practice of openly defecating. Predicted increases of the absorptive and adaptive capacity index achieved through adoption (or non-adoption, in the case of open defecation) of these behaviors and practices lead to estimated increases of 20 in both absorptive and adaptive capacity (as measured by the index scales: 0-100). Increases of this magnitude in absorptive and adaptive capacity imply an 8-percentage point better chance of recovering from shock.

In the context of resilience capacity, there is evidence of several levers available for improving well-being outcomes, both indirectly through improved absorptive, adaptive, or transformative capacities, or directly. As noted above, there is strong evidence that absorptive and adaptive capacities contribute to improved outcomes in the face of shock. Components of absorptive capacity that appear to be particularly strong across all castes and likely contribute to current, improved well-being outcomes include: access to informal safety nets (average 5 of 13 potential types), bonding social capital (average score of 4 of a maximum potential 6), and access to remittances (ranging from 24 to 34 percent of households). Components of adaptive capacity that are supporting higher household resilience across caste include: higher levels of education (59-77 percent of households include an adult with primary education or higher), livelihood diversity (households engaging in an average of 3.0-3.4 different types of livelihoods), and access to financial services (most households have access to both a savings and lending institutions in their communities).

There are several underlying components of resilience capacity that directly support improvements in well-being, independent of their influence on absorptive, adaptive, or transformative capacities. Access to savings and increases in household assets, consistently and directly, are associated with better outcomes. Access to markets has a strong, direct positive influence on household recovery from shock. Higher education levels and bonding social capital directly support lower hunger; while bonding social capital, linking social capital, access to information, and access to infrastructure directly support reduced poverty.

Notably, absorptive and adaptive capacities reduce hunger more than any of these single other measures alone. This suggests that most of the improvements in hunger and poverty affected by the components of the resilience capacities are achieved through improvements made directly to absorptive, adaptive, and/or transformative capacities.

There are notable gaps in household ability to respond, related to deficiencies in resilience capacity that represent opportunities for improvement. Limited access to formal safety nets and household disaster preparedness measures are likely contributing to lower levels of sustained absorptive capacity. Access to shock preparedness and mitigation activities is low, averaging between 0.3 to 0.4 on a scale of 3 potential activities. This may reflect a lull following a flurry of formal relief activity happening in the previous year in response to the April 2015 earthquake However, this could also reflect a structural deficiency in community and social service infrastructure that support shock preparedness.

Overall, access to broader social networks (linking and bridging social capital) is relatively low and represents opportunities to help build informal networks that transcend community boundaries, as well as, link local government and community support to households.

1. Introduction

1.1 Objectives

The objective of this research is to provide implementing partners, Food for Peace (FFP), and the United States Agency for International Development (USAID) with insights into factors that strengthen household and community resilience in Nepal. This report complements the Baseline Study implemented by ICF Macro in Fiscal Year 2015. In particular, the research examines factors that can serve as the foundation for an evidence base for improving resilience programming in the SABAL and PAHAL project areas. The research aims to address the following three questions:

1. Which resilience capacities are associated with positive well-being outcomes, including recovery from shock, in the combined program areas?

2. Are there coping strategies that households use to deal with shocks that lead to better – or, conversely, act as barriers to – well-being outcomes?

3. How do planned SABAL/PAHAL programming activities enhance resilience and lead to better well-being outcomes?

1.2 Organization of the Report

Section 2 describes the methodology used to conduct this research.

2. Methodology

This section briefly outlines the methodology, in particular the multivariate methods, employed to address the objectives of this research as described above.

Quantitative Analysis

Quantitative data collection took place from December 2015 to February 2016 as part of a baseline study of the SABAL and PAHAL development food assistance projects. The study, implemented by ICF International (ICF), utilized a population-based household survey and an accompanying community survey to collect information needed to report project indicators, including those measuring resilience capacities of households in the project areas. The original sample size was 6,840 households overall, divided equally (3,420 households each) between the two project areas. The sample consists of 114 enumeration areas (EAs) drawn from each of the project areas. For further details concerning the baseline study sample design, see the ICF Baseline Study Draft Report (ICF 2016).

Data analysis

The quantitative data analysis was conducted with Stata SE version 13.1. Results are initially presented descriptively (e.g. means and percentage of households disaggregated by caste) in sections four, five, six, seven, and ten of the main body of the report. Household exposure to shock (section four) and utilization of coping strategies to respond to shock (section five) are disaggregated by project area – differences in project geographies help explain differential impacts resulting from the most influential shock, the April 2015 Gorkha earthquake. Next, key well-being outcomes (section six), resilience capacities (section seven), and selected program indicators related to WASH and agricultural practice adoption (section ten) are disaggregated by caste, an important structural characteristic of the sample population of interest. Caste is a salient socio-economic characteristics that aids in understanding historical and persistent differences in well-being and resilience.

Results from multivariate analyses are summarized in the form of figures and tables in sections eight, nine, and eleven and are discussed in more detail below. Both descriptive and multivariate results incorporate sample weights and techniques necessary (i.e., complex sample corrected standard errors) to account for the clustering and stratification used as part of the sample design.

Resilience capacity indexes are generated using (exploratory) factor analysis methods and are consistent with the methods employed by ICF as part of their baseline analysis of the SABAL and PAHAL projects (ICF 2016). The calculation of the resilience capacities and resilience capacity indexes are described in detail in Annex A.

Multivariate Analysis

Following the descriptive analysis, key results from multivariate regression analysis are presented in tabular and graphic form. Comprehensive results generated as part of the multivariate analysis are available in Annex B. The multivariate analysis utilizes four different, appropriately chosen, estimators depending on the particular specification and distribution of the dependent variable (i.e., outcomes). Dichotomous dependent variables are estimated with a probit estimator, continuous with an ordinary least squares (OLS) estimator, ordinal with an ordinal probit ("Oprobit") estimator, and censored dependent variables are estimated with a Tobit estimator. Estimators used are noted in the respective regression output tables in Annex B.

In general, the multivariate specifications treat resilience capacity, in the face of shocks and stressors, as a key determinant of well-being outcomes. Other determinants, used as controls, include shock exposure, structural household characteristics, and community characteristics.

The presentation of multivariate results begins in section 8. Section 8.1 summarizes results exploring the direct relationship between resilience capacity indexes and well-being outcomes. Subsequently, in

section 8.2, the relationships between the underlying components of the resilience capacity indexes and well-being outcomes are presented.

Section 9 includes a summary of the relationship between key coping strategies (i.e. household response to shocks and stresses) and well-being outcomes. Finally, section 11 begins with a presentation of results relating WASH and improved agricultural practices to improved resilience. Subsequently, the relationship between improved resilience, that considers WASH and improved agricultural practices, relates these measures to well-being outcomes. A detailed description of all multivariate specifications used in this study is available in Annex C.

Predicted values of outcomes

In Sections 8, 9 and 11 of this report, the relationships between resilience capacities, coping strategies and outcomes are presented in the (graphical) form of predicted values or probabilities of outcomes. The predicted values of the outcomes are computed using the estimated results from the respective regression specifications at varying values of resilience capacities (i.e., 0 to 1 in 0.05 increments; at the 25^{th} percentile of a respective resilience capacity compared to at the 75^{th} percentile of the resilience capacity; 0 and 1 if the resilience capacity is a binary variable), while holding all values of other explanatory variables constant at their means.

Annex B: **Table 20** is a summary of changes in predicted values and/or probabilities of all outcomes resulting from varying all resilience capacities (indexes and components) between the 25^{th} percentile of the resilience capacity to the 75^{th} percentile of the resilience capacity (or in the case of capacities measured as binary variables, 0 to 1). This table gives a depiction of the strength, or magnitude, of the relationship between resilience capacities and outcomes reported in similar units.[1] (See also additional descriptives in Annex D, which describes a move from the 25th to 75th percentiles in actual values for each resilience capacity.)

Limitations

Responses to shocks: The baseline survey was tailored to capture data on a limited number of household responses to shocks. Measures of coping strategies were calculated with the information available and are described in section 5. In particular, the source of the coping strategy related to social capital is from questions regarding receipt of informal assistance in the past 12 months; however, the questions did not specify informal assistance specifically given as aid for shocks. Annex A.1.6 describes how the coping strategies are calculated.

[1] It was debated whether to report elasticities or changes in predicted values. In the end, predicted values were chosen given the difficulty of interpreting elasticities of effects on binary or ordinal dependent variables.

Cross-sectional analysis: Resilience is operationalized as the mitigation of the negative effects of shocks and stresses on well-being outcomes. This relationship is best understood in the context of changes in well-being outcomes over time. This study utilizes data from just one period, or cross-section of time, which is a limitation.

Livelihood diversity: The livelihood diversity measure used in this study is not ideal, in that, it only counts the number of livelihoods employed by members of a given household. A better livelihood diversity measure would capture the number of different livelihoods in which a household participates across different livelihood risk profiles (e.g. climate risk, macroeconomic risk, etc.).

Recovery from shock: The source of the shock recovery measure employed in this analysis is from a question asking perception of a, "Household's ability to meet food needs returning to the level it was before *all* of the shocks and stressors experienced in the past 12 months." Thus, as the majority of households experienced multiple shocks and stresses, the interpretation of recovery is the recovery of a household's ability to meet food needs across each household's distinct portfolio of shocks and stresses experienced in the previous 12 months. In order to account for this, we have controlled for the number of shocks experienced as part of the multivariate analyses.

Shock severity: Ideally, a measure controlling for severity of shock would be employed as part of any multivariate analysis exploring the relationships between shock exposure, resilience capacity, and well-being outcomes. When available, secondary sources of shock/stress data are used to triangulate self-reported shock experience data sourced directly from household respondents. At the time of the analysis, this secondary information was not available. Instead, the self-reported number of shocks is used as a proxy for shock severity, which in similar studies has served as a reasonable substitute. However, in several cases we found the shock exposure measure to be positively associated with well-being outcomes – rendering further analysis isolating the effect of resilience capacity on shock exposure (i.e. interacting shock exposure with resilience capacity) moot. Specifications interacting shock exposure with resilience capacity (indexes) were tested, and in no cases were the results statistically significant with the correct sign (i.e. direction of influence of effect). Results are not presented in the body of the paper, but are available in Annex B: **Table 27** to **Table 32**.

Transformative capacity: Several important dimensions of transformative capacity, including quality of infrastructure and services, the equitable distribution of services, participation in local governance, and gender equitable decision-making norms were not adequately captured by the household survey and are not included as part of the transformative capacity index.

Nutrition: Results exploring relationships between childhood weight-to-height, shock exposure, and resilience were inconclusive. Neither shock exposure, nor key structural characteristics, such as access to clean water and access to improved sanitation are related to wasting for children (i.e. child under 5, weight-to-height) in the study sample. Results are presented in **Table 33** in Annex B.

Gender: Program indicators related to women's decision making were considered and explored; however, indicators related to gender are restricted to small proportions of the total sample (20-40 percent of full sample). Inclusion would result in large losses in statistical power and, additionally, bias if the households responding to the relevant questions were structurally different from those that did not respond.

WASH: It is important to note that several of the indicators related to WASH measure access to water and sanitation, but may not completely capture important dimensions of these characteristics related to well-being outcomes such as sufficiency and quality.

3. Description of Projects

In fiscal year 2015, FFP awarded funding for two development food assistance projects in Nepal: (1) the SABAL project, implemented by Save the Children and its partners; and (2) the PAHAL Project, implemented by Mercy Corps and its partners.

The goal of SABAL is to build a more resilient population in targeted areas of the Eastern and Central Hills regions of Nepal. The project is guided by three programmatic purposes:

- Purpose 1: Strengthened and diversified livelihoods
- Purpose 2: Improved health and nutrition of pregnant and lactating women and children under five
- Purpose 3: Improved resilience of the program households

PAHAL's project goal is to build resilience among vulnerable populations to the stressors and shocks that impede local food security in the Mid-Western and Far-Western Hills and Far-Western Mountains regions of Nepal. Specifically, the project has two purposes:

- Purpose 1: Improved mitigation of risks against socio-ecological stressors and shocks that reduce individuals', households' and communities' local food security
- Purpose 2: Strengthened and diversified livelihoods for food insecure populations, including disadvantaged groups, improve the availability of and access to a nutritious diet

4. Household exposure to shocks

This section describes the types of shocks households at baseline reported experiencing over the last year. Shocks/stresses rarely occur as isolated events; rather, one shock often contributes to another, resulting in households experiencing several shocks/stresses simultaneously.[2] For example, high food prices can lead to social unrest, which can itself be experienced as a shock. The potential for multiple

2 Choularton et al. 2015.

shocks – as well as possible interactions among shocks – suggests that shocks should not be considered in isolation from each other.[3]

Households in the survey area experienced an average of three shocks in the 12 months prior to the survey (**Table 1**). Earthquake was the most common shock for the entire area (91.7 percent of all households), and nearly universal for SABAL (99.6 percent). Though earthquake was also an important shock in PAHAL, a comparison of the two project areas finds a statistically significant difference in exposure to this shock: at 72.1 percent of households, earthquake was the third-most common shock in PAHAL. Another shock experienced by a high number of households in both areas that marks a significant difference between them was drought: it was the most common shock in PAHAL (80.2 percent), yet only the third-most common in SABAL (64.5 percent). The second-most common shock overall was market price fluctuations, which both areas experienced at similar prevalence levels (76.3 percent in SABAL; 79.3 percent in PAHAL). While hailstorms were less common compared to other shock types, this shock also differentiates the two areas in a statistically significant way, with 21.6 percent of PAHAL households reporting hailstorms versus 11.5 percent in SABAL. Similarly, land and forest degradation were relatively uncommon overall, though it marks a statistically significant difference between the two areas (6.2 percent in PAHAL versus 3.9 percent in SABAL).

Table 1: Number and types of shocks experienced in past 12 months

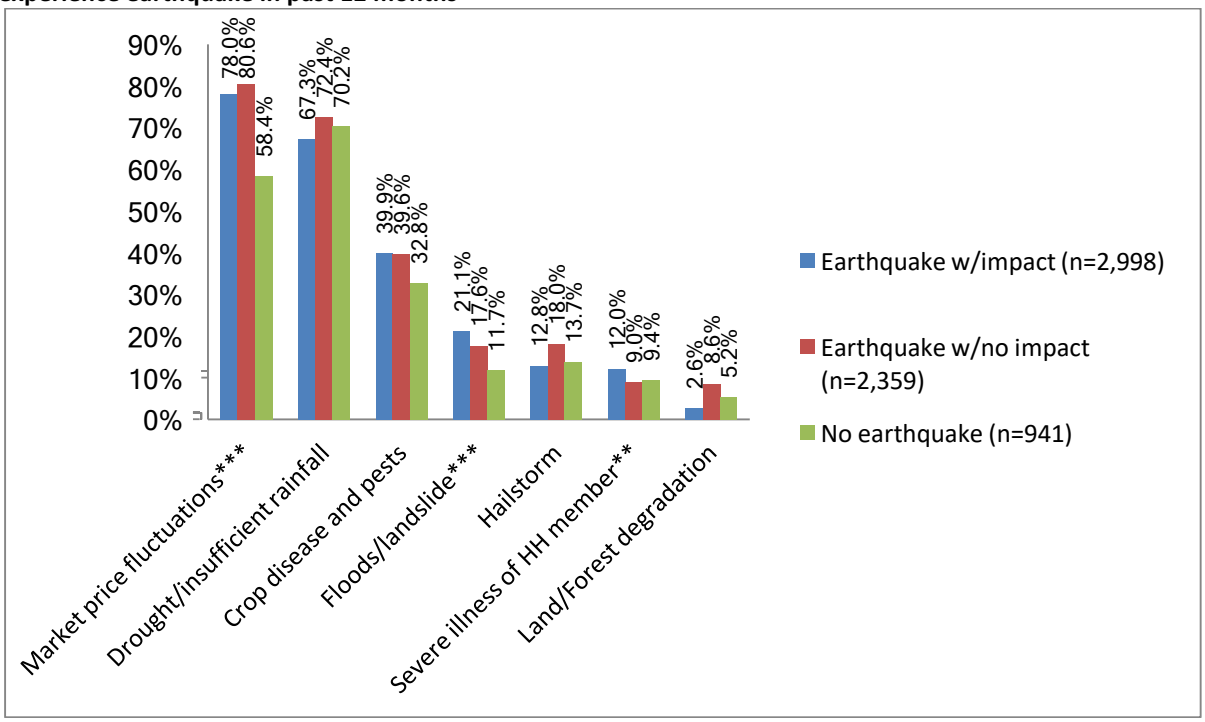
# of shocks experienced by households	SABAL	PAHAL		All
# of shocks experienced by HHs (mean)	3.3	3.4		3.3
Type of shock experienced	**SABAL**	**PAHAL**		**All**
	(% HHs)			
Floods/ landslide	20.0	17.4		19.3
Drought/ insufficient rainfall	64.5	80.2	***	69.0
Earthquake	99.6	72.1	***	91.7
Land/ forest degradation	3.9	6.2	*	4.6
Crop disease and pests	37.8	42.8		39.2
Hailstorm	11.5	21.6	***	14.4
Severe illness of HH member	11.3	9.8		10.9
Market price fluctuations	76.3	79.3		77.1
Theft/ conflict	1.7	1.6		1.7
n	3112	3186		6298

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

[3] TANGO 2016

FINDING 1: Households affected by the earthquake were more likely to experience market price fluctuations and floods/landslides. Further, households that reported experiencing negative impacts, specifically from the earthquake, more often reported a household member falling seriously ill.

Figure 1: Prevalence of other shocks in households that experienced earthquake vs. households that did not experience earthquake in past 12 months



NOTE: Asterisks represent statistical significance between *earthquake* and *no-earthquake* households at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Figure 1 documents shock experience as reported across three distinct groups: households reporting earthquake and reporting experiencing some type of direct negative impact from the earthquake (n=2,998); a similar, but slightly smaller number of households reporting earthquake and no direct negative impacts from the earthquake (n=2,359); and finally, households that reported not experiencing the earthquake (n=941). Households in the PAHAL area, farther from the earthquake's epicenter near Kathmandu, were much more likely to report no direct, negative impact from the quake (75.9 percent) compared to households in the SABAL area (18.9 percent). Further analysis indicates that on average, households that experienced an earthquake, regardless whether any direct impacts were felt from the earthquake, experienced 2.4 additional shocks, compared to non-earthquake households, which experienced two shocks total. This difference is statistically significant.

In particular, households that experienced an earthquake were more likely to report market price fluctuations (78-81 percent vs. 58 percent for no-earthquake households); one possible explanation for this difference is that the earthquake caused road closures that resulted in localized market fluctuations. Floods and/or landslides were also more common for households experiencing earthquake (18-21 percent vs. 12 percent for no-earthquake households). Finally, severe illness of a household member was reported more frequently by households experiencing earthquake with impact (12 percent) compared to households in the other two groups (9.0 to 9.4 percent).

The coincidence within a year's time of earthquake and some other shocks (floods/landslides more directly; price fluctuations, crop disease/pests, illness, and land/forest degradation less directly) may reflect the covariate and downstream effects of earthquake, which can have an accumulated negative impact on earthquake-affected households. (Certain other shocks – such as drought/insufficient rainfall and hailstorms – are phenomena that occur more independently, i.e., are less linked to the occurrence of an earthquake.)

Takeaways 1: Shock exposure

Earthquake, drought, and market fluctuations were the most prevalent shocks for program area households.

While nearly all households reported experiencing earthquake, almost half reported experiencing no direct negative impacts from the event.

Households experiencing the earthquake but reporting no direct impact were more likely to experience shocks downstream from the earthquake. Downstream shocks with a higher level of prevalence for households experiencing the earthquake include floods/landslides and market price fluctuations.

Moving forward when examining the relationships between well-being outcomes and resilience, the analysis will differentiate between (i.e. control for) households that reported earthquake but different levels of impact. Further, it will be assumed that households reporting experiencing earthquake as their sole shock, however reported no direct impacts from the earthquake, will be treated as not experiencing any shock in the past 12 months.

Given the high-level of covariate shock experience, a count of shocks experienced should serve as an adequate proxy of shock exposure for this sample in the absence of more complete secondary data describing shock severity.

5. Coping strategies to recover from shocks

Table 2 compares the extent to which households in the SABAL and PAHAL areas employed different coping strategies to recover from shocks. Across the board, how the two project areas coped with shocks was different in statistically significant ways. Accessing formal assistance was a major coping strategy in SABAL areas (68.7 percent) but used barely at all in PAHAL (1.0 percent). The primary explanation for greater use of formal assistance in SABAL is that it was closer than PAHAL to the epicenter of the devastating 2015 earthquake and experienced a relatively stronger impact, with correspondingly more robust assistance. In fact, it is likely the higher percentages in SABAL for accessing help for post-shock recovery of any type listed, compared to PAHAL, reflect the greater need for recovery assistance generally, given that nearly all SABAL households were affected by earthquake(s) in the last 12 months. Additionally, in general, physical access to PAHAL project areas is extremely challenging. The PAHAL area has mountainous terrain and poor road infrastructure; conveying assistance to remote and isolated villages via land is difficult even when conditions are good – much less when natural disasters have blocked or destroyed roads. Air transport can also be difficult, given the topography. Therefore, PAHAL households may have limited or no viable means of receiving emergency assistance from government or outside organizations.

Relying on social capital – on the support of connections both within and outside one's community – was relatively more common in SABAL areas (16.3 percent of households) than PAHAL areas (10.6 percent). Using savings or remittances was also more common in SABAL (13.8 percent and 7.3 percent, respectively) than in PAHAL (8.1 percent and 5.6 percent, respectively).

Table 2: Coping strategies used to help recover from shocks in past 12 months

Coping strategies used	SABAL	PAHAL		All
	(% HHs)			
To help recover from ANY shock:				
Used savings	13.8	8.2	***	12.1
Relied on individuals inside or outside community	16.3	10.6	**	14.7
Used remittances	7.3	5.6	*	6.8
Received formal assistance	68.7	1.0	***	49.8
n	3021	3021		6042

Coping strategies used		Impact	No impact		All
		(% HHs)			
To help recover from earthquake:					
Received formal assistance		74.4	7.0	***	54.4
	n	2998	2205		5203

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Takeaways 2: Coping strategies

Utilization of coping strategies for shock in the previous 12 months related to drawing down savings, reliance on social networks, and increased reliance on remittances was generally low across the combined project areas.

SABAL households were able to rely on savings and their social networks more frequently than PAHAL households.

Less than 10 percent of households in the project areas reported using remittances as a means of recovering from shock.

Primarily SABAL households reported receiving relief in the form of formal assistance over the past 12 months. This is a reflection of the proximity of the SABAL program area to the April 2015 earthquake. The assistance appears to have been targeted appropriately, as only 7 percent of households reporting earthquake, but no negative impact, reported receiving assistance, compared to 74.4 percent of households that reported some form of negative impact from the earthquake.

6. Household well-being outcomes

Table 3 shows the values for selected outcome indicators used as part of this study, disaggregated by caste. All indicators shown are employed in both SABAL and PAHAL monitoring and evaluation systems. Daily expenditures are lowest in Dalit households (US$2.60) and nearly 12 percent higher in Brahmin/Chhetri and Janajati households (US$2.90). Nearly a quarter of Dalit households live under the

poverty line (US$1.90 per day), whereas between 15 and 16 percent are below this poverty level in Janajati and Brahmin/Chhetri households, respectively.

Table 3: Outcome indicators, by caste

Outcome indicator	Brahmin/ Chhetri	n	Janajati		n	Dalit		n	Newar		n
Income proxy:											
Per capita daily expenditures (mean; US$)	2.9	2625	2.9		2192	2.6	***	967	3.5	***	221
Prevalence of poverty (% HH, <US$1.90)	16.3	2625	15.1		2192	23.6	***	967	3.1	***	221
Nutrition:											
% HH with a wasted child (whz < 2 SD)	6.6	1030	4.0	**	1415	8.1		435	2.3	*	58
Weight/height (mean Z-score, children under 5)	-0.4	1027	-0.1	***	1413	-0.6	***	435	0.0	***	57
Food security:											
HDDS (past 24 hrs) (mean; range 0-12)	6.9	2554	6.2	***	3114	6.0	***	939	7.4	***	213
CSI score (past 30 days) (mean; range 0-497)	3.7	2625	3.5		2192	8.0	***	967	1.1	***	221
% HH moderate or severe hunger (past month)	1.6	2625	2.0		2192	6.1	***	967	0.0	***	221
Recovery from shock (% HH)	59.2	2625	59.4		2192	45.4	***	967	65.3		221

NOTE: Asterisks represent statistical significance between Brahmin/Chhetri and other castes at at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Muslim and "Other" Castes not presented due to low sample size.

The next set of outcome indicators measure different aspects of food security. The Household Dietary Diversity Score (HDDS) is used as a proxy measure of household food access, defined as the ability to acquire a sufficient quality and quantity of food to meet all household members' nutritional requirements for productive lives.[4] (It is important to note that HDDS does not indicate nutrition levels.) HDDS is computed by summing the number of different food categories reported eaten by the household in the 24 hours prior to the interview. The HDDS was measured as recommended by FANTA, using the following 12 food groups: cereals, tubers, vegetables, fruits, meat, eggs, fish, legumes, dairy, oils, sugar, and other.[5] A higher HDDS represents a more diverse diet, which is empirically highly

[4] FANTA III Food and Nutrition Technical Assistance Web site. Fanta 3 Food and Nutrition Technical Assitance Accessed February 1, 2017.
[5] Other may include such items as condiments, spices, coffee or tea

correlated with a household's income level and access to food.[6] The mean HDDS values in this sample indicate moderate to high dietary diversity across castes, with households consuming 6 to 7 food groups per day, on average. While Janajati households are similar to Brahmin/Chhatri households with respect to expenditure and poverty measures, on average, Janajati households are more similar to Dalit households with respect to dietary diversity. Janajati and Dalit households consume, on average, roughly one food group less than Brahmin/Chhetri households.

The Coping Strategy Index (CSI) is computed on the basis of a series of questions about how frequently[7] respondents utilized each of the following 16 possible strategies[8] in the 30 days prior to the interview:

1. Skip entire day without eating
2. Limit portion size at meal times
3. Reduce number of meals eaten in a day
4. Borrow food from a friend or relative
5. Rely on less preferred and less expensive foods
6. Purchase food on credit
7. Harvest immature crops
8. Send children to eat with neighbors or relatives
9. Send household members to beg
10. Reduce adult consumption in order for small children to eat
11. Gather wild food or hunt
12. Consume seed stock held for the next season
13. Pull children from school for work
14. Use a social mechanism (such as a rotating credit association) as emergency food relief
15. Pawn household assets (such as jewelry, land)
16. Feed working members of the household at the expense of non-working members

The computation of the index[9] involves weighting the frequency responses reported for each strategy, then applying the severity weight of each strategy (see Annex D for weighting values and computation details). The maximum value for the CSI created for SABAL and PAHAL is 497.

All caste groups have extremely low CSI scores: between 1.1 (Newar) and 8.0 (Dalit), respectively, out of a maximum of 497 (this high number for the theoretical maximum value reflects the various weighting computations applied). These low values indicate that households are not engaging in severe coping strategies. A closer look at the data shows that only 2777 households are resorting to coping strategies at all (i.e., only 2777 households – less than half the entire sample – reported using one or more strategy). Redoing the computation to exclude households that reported using zero coping strategies,

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[6] Swindale, Anne, and Paula Bilinsky. *Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2).* Washington, D.C.: Food and Nutrition Technical Assistance Project, Academy for Educational Development, 2006.

[7] Response options: *never, hardly at all, once in a while, pretty often,* and *every day*.

[8] Maxwell, Daniel, Richard Caldwell and Mark Langworthy. " Measuring food insecurity: Can an indicator based on localized coping behaviors be used to compare across contexts?" *Food Policy*, Volume 33, Issue 6, December 2008

9 Note that this CSI is specific to food security – it is different from general coping strategies for recovering from shock reported in Section 5.

the overall mean CSI is 10.4. This is still a very low CSI relative to the maximum index score of 497. This analysis therefore suggests that not only are households not engaging in severe coping strategies, but those that do are not engaging in them often.

The CSI is also not unusual when we consider it in conjunction with the percentage of households reporting moderate or severe hunger: less than four percent of households in either project area experienced moderate or severe hunger in the last 30 days, so it makes sense they would not have employed food security coping strategies. In fact, 56 percent of sampled households reported not employing any of the listed coping strategies. This skews the CSI score for the entire sample downward. The low CSI score values observed should not be interpreted as a signal that households in the program area are resilient to shock. While we may expect households to exploit a variety of coping strategies given the high prevalence of shocks (especially in SABAL areas where, as noted earlier, nearly 100 percent of households experienced earthquake in the last year), the survey question delimits the reference period to the past 30 days. Therefore, the CSI score can only be interpreted with reference to the past month, when the immediate food security effects of past shocks have waned.

Prevalence of child wasting (children under 5, less than 2 standard deviations below an international standard weight-to-height mean by age category) is generally low for the entire sample (4.7 percent; ICF 2015 p.38); however, there are noticeable differences when looking at percentage of households with a child that is wasting across caste. Eight percent (8.1 percent) of Dalit households have at least one wasted child compared to 6.6 percent of Brahmin/Chhetri households, 4.0 percent of Janajati households, and only 2.3 percent of Newar households.

Finally, the proportion of households recovering from shock (defined as recovering to the same level or better from all shocks experienced) is relatively high for the whole sample. The majority of households (57.5 percent) recovered from all shocks experienced in the previous 12 months, as of the time of the household survey. There were no differences across caste groups with one exception – Dalit households had worse recovery outcomes, on average. Less than half of Dalit households (45.4 percent) reported recovering from shock.

Takeaways 3: Well-being outcomes

Newar households unilaterally measure higher than all other caste groups across all measured income proxy, nutrition, and food security outcomes. The Newar households encountered in the project areas suffer zero household hunger, are nearly universally above the poverty line, have high dietary diversity, and low childhood wasting.

Alternatively, Dalit households report the poorest performance across all outcome measures. Dalit households, in particular, suffer from disproportionally high rates of poverty – likely, a reflection of limited economic opportunities based on the historic and ongoing discrimination this caste groups receives.

Overall, rates of household hunger are low. Six percent of Dalit households experienced severe or moderate hunger at the time of the household survey, the highest of any caste group; however, prevalence of hunger was two percent or less for all other castes.

Utilization of negative food coping strategy usage is extremely low, a reflection of the generally low prevalence of hunger and high availability of staple foods at the time of the household survey. The relationship between CSI and resilience capacity was explored as part of the multivariate analysis accompanying this study; however, given the low utilization rates of these coping strategies the results are not particularly meaningful, thus, are not presented moving forward in this report. The results from these analyses can be found in Annex B.

Reported recovery from shock was generally high across all households. Nearly sixty percent of households (57.5 percent) reported recovering from all shocks experienced in the previous 12 months. This is partly a function of timing, as the survey was implemented roughly 8 months after the Gorkha earthquake, allowing for adequate recovery time from this extremely severe event.

7. Household resilience capacities

This section presents and analyzes the absorptive, adaptive, and transformative resilience capacity index scores, by caste, along with the indicators that comprise each index. Annex A details how each indicator is computed and cross-references survey questions used to gather data for the indicator. Note that some indicators are components of more than one index (e.g., asset score is a component of both the absorptive capacity index and the adaptive capacity index). All resilience capacity components included in this section are presented on their original scales to facilitate understanding of the disparate factors - and their differing measurement - contributing to resilience capacities. Annex D includes tables with all resilience capacity components and resilience capacity indexes scaled to 0-100 indexes to facilitate comparison to the same measures reported in the ICF Baseline Study.

Please note that the adaptive capacity index differs slightly, with respect to composition, compared to the same index calculated and reported in the ICF Baseline Study. For purposes of this analysis, the decision was made to exclude adoption of sustainable agricultural practices from the adaptive capacity index. This decision was made for two reasons – in order to facilitate comparison across similar studies, which generally do not include this measure as part of adaptive capacity, as well as, to enable multivariate analysis using adoption of improved agricultural practices as exogenous determinants of household resilience capacity (e.g. absorptive and adaptive capacity). The adaptive capacity index reported in Annex D is recalculated to include adoption of sustainable agricultural practices in order to maintain consistency with the original specifications reported in the Baseline Study.

7.1 Absorptive capacity

Table 4 shows the overall absorptive capacity index values for the four most populous castes in the combined project areas. The analysis indicates that Newar households have the highest levels of absorptive capacity and Dalit households the lowest, 39.0 and 30.1 respectively, out of a possible 100. Higher levels of absorptive capacity for Newar households appear to be driven by high levels of cash savings (79 percent) and higher asset levels (4 assets out of 15). [10]

Table 4: Absorptive capacity index and components, by caste

Indicator	Brahmin/ Chhetri	Janajati	Dalit	Newar
Absorptive capacity index (mean; range 0-100)	32.9	31.2 *	30.2 ***	39.0 ***
Index components:				
Access to informal safety nets (mean; max 14)	5.0	4.8	5.0	5.6 *
Bonding social capital score (mean; max 6)	4.3	4.2	4.2	4.0
% HH that regularly save cash	65.6	61.7	60.0 *	80.2 ***
% HH receiving remittances	30.7	27.4	33.9	24.1
Asset score (mean; max 15)	3.0	2.9	2.5 ***	4.2 ***
Shock preparedness and mitigation score (mean; max 3)	0.4	0.3 *	0.4	0.4
% HH w/ agricultural hazard insurance	2.4	1.8	1.3 *	2.2
n	2625	2192	967	221

NOTE: Asterisks represent statistical significance between Brahmin/Chhetri and other castes at at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Muslim and "Other" Castes not presented due to low sample size.

[10] The survey asked whether households owned one or more assets in any of the following 15 categories: 1 furniture and fixtures; 2 electric fan; 3 cassette, CD recorder/player, radio, etc.; 4 television, DVD player, VCR; 5 sewing machine; 6 kitchen appliances (refrigerator, cooking range, blenders, etc.; 7 washing machine; 8 bicycle; 9 motorcycle; 10 motor car or other such vehicle; 11 mobile phone; 12 clock; 13 iron (for pressing clothes; electric or other); 14 computer (including equipment and accessories; and 15 other.

While the analysis finds statistically significant differences relative to other indicators, the differences are small. *Access to informal safety nets* is a count of community organizations potentially providing safety nets in the interviewed household's community; out of a possible 14 organization types, on average between 5-6 organization types were available to project households. *Bonding social capital* is seen in the bonds between community members. It involves principles and norms such as trust, reciprocity, and cooperation, and is often drawn on in the disaster context, where survivors work closely to help each other to cope and recover (Frankenberger et al., 2013). The bonding social capital score is based on responses to two questions: one asking whether the household would be able to get help from various categories of people in their community if they need it, and one asking whether the household would be able to give help to people in need in their community. The possible responses are *relatives, non-relatives within my ethnic/caste group, non-relatives of other ethnic/caste groups* or *no one,* and the maximum score is 6. Levels of bonding social capital are generally strong across all caste groups, with mean scores ranging from 4.3 (Dalit) to 4.1 (Newar).

Takeaways 4: Absorptive capacity

Average values of the absorptive capacity index range from a low of 30.2 in Dalit households to 39.0 in Newar households. Brahmin/Chhetri and Janajati households, on average, fall near the lower end of this range at 32.9 and 31.2, respectively.

What is driving differences?

Differences in absorptive capacity across caste are driven by household access to savings and household asset holdings. Over three-quarters of Newar households (80.2 percent) report regularly saving cash and a robust two-thirds of Brahmin/Chhetri households (65.6 percent) describe doing the same. Alternatively, rates of saving for Janajati and Dalit households are lower, 61.7 and 60.0 percent, respectively. Brahmin/Chhetri and Janajati households own an average of 3.0 and 2.9 assets out of 15 total. Dalit households own, on average, 0.5 less assets (2.5 assets) and Newar households report owning on average 1.2 more assets per household (4.2 assets).

What is working?

Access to informal safety nets, as measured by the average number of organizations reported to exist in the community that potentially provide safety nets, is a fairly high 5 of 14 potential types of groups across all castes. This may be reflected in relatively high bonding social capital scores that, again, are virtually the same across caste. The average bonding social capital score is roughly 4 out of a maximum potential of 6. Access to remittances (from both inside and outside Nepal) is similar across caste groups ranging from 24 percent of Newar households to 34 percent of Dalit households.

What could be improved?

Formal safety net support is generally low across castes and the sample overall. Household participation and access to shock preparedness and mitigation activities is low, averaging 0.3 to 0.4 on a scale of 3 potential activities. This may reflect a lull following a flurry of formal relief activity happening in the previous year related to the April 2015 earthquake; but, could also reflect a structural deficiency in community and social service infrastructure that support shock preparedness. In addition, agricultural insurance is not being utilized. Less than 2.5 percent of households report owning agricultural insurance – this may reflect lack of access and/or uptake.

7.2 Adaptive capacity

Table 5 presents the findings on adaptive capacity. Adaptive capacity varies significantly by caste. Levels are markedly higher in Newar (43.7 out of 100) and Brahmin/Chhetri (40.7) households compared to Janajati (36.7) and Dalit (30.1) households. A closer look at the component indicators suggests that the main drivers in differences in adaptive capacity include differing levels of human capital and assets. While Brahmin/Chhetri and Newar household have a high percentage of households with at least one adult with primary or higher education (76.7 percent and 76.9 percent, respectively), between half and two-thirds of Dalit (59.1 percent) and Janajati (66.1 percent) households include members with similar education levels. Average asset scores are similar for Brahmin/Chhetri and Janajati households (3.0 and 2.9 out of 15 assets, respectively); however, Dalit households own, on average, 0.5 less assets (2.5), while Newar households own roughly one more asset (4.2) than their Brahmin/Chhetri and Newar counterparts.

Table 5: Adaptive capacity index and components, by caste

Indicator	Brahmin/ Chhetri	Janajati	Dalit	Newar
Adaptive capacity index (mean; range 0-100)	40.7	36.7 ***	35.1 ***	43.7 *
Index components:				
Bridging social capital score (mean; max 6)	3.5	3.3 **	3.2 *	3.3
Linking social capital score (mean; max 6)	1.4	1.0 ***	0.9 ***	1.1
% HH w/ one or more adults in HH w/primary education or higher	76.7	66.1 ***	59.1 ***	76.9
Livelihood diversity score (mean; max 15)	3.0	3.0	3.1 *	2.8 **
Exposure to information (mean; max 15)	3.4	3.0 **	3.0 **	3.2
Asset score (mean; max 15)	3.0	2.9	2.5 ***	4.2 ***
Access to financial services score (mean; max 2)	1.6	1.5	1.6	1.8 ***
n	2625	2192	967	221

NOTE: Asterisks represent statistical significance between Brahmin/Chhetri and other castes at at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Muslim and "Other" Castes not presented due to low sample size.

Linking social capital is seen in trusted social networks between individuals and groups interacting across explicit, institutionalized, and formal boundaries in society. Linked networks are particularly important for economic development and resilience because they provide resources and information that are otherwise unavailable. This type of social capital is often conceived of as a vertical link between a network and some form of authority or power in the social sphere. The linking social capital score is based on answers to questions regarding whether household members know a government official

and/or NGO leader, how well they know them, and whether they believe the official/leader would help their family or community if help was needed. The index ranges from 0 to 6. The mean score for this indicator differs slightly across caste; in particular, Brahmin/Chhetri households have higher linking social capital index scores (1.4) compared to Janajati (1.0) and Dalit households.

The *bridging social capital* component of the adaptive capacity index does not show meaningful differences between caste groups; nevertheless, it is important to understand what these scores mean. Bridging social capital connects members of one community or group to other communities/groups. It often crosses ethnic/racial lines, geographic boundaries and language groups, and can facilitate links to external assets and broader social and economic identities. Bridging social capital makes a direct contribution to community resilience in that those with social ties outside their immediate community can draw on these links when local resources are insufficient or unavailable (Wetterberg 2004, cited in Frankenberger et al., 2013). The bridging social capital score is based on responses to two questions: one asking whether the household would be able to *get* help from various categories of people living outside their community if they need it, and one asking whether the household would be able to *give* help to people in need living outside of their community. The possible responses are *relatives, non-relatives within my ethnic/caste group, non-relatives of other ethnic/caste groups* and *no one,* and the maximum score is 6. The mean score ranges between 3.2, in Dalit households, to 3.5 in Brahmin/Chhetri households.

Households across the sample have relatively *high* livelihood diversity as measured by a simple count of livelihoods engaged in. On average, households are engaging in about three different livelihoods out of a possible 15 inquired about in the survey.[11] In the past year, households across all castes were exposed to information, on average, to three of the 15 possible topics inquired about in the survey.[12] This question asks about information received that potentially improves livelihood outcomes, quality of life, and human and animal health; the low values for this indicator suggest that communities have very poor access to information that would help them to make positive livelihood and other adaptations. The *access to financial services* indicator values indicate the presence of an institution that provides savings and/or credit support; a score of zero indicates that the household has no access to any such institution

[11] The survey asked what were the household's sources of food/income in the past 12 months, vis a vis the following 15 categories: 1 farming/crop production and sales; 2 livestock production and sales; 3 wage labor (agriculture – crop/ livestock inside community); 4 wage labor (agriculture – crop/ livestock outside community); 5 wage labor (non-agriculture inside community); 6 wage labor (non-agriculture outside community); 7 sale of wild/ bush products (e.g., honey, herbs, charcoal) inside community; 8 sale of wild/ bush products outside community; 9 other self-employment/ own business (agriculture crop/livestock) inside community; 10 other self-employment/ own business (agriculture crop/livestock) outside community; 11 other self-employment/ own business (non-agriculture) inside community; 12 other self-employment/ own business (non-agriculture) outside community; 13 remittances coming from inside Nepal; 14 remittances coming from outside Nepal; 15 other.

[12] The survey asked whether households had received information on any of the following 15 topics: 1 early warning, 2 threats to crop health, 3 threats to animal health, 4 rainfall/ weather prospects for the coming growing season, 5 long-term changes in weather patterns, 6 disease prevention, 7 safe migration opportunities, 8 methods to improve crop production, 9 methods to improve animal health/ husbandry, 10 business and investment opportunities, 11 opportunities for borrowing money, 12 available government services for this VDC, 13 natural resource management for this community, 14 equal rights for all ethnic groups, and 15 gender equality or gender-based violence.

in its community, whereas a (maximum) score of two indicates that institutions exist that provide both savings and credit services. The average scores of 1.8 in Newar households, and 1.5 to 1.6 in all other households, indicate that access is generally available to at least one of these two types of financial services.

Takeaways 5: Adaptive capacity

Average values of the adaptive capacity index range from a low of 35.1 in Dalit households to 43.7 in Newar households. Brahmin/Chhetri households are closer to the upper-end of this range with an average score of 40.7 and Janajati households (36.7) have levels, on average, closer to Dalits (35.1).

What is driving differences?

Differences in adaptive capacity can be explained by disparities in education, linking social capital, and asset levels. Over three quarters of Newar (76.9 percent) and Brahmin/Chhetri (76.7 percent) households report a household adult with primary education or higher, while only 66.1 percent of Janajati and 59.1 percent of Dalit households have at least one adult with similar levels of education. These higher education levels may be reflected in the higher assets levels observed for Newar households and lower levels observed in Dalit households, discussed above in the absorptive capacity section. Linking social capital, measuring the level of perceived personal support that could be received from government or NGO officials, is on average higher for Brahmin/Chhetri households (1.4 out of a potential 6) than for other castes in which the average score is roughly 1.0.

What is working?

Livelihoods are relatively diversified with households engaging in roughly 3 different livelihood activities with little difference observed, at least with respect to number of activities, across caste. While this simple tally of the number of livelihoods is relatively high compared to other contexts (Nelson, et al. 2016), the measure does not speak to livelihood risk diversification across different risk profiles, such as climate, macroeconomic, conflict, etc. Access to financial services is also quite high, with most households reporting the existence of both formal savings and lending institutions in their respective communities.

What could be improved?

Bridging social capital levels are similar across caste, and on average, slightly lower than bonding social capital levels above. Average bridging social capital score ranges from 3.2 to 3.5 (out of 6) compared to an average bonding social capital score of roughly four. This signals marginally greater reliance on social networks existing within respective communities and lower access to broader social networks traversing local community boundaries.

7.3 Transformative capacity

The values for the transformative capacity index and its component indicators are shown in **Table 6**. The average index scores range from a low of 31.7 (out of 100) for Janajati households to a high of 38.7 in

Newar households. There are few differences in underlying components in transformative across caste. Brahmin/Chhetri households, as noted in the adaptive capacity section above, have slightly higher levels of linking social capital (1.4 of a possible 6) compared to other castes. Nearly one-third of Newar households (29 percent) benefit from access to agricultural extension, compared to rates ranging between 16 percent (Janajati) and 20 percent (Dalit) for other castes. Otherwise, elements of transformative capacity are remarkably similar across caste. Households from all castes score moderate to high in terms of access to basic services – defined as having a primary school within 5 km, a health center within 5 km, and access to safe drinking water – with scores of 2.3 (Janajati) to 2.6 (Newar) out of a possible 3. The percent of households with access to markets within 10 km is essentially the same, between an average of 32 percent for Janajati households to 35 percent for Dalit households. One notable area of low transformative capacity is with respect to formal safety nets. Less than six percent of households across all castes report having access to programs in their respective communities that provide food or income after a shock.

Table 6: Transformative capacity index and components, by caste

Indicator	Brahmin/ Chhetri	Janajati		Dalit		Newar	
Transformative capacity index (mean; range 0-100)	34.0	31.7	*	33.1		38.7	*
Index components:							
% HH w/ access to formal safety nets	2.7	2.9		2.9		5.7	
% HH w/ access to markets w/in 10 km	33.6	31.7		35.1		34.1	
Access to basic services score (mean; max 3)	2.4	2.3		2.4		2.6	**
Access to infrastructure score (mean; max 4)	2.0	2.0		2.0		2.2	
% HH w/ access to agricultural extension	19.3	16.0		19.9		29.0	*
Bridging social capital score (mean; max 6)	3.5	3.3	**	3.2	***	3.3	
Linking social capital score (mean; max 6)	1.4	1.0	***	0.9	***	1.1	
Active participation in local decision making (mean; max 42)	5.0	4.2	**	4.5		5.8	*
n	2625	2192		967		221	

NOTE: Asterisks represent statistical significance between Brahmin/Chhetri and other castes at at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Muslim and "Other" Castes not presented due to low sample size.

Takeaways 6: Transformative capacity

Transformative index levels are similar across caste, ranging from 31.7 in Janajati households to 34.0 in Brahmin/Chhetri households. Levels of the transformative capacity index are slightly higher, on average, in Newar households (38.7).

What is driving differences?
Differences in components of transformative capacity are mostly observed in access to agricultural extension, particularly for Newar households, and as discussed above, in linking social capital. Twenty-nine percent of Newar households report access to agricultural extension, compared to access rates of 16.0 to 19.9 percent for other castes.

What is working?
Access to basic services is high, ranging from 2.3 to 2.6 on a scale of 3. While this measure does not speak to the quality of the services, the distribution, overall, appears to be equally allocated across caste groups.

What could be improved?
Access to markets is relatively low for households in the project areas, with roughly one-third of households reporting an existing market within 10 km, and no differences in access across castes. Access to infrastructure is similar across castes, with households reporting an average of 2 forms of infrastructure available in their respective communities out of a potential 4. Congruent with low observed levels of shock preparedness behaviors, reported access to formal safety nets at the community level is virtually non-existent with no caste group reporting higher than 6 percent access. Finally, active participation in local decision-making appears to be universally low, ranging from a low of 4.2 (out of a maximum score of 42) for Janajati households to 5.8 in Newar households.

7.4 Livelihoods

Table 7 presents livelihoods, disaggregated by program. Farming and livestock production and sales are the predominant livelihoods across both project areas. Nearly all households, 94.5 percent, engage in crop production and sales while 78.4 percent of all households engage in livestock production with no meaningful differences reported between the project areas. Agricultural wage labor within the respondent's community also counts as an important source of income and food across the two project areas, on average 15.3 percent of households practice this livelihood.

Non-agricultural sources of food and income are prevalent across both project areas. Roughly, one- third of households (30.4 percent) engage in non-agricultural wage labor within the respondent's own community – slightly more households in the PAHAL area (34.5 percent) compared to the SABAL area

(28.7 percent). PAHAL households also engage slightly more frequently (10.6 percent) in non-agricultural wage labor than SABAL households (14.1 percent).

Remittances also count as an important source of livelihoods for both SABAL and PAHAL households. SABAL households rely on both remittances coming from within Nepal (19.1 percent) and outside Nepal (24.3 percent). Remittances from within Nepal may be a reflection of the proximity of the SABAL project area to the capital Kathmandu. Alternatively, PAHAL area households rely mostly on remittances from outside Nepal – nearly half of PAHAL households (43.2 percent) count this as a livelihood. The PAHAL area location likely affords more attractive migration and livelihood opportunities across Nepal's Western border with India.

Table 7: Livelihoods, SABAL vs. PAHAL

Livelihood	SABAL	PAHAL		All
Farming/crop production sales	96.1	90.3	**	94.5
Livestock production and sales	78.8	77.4		78.4
Agricultural wage labor (inside community)	15.9	13.9		15.3
Agricultural wage labor (outside community)	3.0	2.9		3.0
Non-agricultural wage labor (inside community)	28.7	34.5	***	30.4
Non-agricultural wage labor (outside community)	10.6	14.1	***	11.5
Sale of wild/bush products (inside community)	0.2	2.4	***	0.8
Sale of wild/bush products (outside community)	0.1	2.3	***	0.7
Agricultural self-employment/own business (inside community)	2.9	3.9		3.2
Agricultural self-employment/own business (outside community)	0.6	0.7		0.6
Non-agricultural self-employment/own business (inside community)	10.5	8.9		10.0
Non-agricultural self-employment/own business (outside community)	2.2	1.3	**	1.9
Remittances coming from inside Nepal	19.1	5.7	***	15.3
Remittances coming from outside Nepal	24.3	43.2	***	29.6
Other livelihoods	6.2	4.2	**	5.7
n	3021	3021		6042

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 8 shows levels of absorptive, adaptive, and transformative capacities by different livelihood categories. Households whose only livelihood activity stems from agriculture - namely farming production/sales, livestock production/sales, or agricultural wage labor (in or outside the community) –

have generally lower levels of absorptive, adaptive, and transformative capacities than households that engage in at least one non-agricultural livelihood activity, have access to remittances, or have access to a livelihood activity outside their respective community. In particular, households that count on a non-agricultural livelihood, receive remittances from within Nepal, or have a livelihood outside their community all have higher levels of absorptive capacity than households that only engage in an agricultural livelihood. Also, households that only engage in agricultural livelihoods have lower levels of adaptive capacity compared to households engaging in all other livelihood profiles measured and presented in **Table 8**.

Table 8: Resilience capacity indexes, by livelihood types

Resilience capacity	Ag only	Any non ag	Any remittances (from in Nepal)	Any remittances (from ouside Nepal)	Any livelihood outside community
Absorptive capacity index	30.4	33.9 ***	34.1 ***	31.3	33.4 ***
Adaptive capacity index	34.9	41.3 ***	39.9 ***	38.5 ***	41.1 ***
Transformative capacity index	31.7	34.4 ***	33.7	33.0 *	33.3 **
n	1334	2800	739	2048	1078

Not much difference is observed in transformative capacity levels across livelihood profiles, although households that engage in any non-agricultural livelihood have higher transformative capacity than households engaging in only an agricultural livelihood(s). This is probably a reflection of the higher availability of non-agricultural livelihood opportunities in those communities, i.e. with higher levels of community/transformative capacity.

Overall, results in **Table 8** suggest that livelihood independence, defined as the reliance on at least one livelihood other than agriculture, correspond to household (i.e. absorptive and adaptive) resilience capacity. This result is consistent with Mercy Corp's post-quake study that found livelihood independencewas linked to a much greater chance that households invested in asset after the earthquake (Petryniak, et al. 2015). As seen in sections 7.1 and 7.2, increases in assets are strongly associated with higher absorptive and adaptive capacities.

Takeaways 7: Livelihoods

Nearly all households are engaged in a livelihood activity related to agriculture. Farming and livestock production and marketing are the most prevalent with 94.5 percent and 78.6 percent of all households engaging in these activities. Agricultural wage labor within one's community (15.3 percent of all households) counts as an important livelihood across both project areas, as does within-community, non-agricultural wage labor (34.5 percent of PAHAL household, 27.5 percent of SABAL households).

Given that the prevalence of households receiving remittances is relatively high - 15 percent of households receiving remittances from inside Nepal and 30 percent reporting receiving remittances from outside Nepal – it is curious that so few households report relying on remittances during times of shock (less than 10 percent, see **Table 2** above). This may signal that remittances, for households that receive them, are mainly providing for immediate consumption, with little left over as savings that could be used to help during stress times after providing for basic food needs.

Importantly, households that have livelihood independence have higher absorptive and adaptive capacities.

8. How resilience capacities explain outcomes

The first part of this section presents several figures that map the three resilience capacity index scores against a diverse set of outcome measures for poverty, food security, income, and recovery from shocks. It examines relationships between indicators, such as the relative relationships of the indexes to a given outcome, and the explanatory power of a given index vis a vis a given outcome, including the direction and magnitude of any statistically significant relationship. These findings inform our understanding of the kinds of outcomes we can expect given investments in a particular resilience capacity, and give some idea of the direction and degree of this influence. It is important to emphasize that all of the following results are based on statistical methods exploring the relationships between resilience capacity and well-being outcomes while controlling for shock exposure. Any positive relationship found between resilience capacities and the well-being outcomes suggest that resilience capacity does improve well-being in the face of shock – or that, for any level of shock exposure, higher levels of resilience capacities improve well-being.

The results presented in this section relate to the magnitude, or strength, of the relationships between resilience capacities and outcomes. Again, these results were generated using multivariate regression analysis in which resilience capacities are treated as a principal determinant of outcomes along with

controls for household characteristics, (e.g. wealth, caste, demographics), community characteristics, and exposure to shock. The specifications are described in further detail in Annex C. Full results from all regression are available in Annex B.

The second part of this section presents a series of graphs that demonstrate the predicted effects of resilience capacity variables – indexes as well as index components – that have the strongest positive relationship with key outcomes.

8.1 Resilience capacities and individual outcomes

Probability of poverty

In this report, daily per capita expenditures are a proxy indicator for income. Daily per capita expenditures are directly related to poverty prevalence because a household is considered poor if daily per capita expenditures are less than $US1.90 per day. **Figure 2** maps the relationship of the probability of poverty against varying levels of the three resilience capacity indexes. The full regression results that serve as the foundation of these predicted outcomes can be found in Annex B: **Table 12.**

The slope of a curve shows the predicted magnitude of a given capacity's impact on poverty level: a steeper line indicates more impact; a flatter line indicates less impact. The lines in **Figure 2** tell us that both absorptive and adaptive capacities are predicted to have a strong inverse relationship with poverty, i.e., as these capacity levels increase (left to right along the x-axis), poverty levels decrease (from high to low along the y-axis). The effect is especially strong for higher poverty levels, as indicated by a steeper downward curve: at higher poverty levels, even a small increase (e.g., by an increment of 0.05) in the absorptive or adaptive capacity score has a strong impact.

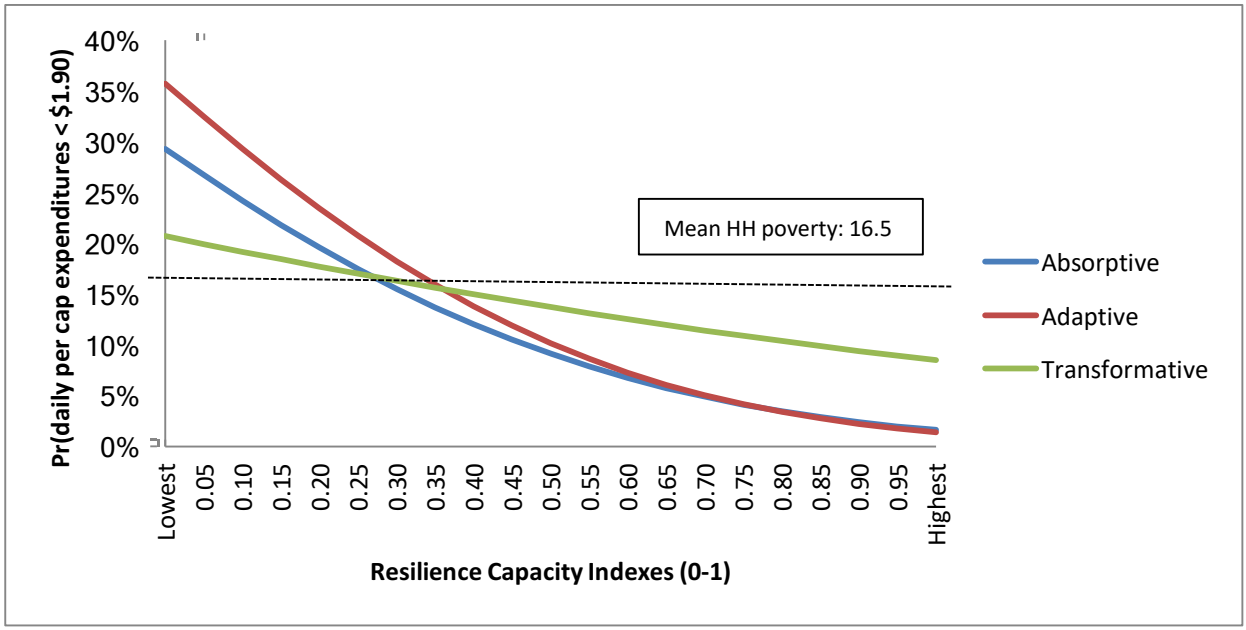
> FINDING 2: Households with higher absorptive or adaptive capacity are less likely to be poor. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a (minimum) 7 to 9 percent absolute reduction in the level of poverty.

Another way to describe the findings in Figure 2 is that it tells us how poverty is predicted to change as resilience levels change, and the relationship between specific resilience index score values and poverty level. The mean prevalence of poverty in the total sample population used in this study is 16.5 percent; this is represented in Figure 2 as a dotted horizontal line. The blue *absorptive capacity* line intersects the *percent household poverty* line at an x-axis value of absorptive capacity of roughly 0.25. This intersection point is where the predicted probability of being poor, as indicated by the y-axis, is equivalent to the actual prevalence of poverty of 16.5 percent. Moving from left to right on the x-axis from an absorptive capacity index value of 0.22 to 0.38, results in moving down the absorptive capacity curve from a y-axis value of roughly 20 percent to a y-axis value of about 12.0 percent. A movement of this magnitude in absorptive capacity is equivalent to moving from levels seen in the bottom quarter of the sample (25th

percentile) to levels observed in top quarter (75th percentile) of the sample. A similar movement in levels of adaptive capacity from 0.27 (25th percentile) to 0.46 (75th percentile) predicts a nearly 9 percent reduction in poverty.

Transformative capacity is predicted to have relatively less effect relative to absorptive and adaptive, as indicated by a flatter slope; this is consistent with the analytical finding that the relationship between transformative capacity and poverty has a lower level of statistical significance. An increase in transformative capacity from levels seen in the bottom quarter of the sample (0.24; 25th percentiles) to those seen in the top quarter of the sample (0.34, 75th percentile) predicts a 2 percent reduction in poverty.

Figure 2: Probability of poverty vs. absorptive, adaptive and transformative capacity levels



NOTE: Absorptive and adaptive capacities statistically significant at the 0.01 (***) level. Transformative capacity significant at the 0.05 (**) level.

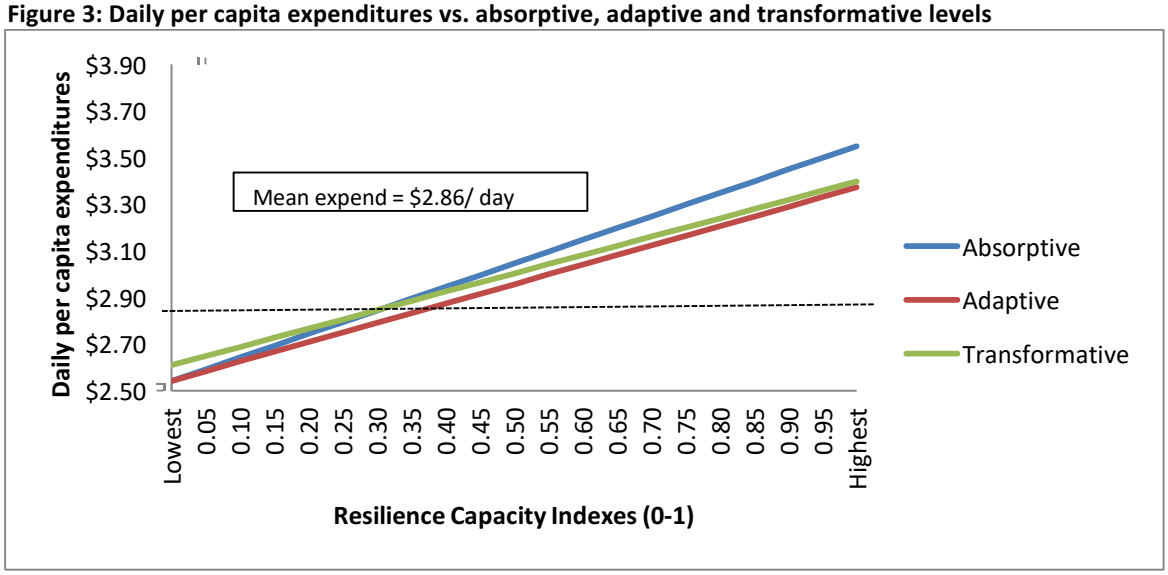
Expenditures

Figure 3 shows the relationship between the three resilience capacities and actual daily per capita expenditures. Mean expenditures for the whole sample are shown as a dotted horizontal line. The data reflect a strong positive and statistically significant relationship between all three capacities and expenditures: as any of the resilience scores increases, expenditures also go up (please see Annex B: **Table 13** for full regression results). As noted earlier, daily per capita expenditures are a proxy for income and used to measure poverty levels; hence, an increase in daily per capita expenditures suggests that poverty is decreasing.

FINDING 3: Households with higher absorptive, adaptive, or transformative capacity are more likely to earn higher income. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a (minimum) 6 percent increase in income. A similar movement in transformative capacity predicts a 2.5 percent increase.

As we did with the probability of poverty figure (**Figure 2**), we can analyze **Figure 3** with respect to where the capacity index scores intersect with the sample mean. Both the *absorptive capacity* (blue) and *adaptive capacity* (red) lines intersect the *mean expenditures* line at index scores of 0.30 and 0.37, respectively. This indicates that an absorptive or adaptive capacity index score of 0.30 and 0.37 corresponds with mean daily per capita expenditures of US$2.86. Moving from left to right along the x-axis from an absorptive capacity index value of 0.22 (25th percentile) to 0.38 (75th percentile), results in moving up the absorptive capacity curve from mean daily per capita expenditures of $2.74/day to $2.94/day, a 7 percent increase. The effect of increased adaptive capacity is similar, though the increase in expenditures is slightly lower: adaptive capacity moving from 0.27 (25th percentile) to 0.46 (75th percentile), predicts an increase in expenditures of 6 percent. Alternatively, the same movement in transformative capacity (from 25th percentile of 0.24 to 75th percentile of 0.34) results in only a 2.5 percent increase in expenditures.

Figure 3: Daily per capita expenditures vs. absorptive, adaptive and transformative levels



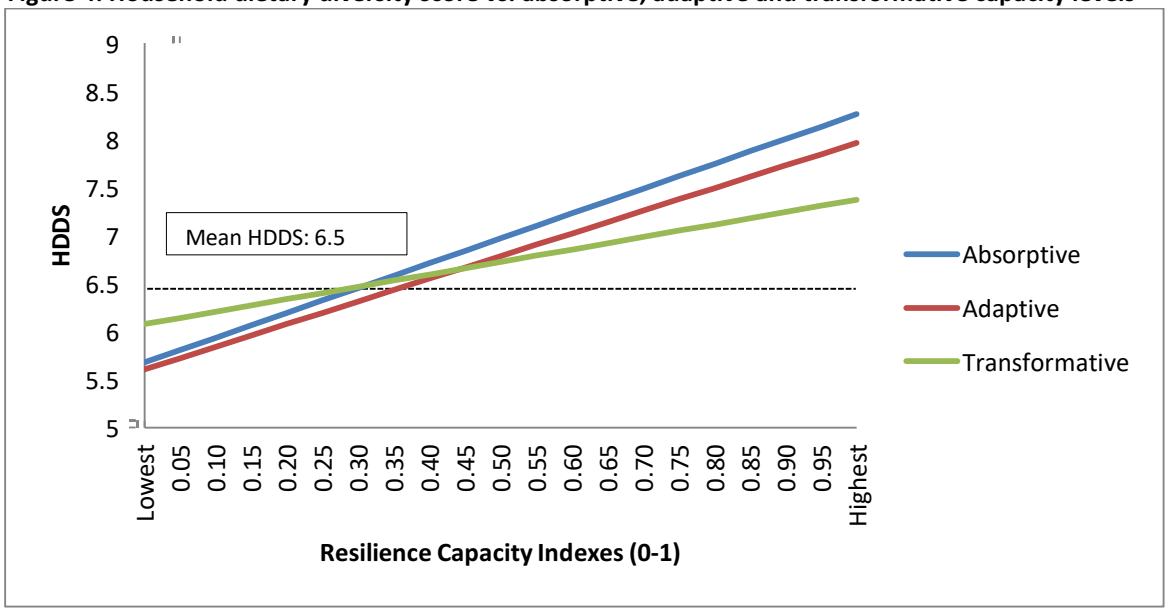
NOTE: All capacities statistically significant at the 0.01 (***) level.

Household dietary diversity

FINDING 4: Households with higher absorptive, adaptive, or transformative capacity are more likely to have diets that are more diverse. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts an increase of 0.5 food groups on average. A similar movement in transformative capacity predicts a 0.1 increase.

A positive and statistically significant relationship exists between the three resilience capacities and household dietary diversity score (HDDS), as shown in **Figure 4** (for full regression results, see Annex B: **Table 14**). The mean HDDS, 6.5 out of a maximum possible score of 12, is shown as a dotted horizontal line. Again, absorptive and adaptive capacities have a stronger effect on HDDS than transformative capacity, as evidenced by their comparatively steeper slopes. In **Figure 4**, the absorptive capacity index has the steepest slope. It intersects the mean HDDS at a score of about 0.30. Movement from the bottom quarter (25th percentile, 0.22) to the top quarter of absorptive capacity (75th percentile, 0.38) results in a 0.5 increase in food groups consumed (6.2 to 6.7). A similar increase in adaptive capacity (25th percentile=0.27 to 75th percentile=0.46) also corresponds to a 0.5 increase in food groups consumed (6.2 to 6.7). The same incremental change in transformative capacity (25th percentile=0.24 to 75th percentile=0.34) has a statistically significant but not as powerful an effect, raising HDDS from 6.4 to about 6.5, the equivalent of about one-tenth of a food group. Overall, this comparison of the slopes of the resilience indexes – the relative size of increases along the y-axis (HDDS) vis a vis incremental changes in index scores (x-axis) – suggests that while improving all three kinds of resilience improves HDDS, improving absorptive capacity and adaptive capacity have the highest relative impact.

Figure 4: Household dietary diversity score vs. absorptive, adaptive and transformative capacity levels



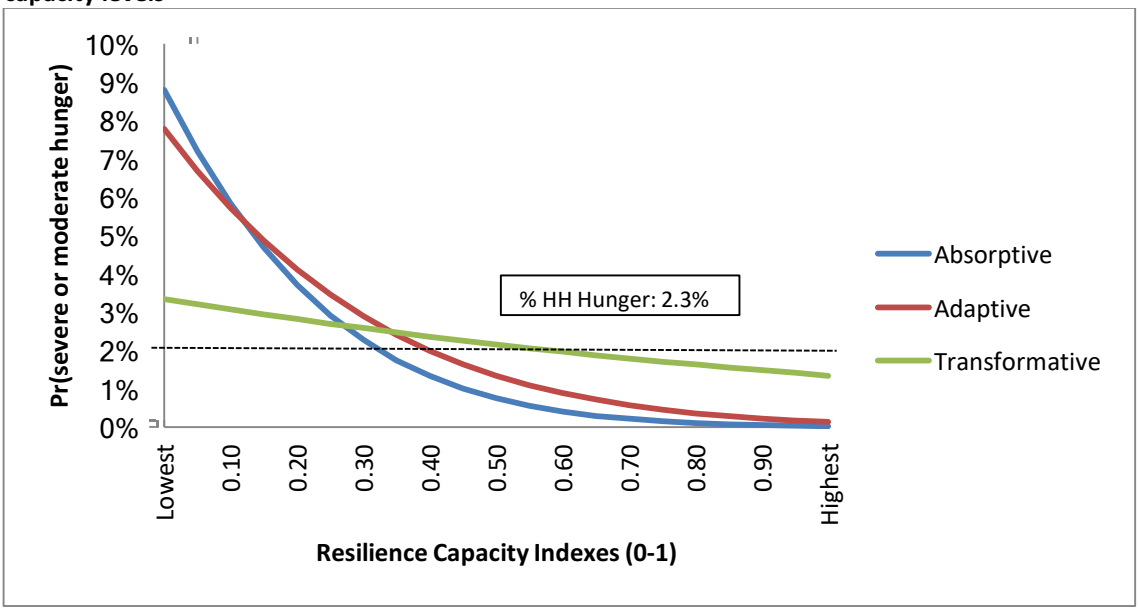
NOTE: All capacities statistically significant at the 0.01 (***) level.

Hunger

FINDING 5: Households with higher absorptive or adaptive capacity are less likely to have moderate or severe hunger, although the influence is not very strong. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a roughly 2 percent decrease in household hunger.

Figure 5 plots probability of severe or moderate hunger against different levels of the three resilience capacity index values. A low probability is the desired outcome for this indicator: we would hope to see fewer than 2.3 percent of households – the sample mean – experiencing hunger. As in the previous figures, this mean is shown as a dotted horizontal line. The statistical analysis indicates that only absorptive and adaptive capacities have a statistically significant relationship with the predicted hunger outcome (Annex B: **Table 15**). Movement from the bottom quarter (25th percentile, 0.22) to the top quarter of absorptive capacity (75th percentile, 0.38) results in a 2 percent reduction in predicted household hunger increase in food groups consumed (3.4 percent to 1.4 percent). A similar increase in adaptive capacity (25th percentile=0.27 to 75th percentile=0.46) corresponds to a roughly 1.5-2 percent decrease in hunger (3.2 percent to 1.5 percent). The remarkable finding in this figure is the extreme downward slopes of the two statistically significant curves: even very small increases in absorptive and adaptive capacities from low levels of these capacities result in reductions in hunger levels. This could provide evidence that improvements for the most vulnerable with extremely low levels of absorptive and adaptive capacity could drive strong reductions in probability of household hunger; however, it may also be a statistical aberration resulting from the extremely low levels of observed hunger in this sample.

Figure 5: Probability of severe or moderate hunger vs. absorptive, adaptive and transformative capacity levels



NOTE: Absorptive and adaptive capacities statistically significant at the 0.01 (***) level. Transformative capacity is not significant at 0.01 (***), 0.05 (**), or 0.10 (*) levels.

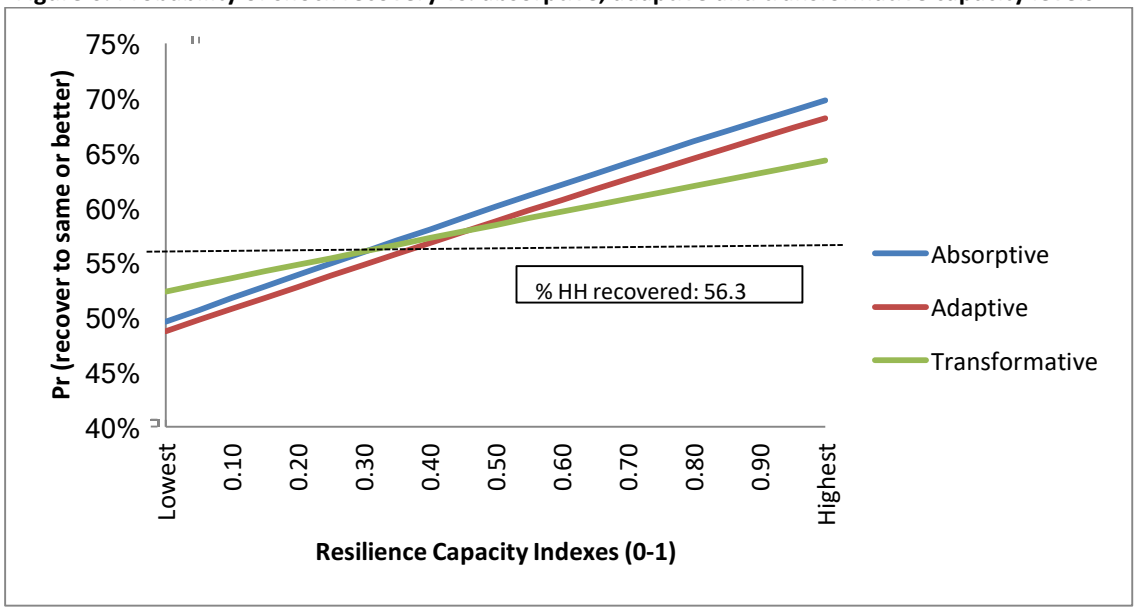
Recovery from shocks

Figure 6 maps the probability of recovering from shock against resilience capacity index values. *Recovery from shock* is computed based on how households responded to questions about their abilities to meet their food needs after a shock (of any type) in the past year – better than, the same as, or worse than before the shock. The dotted horizontal line marks the percentage of households considered to have recovered to the same or a better level than before the shock: 56.3 percent.

> FINDING 6: Households with higher absorptive or adaptive capacity are more likely to recover from shock. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a 4 to 4.5 percent better chance of recovery from shock.

Only absorptive and adaptive capacities are found to have a statistically significant relationship with the probability of shock recovery; absorptive capacity (blue line) appears to have a slightly more powerful effect than adaptive capacity (red line), suggested by its steeper slope. An increase in absorptive capacity score, from the bottom quarter (25th percentile, 0.22) to the top quarter (75th percentile, 0.38), results in a 4.5 percent increase in predicted recovery from shock (53.5 percent to 58 percent). A similar increase in adaptive capacity (25th percentile=0.27 to 75th percentile=0.46) corresponds to a roughly 4 percent increase in likelihood of recovery (53.5 percent to 57.5 percent). The transformative capacity index does not have a statistically significant relationship with recovery from shock.

Figure 6: Probability of shock recovery vs. absorptive, adaptive and transformative capacity levels



NOTE: Absorptive and adaptive capacities statistically significant at the 0.01 (***) level. Transformative capacity is not significant at 0.01 (***), 0.05 (**), or 0.10 (*) levels.

Takeaways 8: Resilience capacity and outcomes

Households with higher absorptive or adaptive capacity are less likely to be poor. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a (minimum) 7 to 9 percent absolute reduction in the level of poverty.

Households with higher absorptive, adaptive, or transformative capacity are more likely to earn higher income. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a (minimum) 6 percent increase in income. A similar movement in transformative capacity predicts a 2.5 percent increase.

Households with higher absorptive, adaptive, or transformative capacity are more likely to have diets that are more diverse. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts an increase of 0.5 food groups on average. A similar movement in transformative capacity predicts a 0.1 increase.

Households with higher absorptive or adaptive capacity are less likely to have moderate or severe hunger, although the influence is not very strong. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a roughly 2 percent decrease in household hunger.

Households with higher absorptive or adaptive capacity are more likely to recover from shock. A movement from the bottom quarter to the top quarter of absorptive and adaptive capacity predicts a (minimum) 4 to 4.5 percent better chance of recovery from shock.

8.2 Decomposing absorptive, adaptive, and transformative capacities: The strongest relationships

The following series of graphs focuses on how changes in components of the resilience capacity indexes are predicted to affect different outcomes. It highlights the particular components that have the strongest effects, both in terms of statistical significance and magnitude, based on the principal regression specification described in Annex C. This analysis differs from the previous discussions because not only does it focus only on the resilience capacities that are statistically significant (which, in all cases shown, are the absorptive and adaptive capacities) and most powerful; it compares them with statistically significant component variables, i.e., individual variables that form part of the indexes. The intent of this approach is to examine the extent to which a combination of variables (i.e., as defined by a given index) has a stronger (or weaker) effect on a particular outcome than any individual variable.

The resilience capacities are plotted on the x-axis, using two points of reference: the value of the variable at the 25th percentile of the sample, and the value at the 75th percentile. Index variables are

shown as solid lines, and component variables are shown as dotted lines. The legend indicates the 25th and 75th percentile values, respectively, of indicators that are measured as continuous variables. This permits comparability across variables that use different scales. In other words, the change from left to right along the x-axis in any explanatory continuous variable is the distance between the 25th and 75th percentile values of that variable. For binary variables, i.e., variables whose values is either 0 (absence of) or 1 (presence of), the change noted is not connected to percentiles; the change is defined as the difference between *absence of* and *presence of* (for example, not having market access versus having market access).

> FINDING 7: Access to markets and increases in household assets are strong enablers of household recovery from shock. Increases in these two measures from the bottom quarter of the sample to the top quarter of the sample improve rates of household recovery by seven percent.

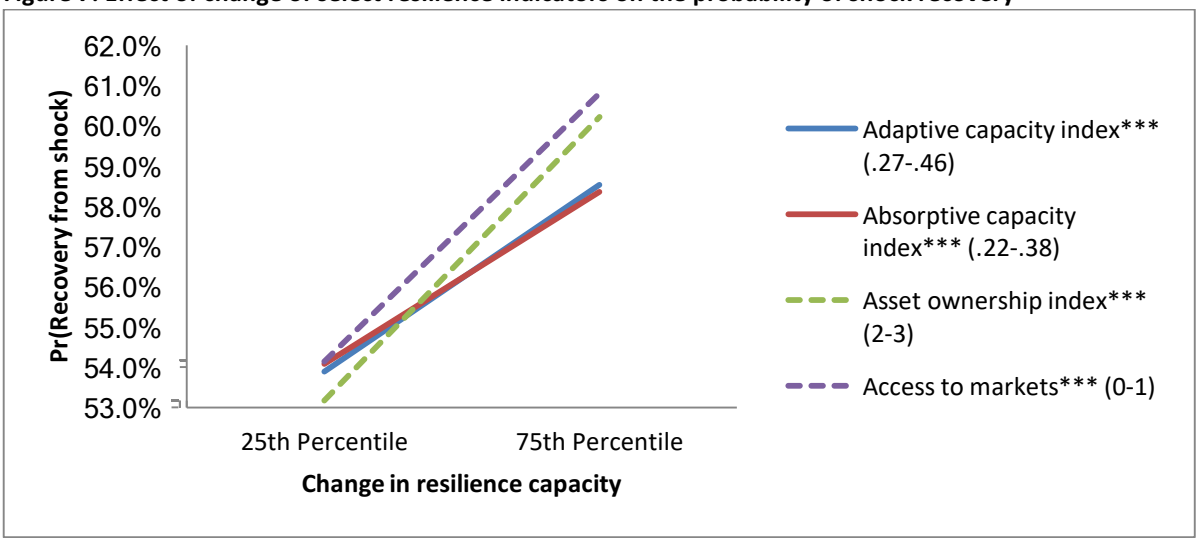
In each of the following figures, the y-axis represents the probability of a particular outcome. **Figure 7** plots the probability of recovery from shock[13] against five resilience capacities with strong and statistically significant relationships with the probability of poverty (for full results, see Annex B: **Table 18**). It shows that the chance of shock recovery increases with increases in any of the variables plotted, as all lines slope upward (i.e., climb to higher values along the y-axis) as the values of these explanatory variables increase left to right along the x-axis. Each of the component indicators (dotted lines) has a stronger effect than either adaptive or absorptive capacities (solid lines), with asset ownership (green dotted line) and access to markets (purple dotted line) having the strongest effect: when the number of asset categories in which households own at least one asset increases from 2 to 3, the probability they will recover to the same or better as before the shock increases from about 53 percent to just over 60 percent. When households gain access to markets (i.e., when they move from having no market access – an indicator value of 0 – to access – a value of 1), on average their chance of recovering from shock increases from about 54 percent (where the purple dotted line starts along the y-axis) to about 61 percent, a substantial change. By comparison, absorptive (red solid line) and adaptive capacities (solid blue line) have weaker effects relative to the other variables plotted here: moving from the 25th and 75th percentile values for both these indexes corresponds to an increase in the probability of shock recovery from about 54 percent to 58 percent. This is still an important change relative to variables not included in this figure; simply, of the most important variables measured, these two capacity indexes are less important than asset ownership and access to markets.

The effects of the individual capacity components (e.g. access to markets and assets) can be interpreted as the direct influence that these characteristics have on recovery, independent of their contributions to absorptive, adaptive, and/or transformative capacities. These findings suggest that market access and

[13] *Recovery from shock* in this measurement includes households who reported recovering to *the same* or *better* levels as before the shock.

asset ownership strongly support improved recovery, over and above, their contributions to absorptive, adaptive, and transformative capacities. This is in contrast to the indirect effect that these variables have on probability of recovery through their direct contributions to improved absorptive, adaptive, and transformative capacities. Notably, in the Mercy Corps post-quake study, access to markets was associated with *lower*, short-term recovery (Petryniak, et al. 2016). A key recommendation of their study was to provide support for restoration of markets as a critical early response. The finding below validates this recommendation. Households with better market access 8 months post-earthquake – presumably to functioning markets – are predicted to have much better recovery.

Figure 7: Effect of change of select resilience indicators on the probability of shock recovery



NOTE: Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

FINDING 8: Several components of resilience capacity have a direct influence on reducing hunger, although absorptive and adaptive capacity reduce hunger more than any of these single other measures alone. Overall, the influence of resilience capacity in reducing hunger for this sample is low, likely a reflection of the low prevalence of hunger in this particular sample population.

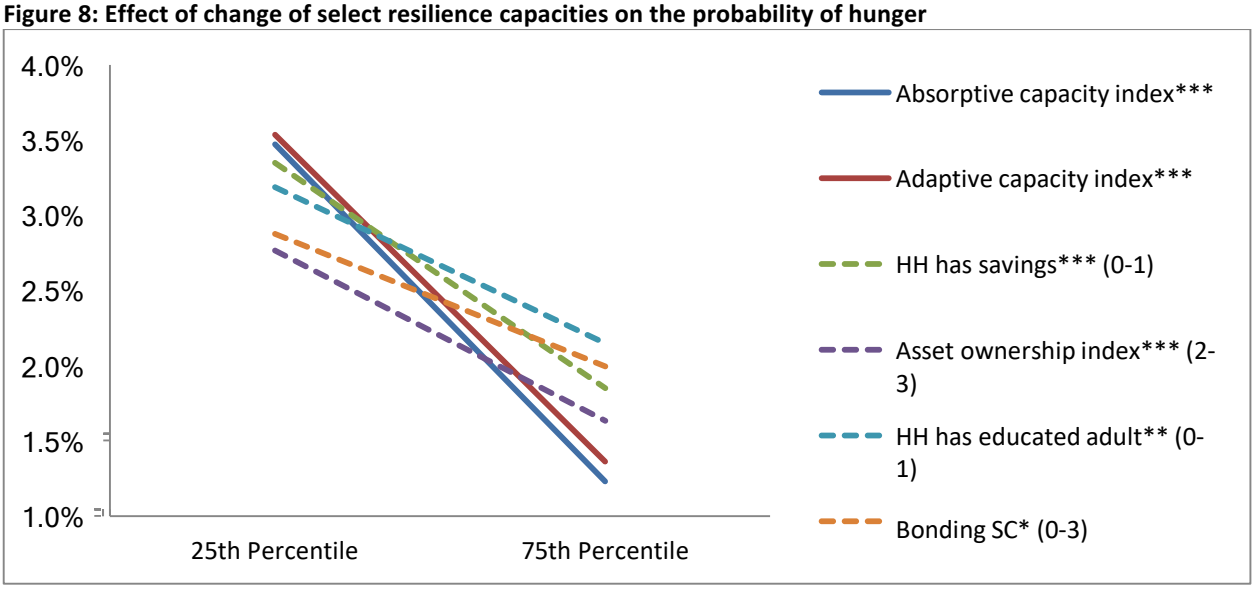
Figure 8 plots the probability of hunger against six variables with strong and statistically significant relationships with this outcome (for full results, see Annex B: **Table 19**). Two are resilience capacity index variables (absorptive and adaptive, shown as solid blue and red lines, respectively) and four are component variables (dotted lines). In contrast to the finding for probability of poverty, when we do a similar analysis for the probability of hunger we find that the resilience indexes are more powerful than the individual component resilience capacities. Moving from the 25th to 75th percentile values for absorptive capacity (0.22 to 0.38, respectively) is predicted to lower the chance of household hunger from 3.5 percent to about 1.25 percent; the same inter-percentile shift for adaptive capacity lowers the probability of hunger almost as much, from 3.5 percent to about 1.4 percent. Again, we should recall that the percentage of households in the sample experiencing hunger is quite low (2.3 percent, see **Table**

3); nevertheless, these data suggest that improving absorptive and adaptive capacities has the strongest influence on hunger when controlling for other resilience capacities.

The third-most powerful indicator – and the strongest of the individual indicators – in terms of effects on hunger, is household savings. This is measured using a binary variable that indicates whether households have savings or not. Households with savings are predicted to have about a 1.7 percent change of experiencing hunger, compared to 3.5 percent chance for those without savings – a marked difference. This is consistent with Mercy Corps study in which households with formal savings before the earthquake were more likely to meet their food needs after the earthquake (Petryniak, et al. 2015)

Overall, these findings suggest that investments in absorptive capacity, adaptive capacity, and household savings practices will positively influence hunger levels to a greater extent than the other possible indicators measured in this survey.

Figure 8: Effect of change of select resilience capacities on the probability of hunger



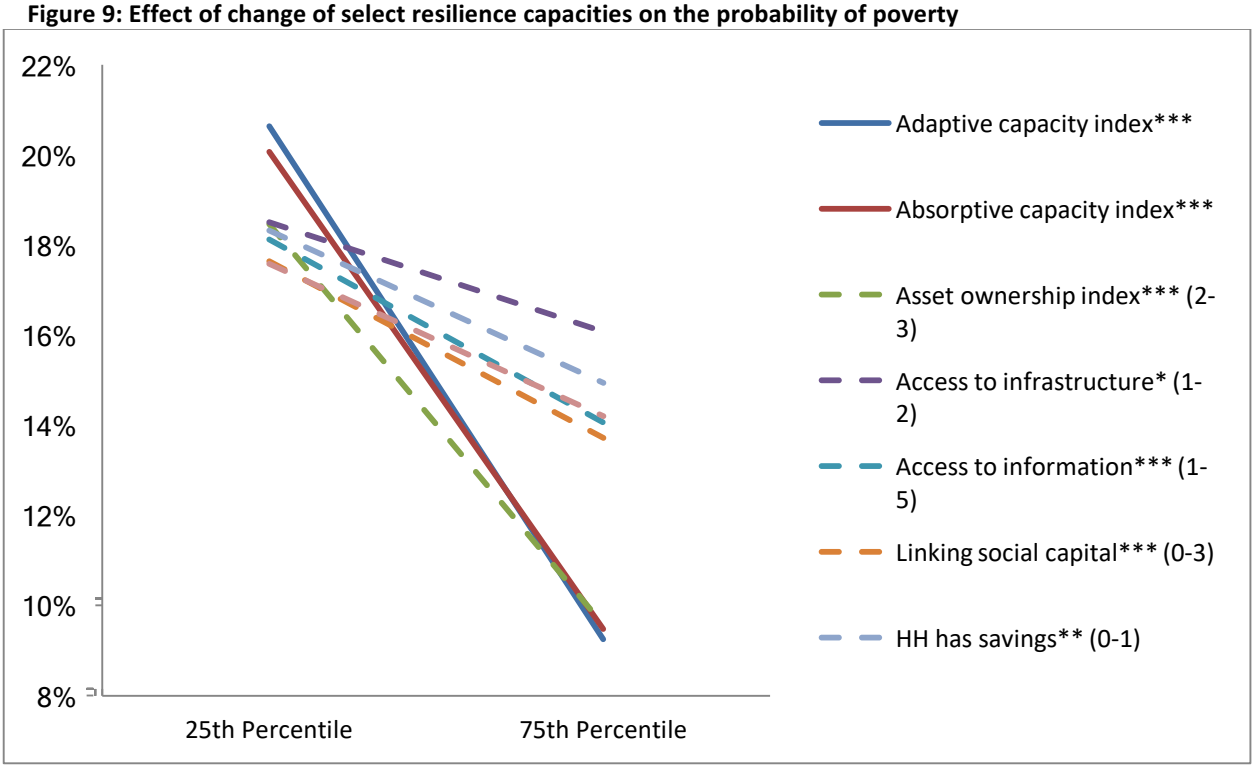
NOTE: Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

FINDING 9: Similar to hunger, several components of resilience capacity have a direct influence on reducing poverty; however, again, absorptive and adaptive capacity reduce poverty more than any single other measure alone. Reductions in poverty predicted by higher absorptive or adaptive capacities are quite strong. Movements from the bottom quarter of absorptive or adaptive capacity to the highest quarter of household surveyed in Nepal reduce the chances a household will be poor by greater than 10 percent.

Figure 9 graphs the probability of poverty (as measured by per capita expenditures) against eight resilience capacities with strong and statistically significant relationships (for full results, see Annex B: **Table 19**). Again, two are the absorptive and adaptive capacity indexes, while the remainder are component resilience capacities. Similar to the hunger finding, absorptive and adaptive capacities are

predicted to make the most powerful improvements with respect to poverty. For both indexes, the 25th percentile values (0.22 for absorptive, 0.27 for adaptive) correspond to about an 18 percent poverty rate. The 75th percentile for both indexes (0.38 for absorptive, 0.46 for adaptive) corresponds to a probability of poverty of about 7 percent, an 11 percentage point reduction. These steep slopes mark dramatic improvements in the poverty level. Asset ownership also has a strong influence: households that gain one asset category (from two to three) improve their chances of poverty by about seven percentage points (from roughly 14.5 percent to 7 percent). Access to infrastructure, access to information, access to savings, bonding social capital, and linking social capital also exhibit direct relationships to predicted reductions in poverty; although, these relationships are weaker than those found with absorptive capacity, adaptive capacity, and asset increases. Similar upward movements in these aforementioned components (e.g. access to infrastructure, access to information, savings, etc.) predict 2-4 percent reductions in poverty.

Figure 9: Effect of change of select resilience capacities on the probability of poverty



NOTE: Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Takeaways 9: Resilience capacity components and outcomes

Access to markets and increases in household assets are strong enablers of household recovery from shock. Increases in these two measures from the bottom quarter to the top quarter of the sample improve rates of household recovery by seven percent.

Quite a few components of resilience capacity have a direct influence on reducing hunger, although absorptive and adaptive capacity reduce hunger more than any of these single measures alone. Overall, the impact resilience capacity has on reducing hunger for this sample is low. This is likely a reflection of the low prevalence of hunger in this particular sample population.

Similar to hunger, a number of components of resilience capacity have a direct influence on reducing poverty; however, again, absorptive and adaptive capacity reduce poverty more than any single other measure alone. Reductions in poverty predicted by higher absorptive or adaptive capacities are quite strong. Movements from the bottom quarter of absorptive or adaptive capacity to the highest quarter of household surveyed in Nepal reduce the chances a household will be poor by greater than 10 percent. This may suggest that most of the reductions in poverty (and hunger) that stem from improvements in the underlying components are realized, or mediated, through improvements in absorptive and/or adaptive capacity.

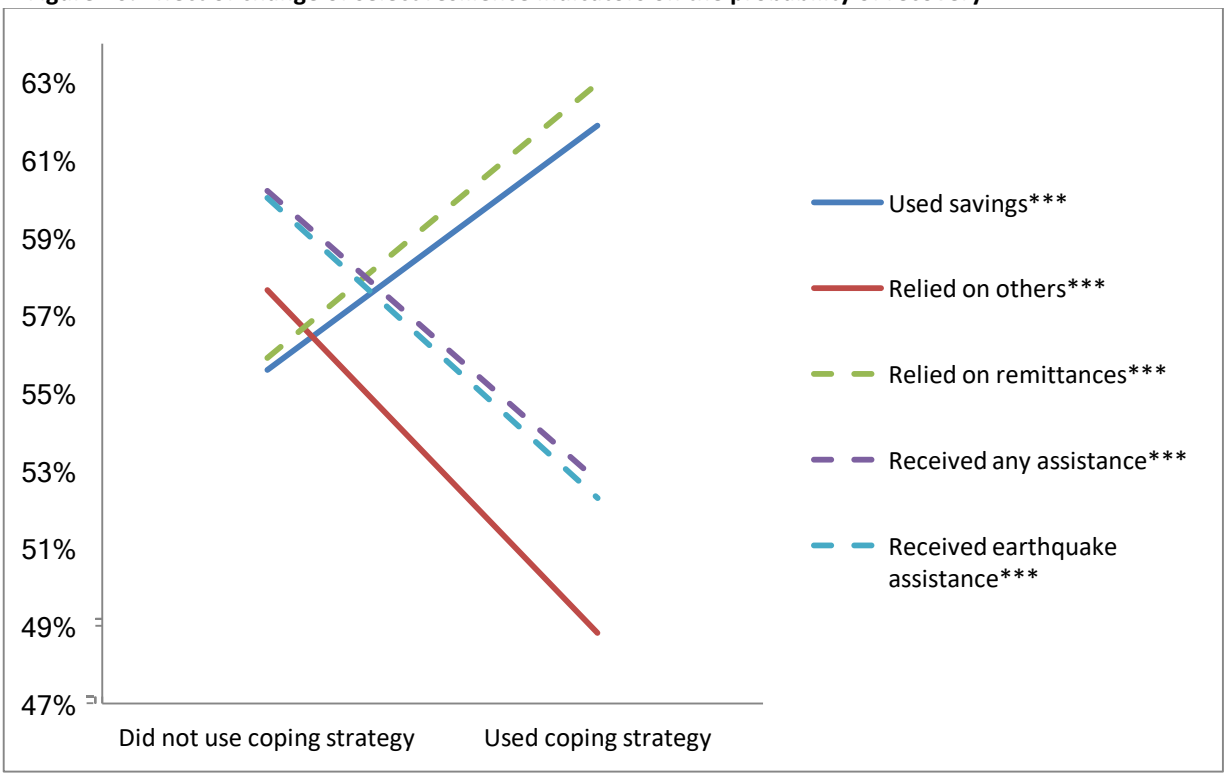
9. Shock coping strategies, resilience capacity, and outcomes

The results presented in this section demonstrate the relationships between well-being outcomes and household response to shock. Results were generated using multivariate regression analysis in which strategies used to cope with shock are intermediate outcomes that are treated as key determinants of recovery from shock, controlling for shock exposure, household characteristics, (e.g. wealth, caste, demographics), and community characteristics. Descriptions of the specifications are described in Annex C. Full results from all regressions are available in Annex B: **Table 21**.

It should be noted that the shock coping strategies presented below, although seemingly similar, are distinct from resilience capacities. All of the shock coping strategies presented below are sourced from questions asking respondents about their use of each of the respective response strategies in reference to shocks experienced. In contrast, similar characteristics that are defined as resilience capacities (e.g. social capital, access to remittances, access to savings, etc.) are measured as sustained household stocks of these characteristics independent of households' exposure to shocks. Descriptions of the measurement of resilience capacities and shock coping strategies are available in Annex A.

FINDING 10: Households that relied on savings and remittances as coping strategies for shock had better recovery outcomes. Alternatively, households that received any type of formal assistance or relied on informal help from others were less likely to recover.

Figure 10: Effect of change of select resilience indicators on the probability of recovery



As seen **Figure 10**, households that used savings, as well as those that could rely on remittances, as means to cope with shock were between 6 and 7 percent more likely to recover than households that did not utilize, or more likely did not have access, to those two coping mechanisms. Alternatively, households that reported relying on informal support, from those within and outside their community, or received formal assistance to help recover from shock were 8 to 9 percent less likely to recover from shock, when controlling for other factors. Mercy Corps' post-quake study found that households that received timely support were more likely to recover (Petryniak et al. 2015). The result presented above which suggests that households that received assistance were less likely to recover may be reflective of the timeliness in which households in this sample received assistance. The inverse relationship between relying on informal networks and recovery may suggest that relying on others is the coping mechanism of "last resort" and is more frequently used by the most vulnerable that do not have access to savings or remittances.

The relationships between resilience capacities and these coping strategies were explored; however, the results did not uncover any consistent patterns. Full results are available in Annex B: **Table 22**.

Takeaways 10: Response to shock and recovery from shock

Households that relied on savings and remittances as coping strategies for shock had better recovery outcomes. Alternatively, households that received any type of formal assistance or relied on informal help from others were less likely to recover.

Households relying on savings and households that reported using remittances to help recover from shock were 6- 7 percent likely to recover. In contrast, households that received formal assistance were 7-8 percent less likely to have recovered at the time of the survey, and households that relied on others were 9 percent less likely to recover.

No consistent patterns were uncovered with respect to the relationships between these coping strategies and resilience capacity.

10. Utilization of anticipated project-promoted practices

This section compares SABAL and PAHAL project areas in terms of their utilization – at baseline – of household practices related to agriculture and WASH. The analysis focuses on specific practices that each project plans to promote or influence, based on the inclusion of these required-if-applicable indicators in the project's M&E results framework.

10.1 Agricultural practices

The first three indicators for agricultural practices in **Table 9** are the same across projects and thus allow a straightforward comparison. Indicators (4a) – (4f) relate to specific crop, livestock, and natural resource management (NRM) practices of each project: while SABAL and PAHAL promote some of the same practices, others are unique to each one. The number of practices promoted in each of these three categories differs between projects, and thus the denominator used to calculate the indicator values for each category also differs. Because this renders the indicators not directly comparable, their values are presented in separate rows and an "all" value is not reported. Indicator (4g) has been created to capture the combination of these three categories (crop, livestock, and NRM), using a calculation that controls for the differences described, thus enabling comparability of the two projects.

The data show substantial and statistically significant differences between SABAL and PAHAL for most of the agriculture indicators. Indicator (1) relates to financial services that may be used to support agricultural livelihoods. These include credit services (agrovet [cash or in-kind], contract farming, village savings/credit groups, farmers associations, microfinance institutions, input from buyers, bank, cooperative, and other); savings services(village savings/credit groups, microfinance institutions, co-ops,

banks, mobile banking, other; and crop insurance. Overall, 69.9 percent of households in both projects utilized some type of these financial services, which is the highest rate of utilization of any agricultural service/practice relative to the other indicators measured. Utilization was much higher in SABAL (74.1 percent of households) than in PAHAL (59.3 percent.)

Value chain promotion (indicator [2]) is an important anticipated component of both projects. The survey measured utilization of the following value chain activities promoted by both projects: purchasing inputs through agro-dealers or community associations; use of mobile finance; use of financial services (not mobile); use of contract farming; use of feed lots/ feed pens; trading/ marketing produce through agro-vets/ community associations/ co-ops; and use of formal marketing systems for livestock/ fruits/ spices/ honey/ organic coffee. A little more than half the sample (55.5 percent of households) reported engaging at least one of these practices in the past year; the difference between SABAL and PAHAL is not statistically significant.

Both projects intend to promote the following improved storage practices (indicator [3]): hermetic storage, improved granary, warehousing/ cereal banks, and grain bag with bio-pesticides. Use of such practices is far more prevalent in PAHAL areas than SABAL (50.5 percent of vs. 27.5 percent of households, respectively).

As noted earlier, SABAL and PAHAL intend to promote some common and some different practices relating to sustainable crop, livestock, and NRM practices. Annex E details these practices. Examining the values for these indicators in **Table 9**, we see that utilization rates for sustainable crop practices – *as defined by each project* (recall that SABAL and PAHAL computations are different due to differences in the number of practices promoted) – are similar in the two project areas: 27.2 percent of households in SABAL, and 28.1 percent in PAHAL, are using at least three target crop practices. In contrast, utilization of sustainable livestock practices is quite different across projects, with 27.0 percent of SABAL households using at least three practices but only a low 5 percent in PAHAL. The NRM indicator value is also drastically different, with 43.7 percent of SABAL households using the target number of NRM practices compared to only 3.4 percent in PAHAL. Again, it is important to note that these differences cannot be compared statistically. SABAL intends to promote more practices than PAHAL in each of these three areas, yet the target number for practices utilized is three for any category (crop, livestock, and NRM). It is therefore likely easier for SABAL households to meet the threshold of three practices (i.e., because the SABAL utilization rate is computed based on a wider range – a higher number – of possible practices). The more meaningful comparison in this table is indicator (4g): percentage of households practicing at least three (in the case of PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices. This measure has been adjusted to account for the disparities described above. Here we see that when considering the range of improved practices for crops, livestock, and NRM, and in light of the measurement adjustment, PAHAL households are in fact utilizing these practices to a much greater extent than SABAL (58.8 percent vs. 36.1 percent, respectively). This notable difference will be further

commented on when we speak about the relationship of these practices to resilience and shock recovery (see Section 11).

Table 9: Household utilization of agricultural practices and agricultural financial services

	Indicator	SABAL	PAHAL		All
1	% HH using at least 1 financial service in past 12 months	74.1	59.3	***	69.9
2	% HH that practiced at least 1 value chain activity in past 12 months	57.2	51.1		55.5
3	% HH that used any improved storage practice in past 12 months	27.5	50.5	***	34.0
4a	*% HH practicing at least 3 (of 8) sustainable CROP practices (SABAL)*	*27.2*	--		*NA*
4b	*% HH practicing at least 3 (of 7) sustainable CROP practices (PAHAL)*		*28.1*		*NA*
4c	*% HH practicing at least 3 (of 8) sustainable LIVESTOCK practices (SABAL)*	*27.0*	--		*NA*
4d	*% HH practicing at least 3 (of 5) sustainable LIVESTOCK practices (PAHAL)*		*5.0*		*NA*
4e	*% HH practicing at least 3 (of 6) sustainable NRM practices (SABAL)*	*43.7*	--		*NA*
4f	*% HH practicing at least 3 (of 4) sustainable NRM practices (PAHAL)*		*3.4*		*NA*
4g	% HH practicing at least 3 (PAHAL) or 5 (SABAL) sustainable crop, livestock, or NRM practices	36.1	58.8	***	42.5
	n	*3112*	*3186*		*6298*

NOTE: Asterisks represent statistical significance between programs at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

10.2 WASH practices

Table 10 shows the values for the WASH indicators applicable to the two projects. High values are considered positive, i.e, increased values for these indicators over project life will indicate improvements (except for the last indicator, which measures open defecation, where we would wish to see lower values). The data show that more than half (59.2 percent) of sampled households have access to an improved water source.[14] A large majority (87.6 percent) of sample households has access to a water source within 30 minutes' walking (this also includes cases where water is available at the dwelling or plot). SABAL households are slightly better-off in this regard compared to PAHAL, though the

[14] Improved water sources include piped water, tube well or borehole, protected well, protected spring, rainwater, and bottled water. The source must be available year round, with no interruption in the two weeks prior to the survey.

difference is small (89.0 percent and 84.1 percent of households, respectively, have such access). Water treatment rates, however, are quite low in both areas (12.8 percent in SABAL. 6.7 percent in PAHAL).

Most households have improved sanitation[15]: 67.3 percent in SABAL and 75.4 percent in PAHAL. Consistent with this finding, more SABAL households practice open defecation (14.8 percent, versus 8.2 percent in PAHAL). Handwashing practices[16] are not commonly observed, though they are more prevalent in SABAL (51.0 percent of households) than PAHAL (35.7 percent).

Table 10: Utilization of WASH practices

Indicator	SABAL	PAHAL		All
% HH with improved water source	59.4	58.5		59.2
% HH within 30 minutes walking of water source	89.0	84.1	**	87.6
% HH following correct water treatment practices	12.8	6.7	***	11.1
% HH with improved sanitation	67.3	75.4	***	69.6
% HH practicing proper handwashing practices	51.0	35.7	***	46.6
% HH practicing open defecation	14.8	8.2	***	12.9
n	*3112*	*3186*		*6298*

NOTE: Asterisks represent statistical significance between programs at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

[15] Improved sanitation must be non-shared and includes flush to piped sewer, flush to septic tank, flush to pit latrine, ventilated pit latrine, pit latrine w/slab, and/or composting toilet.

[16] Proper handwashing practice is defined as when all of the following conditions are observed: place to wash hands + water is available + soap/ detergent/ ash/ mud/ sand is available.

Takeaways 11: Utilization of WASH and agricultural practices

Overall, utilization of agricultural financial services and adoption of improved agricultural practices is relatively widespread across the combined project areas, particularly considering that project implementation has yet to begin. Utilization of agricultural financial services is high, 59.3 percent of PAHAL households and 74.1 percent of SABAL households report using an agricultural financial service in the past 12 months. Just over 50 percent of households in the project areas have adopted a value chain activity at the time of the baseline survey. Adoption of improved storage practices is high in the PAHAL project area (50.5 percent) of households and double the rate of adoption by SABAL project-area households (27.5 percent). Nearly 60 percent (58.8) of households in the PAHAL area report adoption of at least 3 sustainable crop, livestock, or NRM practices and over one-third of SABAL households (36.1 percent) report adopting 5 or more of these practices.

Most households in the combined project areas have improved sanitation (69.6 percent), access to an improved water source (59.2 percent), and a reasonable commute to a water source (87.6 percent)

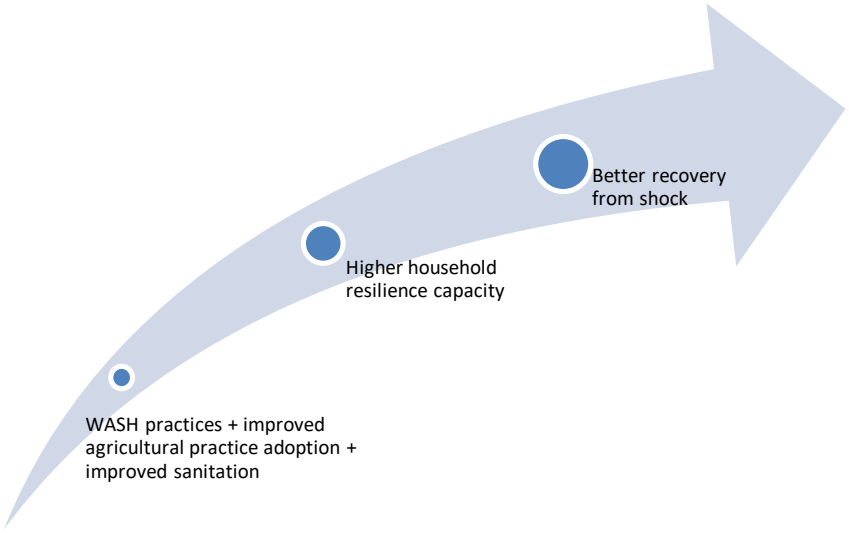
Only half of SABAL households practice proper handwashing (51 percent), while only one-third of PAHAL households (35.7 percent) observe proper handwashing techniques. Consistent with relatively high access to improved sanitation, rates of open defecation are low; however, almost twice as many SABAL households practice open defecation (14.8 percent) compared to PAHAL households (8.2 percent). Rates of application of correct water treatment practices are very low across both areas, 12.8 percent in the SABAL project area and 6.7 percent in the PAHAL project area.

11. Factoring in program variables: Regression analysis of effects on recovery and resilience outcomes

The regression analyses described graphically in this section seek to determine the influence adoption of improved agricultural practices and better WASH behavior has on recovery outcomes. The hypothesis tested is that anticipated program activities improve household recovery from shock mainly through the improvement of household resilience capacity. For purposes of this analysis and following discussion, “anticipated program variables” refers to indicators that are tracking activities anticipated to be promoted by the projects (e.g. agricultural practice adoption, WASH practice adoption), as well as indicators the projects are measuring that are related to expected program implementation (e.g. improved sanitation). In all, there are 13 anticipated program variables sourced from the Baseline Study. All are binary variables, i.e., each one tells us whether a specific condition or set of related conditions is met or not met, whether a certain characteristic or set of related characteristics is present or not

present. Taking as an example the topmost anticipated program variable shown in - *% HH that practiced at least one value chain activity in past 12 months*, this can have a value of 0 or 1, "present" or "not present." The household either practices one or more of the value chain activities expressed in the survey (value = 1), or it does not (value = 0).

The first set of analyses employed to test our hypothesis, investigates whether anticipated program variables have a *direct*, positive effect on household recovery from shock. There is no reason to believe that WASH behaviors or adoption of agricultural practices measured should directly improve recovery; however, we do believe that the anticipated program variables should improve some intermediate outcomes – in particular, resilience capacity. In turn, these increases in resilience capacity should support, positively and directly, improved recovery. Evidence from section 8.1 (see **Figure 6**) already suggests that household resilience capacity supports improved recovery. If we find no evidence that anticipated program variables directly support recovery; but, alternatively find that the anticipated program variables do lead to higher household resilience capacity, this would provide evidence of the pathway in which improved WASH and agricultural practices support recovery from shock.



FINDING 11: Improved WASH and agricultural practice adoption **DO NOT** have a strong, direct influence on household recovery from shock. Alternatively, improved WASH and agricultural practice adoption **DO** directly support higher absorptive and adaptive capacities.

Results from analysis exploring the relationship between WASH behaviors and adoption of agricultural practices suggest that they are weakly related to recovery from shock (**Table 11**). Of 13 possible behaviors and practices, only 3 are positively and significantly related to recovery, controlling for other household and community variables (Annex B:**Table 23**). The 13 WASH and agricultural practice indicators explain just 7.8 percent of the model variance, which is generally considered very weak

explanatory power.[17] Alternatively, subsequent figures and discussion will show, anticipated program variables *are* quite influential in positively supporting resilience capacities, which in turn influence recovery, central to our initial hypothesis.

Table 11: Effects of WASH behaviors and characteristics and adoption of improved agricultural practices on recovery, absorptive capacity, and adaptive capacity

WASH and agricultural practice adoption	Recovery	Absorptive Capacity	Adaptive Capacity
% of farming HH using at least one financial service in past 12 months		+++	+++
% of farmer HH that practiced at least one value chain activity in past 12 months	+	++	
% of farming HH practicing at least three sustainable crop practices			
% of farming HH practicing at least three sustainable livestock practices	-	+++	+++
% of farming HH practicing at least three sustainable NRM practices	- - -	+++	+++
% of farming HH practicing at least three (PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices		+++	+++
% of farming HH who used any improved storage practice in the past 12 months	+++		
% of HH with improved water source		++	
% of HH within 30 minutes walking of water		++	+
% of HH following correct water treatment practices		+++	+++
% of HH with improved sanitation			++
% of HH practicing open defecation		- - -	- - -
% of HH practicing proper handwashing practices	+++	+++	+++
Total effect of WASH and improved agricultural practice	**Weak (7.8 of 100)**	**Strong (37.8 of 100)**	**Strong (25.8 of 100)**

(+) represents a positive relationship between practice with more (+) representing stronger statistical significance; (-) represents a negative relationship with more (-) representing stronger statistical significance

Contrary to the aforementioned results in which few WASH and agricultural practices are related to recovery, nearly all of the measured WASH and agricultural indicators are related to higher absorptive and adaptive capacity (**Table 11**; full results in Annex B: **Table 23** and **Table 24**). Ten of 13 are strongly related to higher absorptive capacity and 9 of 13 are strongly related to adaptive capacity. Overall, the 13 indicators explain 37.8 percent and 25.8 percent of the variation in absorptive capacity and adaptive

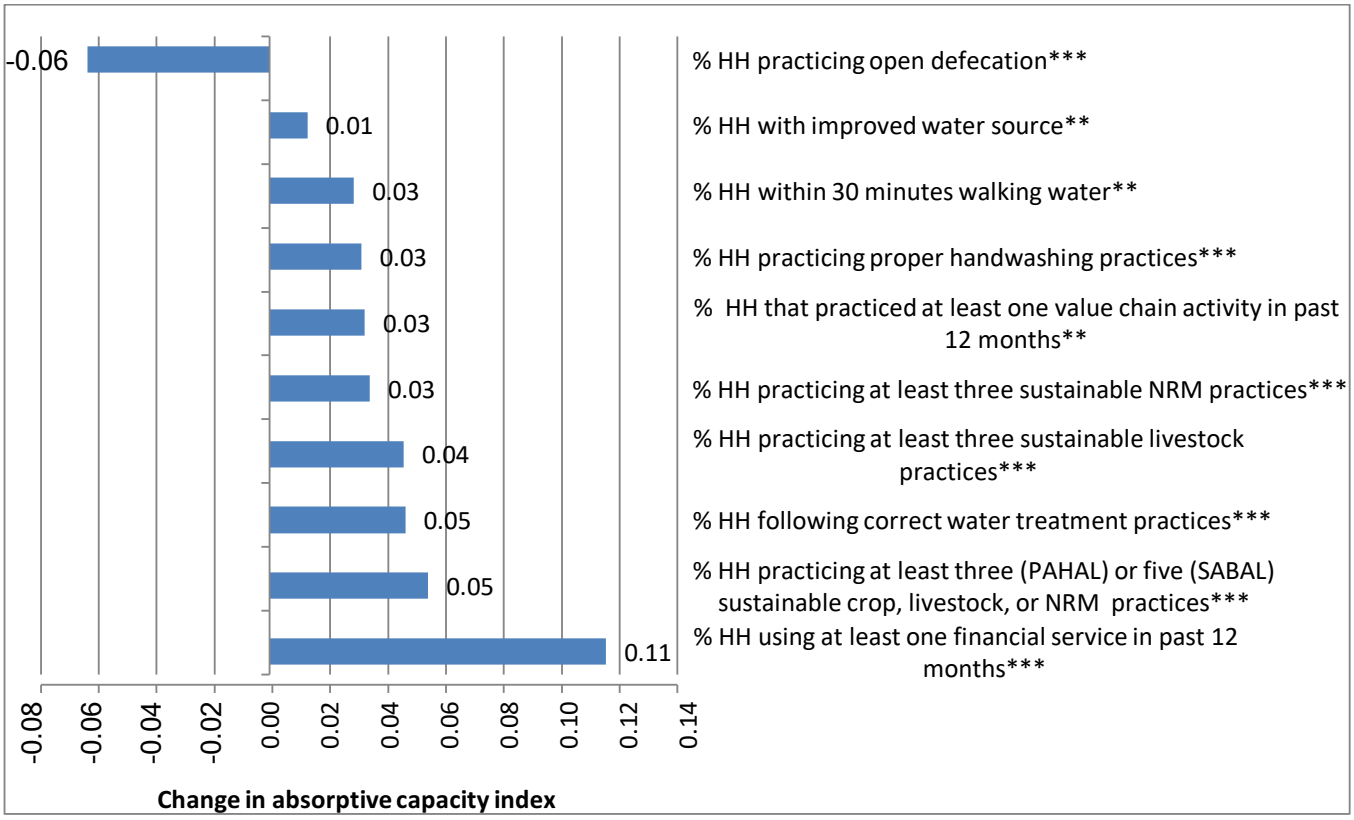
[17] Model variance refers to the coefficient of determination ("$R^{2"}$) of this particular specification. The full model, as shown in Annex B: Table 23, that includes household characteristic, community, and shock exposure controls has an R^2 value of 0.25 (i.e. the specified explanatory variables explain 25 percent of the variation seen in household recovery from shock). The anticipated program variables represent roughly one-third (0.078) of this total variation explained.

capacity across sampled households in the program area, respectively. These are robust results and lend support to our hypothesis that these characteristics and behaviors ultimately are supportive of improved recovery; however, indirectly through household-level (i.e. absorptive and adaptive) resilience capacity. Results presented later in this section provide the final piece of evidence necessary to defend the hypothesis – namely, that higher absorptive and adaptive capacities predicted by adoption of these WASH and improved agricultural practices, behaviors and characteristics lead to improved recovery outcomes.

> FINDING 12: Access to financial services; adoption of a portfolio of crop, livestock, or NRM practices; reduction of open defecation; and adoption of water treatment practices are the strongest determinants of improved absorptive capacity. Adoption of these 4 measures increase the level of predicted absorptive capacity from 0.21 to 0.39.

Prior to presenting the final link between practices, resilience capacity, and recovery, the following set of figures demonstrate the *magnitude* of effect that each of the practices have on absorptive and adaptive capacities. **Figure 11** maps the degree of effect of 10 anticipated program variables against absorptive capacity index values. The three indicators that are not statistically significant are excluded from the figure (again, full results in Annex B: **Table 23** and **Table 24**).

Figure 11: Magnitude effects of WASH behaviors and characteristics and adoption of improved agricultural practices on absorptive capacity



NOTE: Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

FINDING 13: Access to financial services; adoption of a portfolio of crop, livestock, or NRM practices; reduction of open defecation; and adoption of water treatment practices are the strongest determinants of improved adaptive capacity.

Of the 13 indicators measured, access to financial services has the strongest positive (desired) effect on absorptive capacity: it increases the absorptive capacity index score by 0.11 points (scale:0-1).[18] Water treatment and the practice of some combination of sustainable crop, livestock, or NRM practices are also important indicators: each raises the absorptive capacity index value by 0.05 points. A reduction in open defecation is also quite important, as open defecation practices account for an (undesired) decrease of 0.06 points on the absorptive index. Taken together and holding everything else constant, the adoption of these 4 measures (given the prior absence, or non-adoption of the measures) result in a

[18] Note that all changes are increases (positive numbers) except for practicing open defecation (negative number; top bar). Even though the direction of this change is negative – a decrease – this is the desired direction; for all other indicators shown, the desired direction is positive.

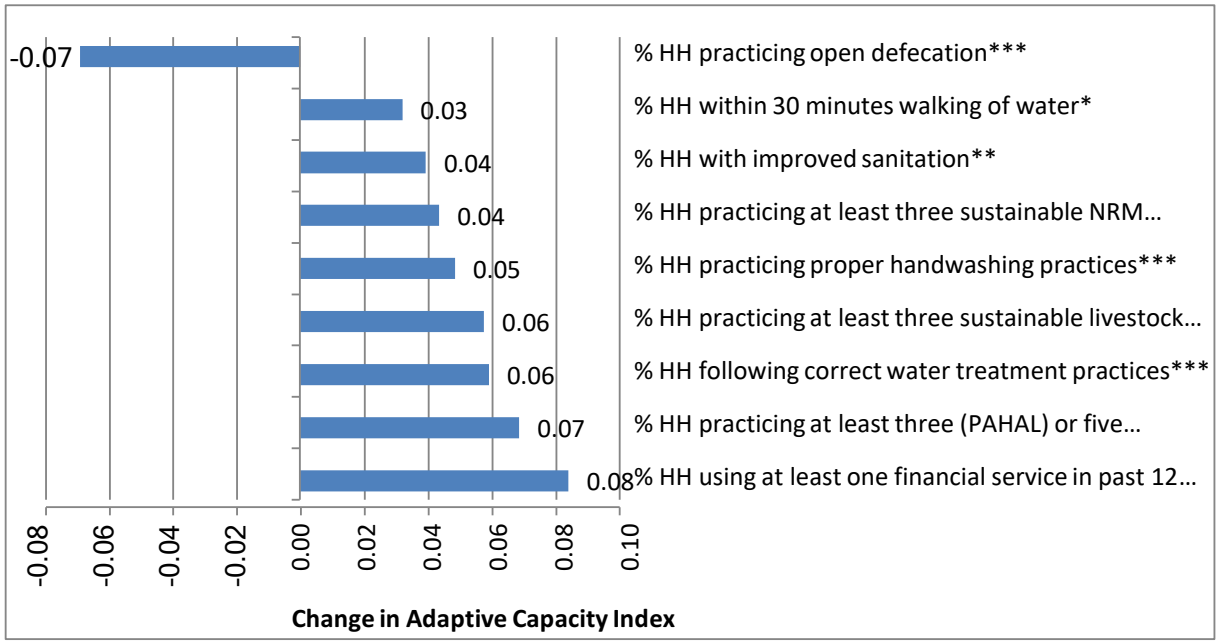
near doubling of the level of predicted absorptive capacity – from 0.21 to 0.39. Later, we will see what a change in this magnitude signals for predicted household recovery from shock.

WASH practices and adoption of agricultural practices also prove to be strong determinants of adaptive capacity, although their relationship with adaptive capacity is not quite as strong as it is with absorptive capacity (**Figure 12**; full results in Annex B: **Table 24**). Of the 13 indicators, 9 are found to be related to higher adaptive capacity, and taken together explain 25.8 percent of the total model variation (versus 37.8 percent for absorptive).

> FINDING 14: Access to financial services; adoption of a portfolio of crop, livestock, or NRM practices; reduction of open defecation; and adoption of water treatment practices are the strongest determinants of improved adaptive capacity. Adoption of these 4 measures increase the level of predicted absorptive capacity from 0.28 to 0.48.

Figure 12 shows the effect of the nine statistically significant variables on the adaptive capacity index. The top four anticipated program variables with the strongest effects on adaptive capacity are the same as those for absorptive: use of financial services (which increases the adaptive index score by 0.08 points, versus 0.11 points for absorptive), open defecation (which decreases the adaptive score by 0.07 points, versus by 0.06 for absorptive), use of a target number of crop, livestock and NRM practices (0.07 increase in the adaptive score, versus 0.05 for absorptive), and use of correct water treatment practices (0.06 increase in the adaptive score, versus 0.05 for absorptive). The other indicators positively, and significantly related to increased adaptive capacity are mostly the same ones, with the same or very similar magnitudes. Taken together and holding everything else constant, the adoption of the 4 measures (given the prior absence, or non-adoption of the measures) result in a large increase in the level of predicted adaptive capacity – from 0.28 to 0.48. Later, we will see what a change in this magnitude signals for predicted household recovery from shock. In sum, the findings in **Figure 11** and **Figure 12** tell us that essentially the same WASH practices and adoption of agricultural practice measures are significant determinants of both absorptive and adaptive capacity, and have mostly the same order of relative importance.

Figure 12: Magnitude effects of WASH behaviors and characteristics and adoption of improved agricultural practices on adaptive capacity



. NOTE: Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

The previous two figures illustrated the strength of relationship between individual practices and characteristics captured as part of the projects' M&E system to absorptive and adaptive capacity. We now will see how, ultimately, this observed positive relationship between practices and characteristics, in which they improve absorptive and adaptive capacity, promote better recovery from shock. As noted in the discussion of **Table 11**, the relationship of individual WASH, adoption of agricultural practices, and improved sanitation measures to recovery is weak. However further analysis indicates that these program indicators do have a strong influence on absorptive and adaptive capacities (see discussions of **Figure 11** and **Figure 12**, respectively).

Figure 13 and **Figure 14**, below, again compare the effect of absorptive and adaptive capacity on recovery from shock. The "standard" index model in both figures is represented as a red line; this model replicates exactly what is presented in **Figure 8**. We have added what we are calling an "enhanced" index, in which new absorptive and adaptive capacity indexes are predicted using the WASH, and adoption of agricultural practice indicators; this alternative relationship between "enhanced" absorptive and adaptive capacities is shown in both figures as a blue line. The predicted values of recovery stemming from changes in "enhanced" absorptive and adaptive capacity are generated using a simultaneous equations models (full results in Annex B: **Table 25** and **Table 26**), while predicted values of recovery based on movements from the original capacity indexes are from the principal regression specification using the initial, factor analysis predicted indexes (Annex B: **Table 17**). We already have

seen in **Figure 11** and **Figure 12** that increases in anticipated program variables improve absorptive and adaptive capacity index scores. While it may be argued that this alone has intrinsic value, the important empirical question is what does this combined effect have on recovery outcomes?

The first set of analyses employed to test our hypothesis, investigates whether WASH practices, improved sanitation, or adoption of improved agricultural practices have a *direct*, positive effect on household recovery from shock. There is no reason to believe that the anticipated program variables measured should directly improve recovery; however, we do believe that the program variables should improve some intermediate outcomes – in particular, resilience capacity - which in turn directly, positively supports improved recovery. Evidence from section 8.1 (see **Figure 6**) already suggests that household resilience capacity supports improved recovery. If we find no evidence that anticipated program variables directly support recovery; but, alternatively find that the anticipated program variables do lead to higher household resilience capacity, this would provide evidence of the pathway in which anticipated program variables support recovery from shock.

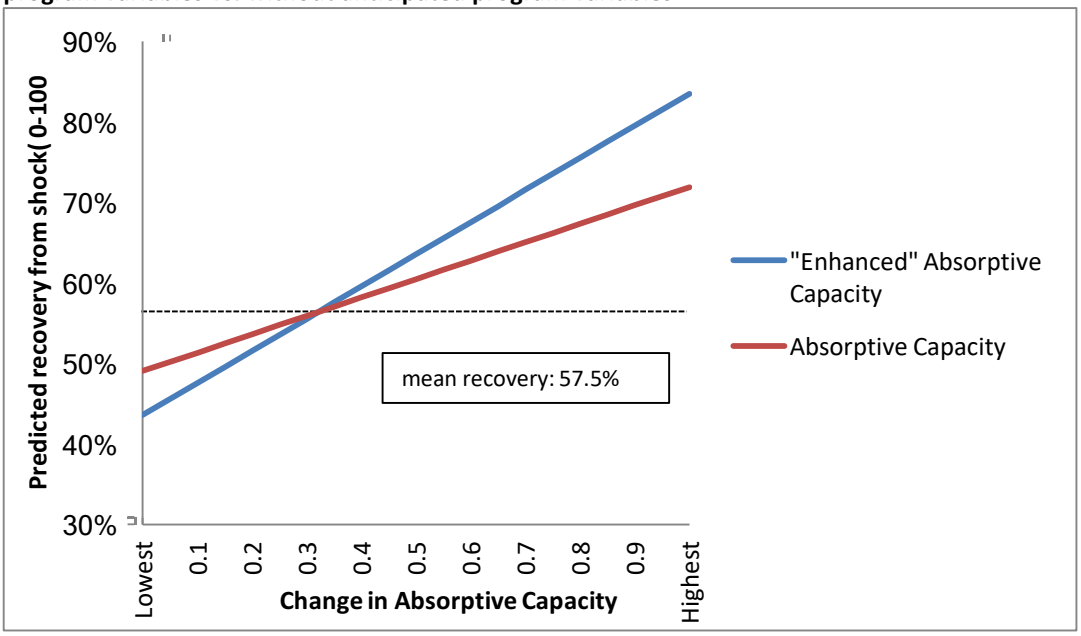
> FINDING 15: Improved WASH behaviors and adoption of improved agricultural practices have a strong, direct impact on improving absorptive and adaptive capacity and this improved household resilience capacity, in turn, give households an even greater likelihood of recovering from shock.

In the two figures below, the data suggest that the predicted absorptive and adaptive capacity indexes that take into account the strong, positive influence that proper WASH practices and adoption of improved agricultural practices have on absorptive and adaptive capacity, improve the predicted recovery trajectory of households. This suggests that building absorptive and adaptive capacity has an even stronger influence on recovery from shock than we initially thought, and this improved recovery is driven by the relationship hypothesized at the beginning of this section. Namely, improved WASH behaviors and adoption of improved agricultural practices have a strong, direct, positive impact on improving absorptive and adaptive capacity, which in turn have a strong, direct positive impact on recovery from shock. Keep in mind Finding 11: WASH behaviorsn and adoption of improved agricultural practices *do not* have a strong, direct relationship with recovery.

This evidence is presented graphically in **Figure 13**. Note, that the "enhanced" line has a steeper slope in both figures, which represents the improved recovery trajectory. The red line represents the original estimated relationship between absorptive capacity and recovery. An increase of the index value from 0.20 to 0.40 - an increase effectuated when a household begins to utilize agricultural financial services, adopts 3-5 improved agricultural practices, follows correct water treatment practices, and stops practicing open defecation (see Finding 13) – improves the predicted recovery rate from 54 percent to 58 percent of households (an increase of 4 percentage points). The same magnitude of change in the "enhanced" model, from 0.20 to 0.40, results in predicted recovery improving from 52 percent to 60

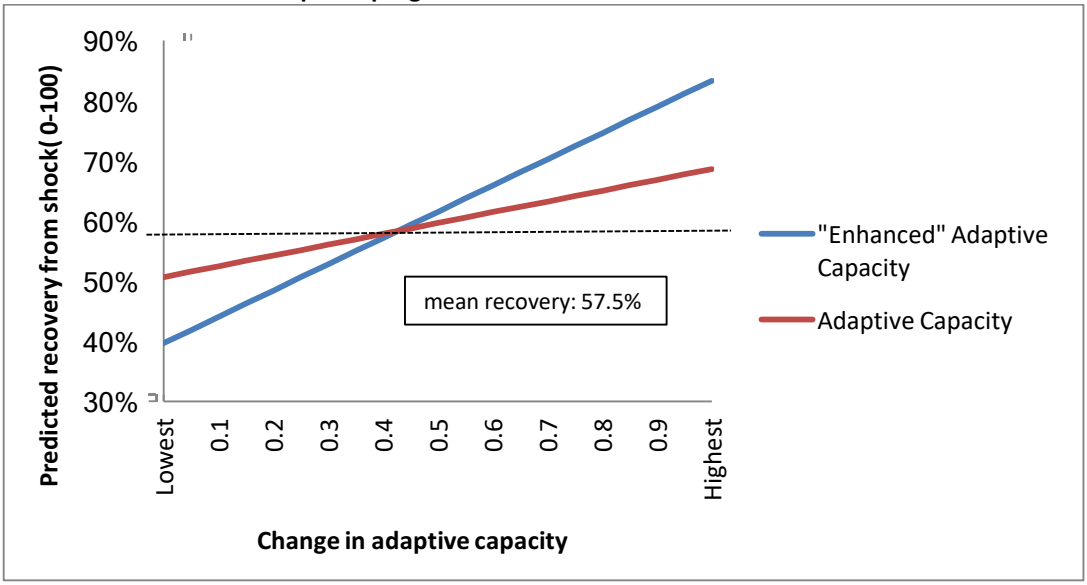
percent – a doubling of the rate of recovery (from a 4 percent improvement to an 8 percent improvement).

Figure 13: Effect of absorptive capacity on predicted recovery: with anticipated program variables vs. without anticipated program variables



This same finding, that recovery is more sensitive to improvements in absorptive capacity when accounting for potential improvements in WASH and adoption of improved agricultural practices, is echoed in the findings shown in **Figure 14** for adaptive capacity. In this case, an increase in the original adaptive capacity index score from 0.28 to 0.48 (see Finding 14) changes predicted recovery from 56 percent to 60 percent of households (4 percentage points). A stronger effect is seen for the enhanced model: the same increase in adaptive capacity (0.28 to 0.48), increases predicted recovery from 56 percent to 64 percent of households (8 percentage points). This reinforces the evidence provided in **Figure 13** that there is a positive empirical link between improved WASH and agricultural practices and resilience capacity that ultimately improve household recovery from shock.

Figure 14: Effect of adaptive capacity on predicted recovery: with anticipated program variables vs. without anticipated program variables



Takeaways 12: WASH/sanitation/agricultural practices, resilience capacity, and recovery

A hypothesis is tested that improved WASH and agricultural practices do no directly support household recovery from shock; but alternatively, these outputs lead to an intermediate outcome of higher household resilience capacity, and subsequently, improved recovery from shock.

Evidence supports this hypothesis. WASH and agricultural practices exhibit little to no direct relationship with recovery from shock. Alternatively, these behaviors, practices, and characteristics strongly support adaptive and absorptive capacities.

Using a simultaneous equation model, statistical evidence is provided linking improved WASH and agricultural practices to increases in adaptive and absorptive capacity, which in turn, lead to better recovery outcomes.

Households that utilize an agricultural financial service, use correct water treatment practices, practice a portfolio of agricultural practices, and do no openly defecate have notable higher levels of expected absorptive and adaptive capacity. Improvements in these variables lead to predicted increases in absorptive capacity from 0.21 to 0.39 and in adaptive capacity from 0.28 to 0.48. These corresponding increases in absorptive and adaptive capacity improve the probability of recovery from shock by 8 percentage points.

12. Conclusions

Using data from the 2015 Baseline Study of the SABAL and PAHAL development food assistance projects, this study provides a glimpse into household well-being and recovery roughly eight months following the catastrophic Gorkha earthquake. The study identifies various factors that strengthen household and community resilience in Nepal. Following are key findings:

Improvements in absorptive and/or adaptive capacity, despite persistent shocks and stresses, are likely to lead to lower poverty, lower hunger, higher incomes, and diets that are more diverse. Movement from levels of absorptive and adaptive capacity seen in the sample population from the bottom quarter to the top quarter decrease the likelihood of poverty by 7 - 9 percent, in absolute terms. Similar increases in absorptive and adaptive capacity lead to an estimated 6 percent increase in income, a 0.5 increase in the average number of food groups consumed, and a 2 percent lower likelihood of hunger.

Transformative capacity, as measured in this study, is not strongly associated with outcomes. Transformative capacity is only weakly associated with three well-being outcomes: reductions in poverty (2 percent reduction), income (2.5 percent increase), and dietary diversity (0.1 food group increase). All improvements cited are based on movements from the bottom quartile of transformative capacity to the top quartile. The weak relationship with well-being outcomes might be a reflection of the inability to capture important dimensions of transformative capacity, such as, quality of infrastructure and services and equitable distribution of services.

Savings and remittances, when used to cope with shocks and stresses, improve the likelihood of recovering from shock. Alternatively, households that relied on others (informal social networks) or received formal assistance were less likely to recover. Increases of 7-8 percent in the likelihood of recovery were associated with use of savings or remittances to cope with shock. Access to savings consistently appears to be associated with higher resilience capacity and improvements in well-being. Remittances, whether sourced from inside or outside the country, also help households recover from shock. Households that relied on others or received formal assistance were 8 to 9 percent less likely to recover from shock, when controlling for other factors.

Improved WASH and agricultural practices support household recovery from shock, principally through their collective influence on absorptive and adaptive capacity that, in turn, promote improved recovery from shock. While WASH and agricultural practices are not directly related to recovery from shock, these behaviors, practices, and characteristics do strongly support adaptive and

absorptive capacities. There is strong evidence that improved WASH and agricultural practices lead to increases in adaptive and absorptive capacity and, consequently, predict better recovery outcomes.

The four most influential drivers of absorptive and adaptive capacity - of the WASH and agricultural adoption practices measured - are utilization of an agricultural financial service, use of correct water treatment practices, adoption of a portfolio of 3-5 improved agricultural practices, and reductions in the practice of openly defecating. Predicted increases of the absorptive and adaptive capacity index achieved through adoption (or non-adoption in the case of open defecation) of these behaviors and practices lead to estimated increases of 0.20 in both absorptive and adaptive capacity (index scales: 0-1). Increases of this magnitude in absorptive and adaptive capacity result in an estimated 8-percentage point increased likelihood of recovering from shock.

In the context of resilience capacity, there is evidence of several opportunities available for improving well-being outcomes, both indirectly through improved absorptive, adaptive, or transformative capacities, and directly through improved access to savings, access to markets, increased education, and stronger bonding social capital. As cited above, evidence suggests that absorptive and adaptive capacities contribute to improved outcomes in the face of shock. Underlying drivers of absorptive capacity that are strong across all castes and contribute to improved well-being outcomes include access to informal safety nets (average 5 of 13 potential types), bonding social capital (average score of 4 of a maximum potential 6), and access to remittances (ranging from 24-34 percent of households. Those supporting better adaptive capacity include better levels of education (59-77 percent of households include an adult with primary education or higher), livelihood diversity (households engaging in an average of 3.0-3.4 different types of livelihoods), and access to financial services (most households have access to both a savings and lending institutions in their communities).

Some underlying components of resilience capacity directly support improvements in well-being, independent of their influence on absorptive, adaptive, or transformative capacities. Access to savings and increases in household assets most often, and directly, are associated with better outcomes, including stronger recovery, lower hunger, and reduced poverty. Better market access has a strong, direct positive influence on household recovery from shock. Access to markets, in particular, is relatively low for all households in the combined project areas. Only one-third of households report an existing market within 10 km and if improved could provide a significant boost to well-being. Resilience capacities that directly support reductions in hunger include higher education levels and bonding social capital. Those that directly support reductions in poverty are bonding social capital, linking social capital, access to information, and access to infrastructure.

An interesting and important finding is that absorptive and adaptive capacities, as overall indexes, reduce hunger more than any other single measure alone. This suggests that most of

the improvements in hunger and poverty driven by the components of the resilience capacities are achieved through improvements made directly to absorptive, adaptive, and/or transformative capacities.

There are notable areas of potential improvement that might afford increased household ability to respond to shock given deficiencies in resilience capacity. Limited access to formal safety nets and household disaster preparedness behaviors contribute to lower levels of sustained absorptive capacity. Access to shock preparedness and mitigation activities is low, averaging 0.3 to 0.4 on a scale of 3 potential activities. This could reflect a structural deficiency in community and social service infrastructure that support shock preparedness.

Overall, access to broader social networks (linking and bridging social capital) is relatively low. This suggests that social networks in the SABAL and PAHAL program areas are "thin" or "sparse" and that there are weak social ties across communities and between households and formal institutions. This may explain why reliance on social capital as a coping strategy to shock does not improve the recovery profile of households. Improvements that would help build informal networks that link households across communities and with public and private organizations could support higher sustained outcomes, including recovery from shock.

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Annex A. Resilience Indicators for Nepal

1. Calculation of measures of resilience

1.1 Absorptive capacity index

The absorptive capacity index is constructed from eight indicators, some of which are themselves indices. The indicators and explanations of their calculation are as follows.

1. Access to informal safety nets. This indicator is the total number of community organizations potentially providing safety nets that are available in each household's community. The household-level information on availability of groups is used to determine availability in the community.

Survey question: R601.

2. Bonding social capital index. The bonding social capital index is based on the responses to two questions: one asking whether the household would be able to get help from various categories of people living inside of their community if they need it and one asking whether the household would be able to give help to people in need living inside of their community. The possible responses are "relatives", "non-relatives within my ethnic/caste group", "non-relatives of other ethnic/caste groups" and "no one". An additive index ranging from 0 to 6 is calculated based on these responses.

Survey questions: R201, R203

3. Whether any household member holds savings. This indicator is a binary (dummy) variable equal to 1 if the respondent reported that a household member regularly saves cash.

Survey questions: R309

4. Access to remittances. This indicator is a binary (dummy) variable equal to 1 if the respondent reported that the household receives remittances.

Survey questions: R305, R306

5. Asset ownership index. Asset ownership is measured using the number of consumer durables owned out of a total of 15.[19]

Survey questions: BL H7.02

6. Shock preparedness and mitigation. Summary variable ranging from 0 to 3 summing up the points assigned to the following:

- Household lives in a community with a disaster management group (1);

[19] Information on the ownership of productive assets should be included in this index. It is not clear whether this information is being collected in the baseline.

- Household reports participating in any of the following activities: protecting crop land from flooding, protecting structures from flooding and landslides, preventing tree-cutting, or improving access to health services (1);

- Household reports receiving any of the following types of information in the last year: early warning for natural hazards, disease prevention, natural resource management (1).

Survey questions: R601d, R801, R802 R401a,f,m

7. Household has agricultural hazard insurance. This indicator is a binary (dummy) variable equal to 1 if the respondent reported that the household has agricultural hazard insurance.

Survey questions: BL G09.

Combine the eight indicators described into an absorptive capacity index using polychoric factor analysis. The factor used to compute the index has a Kaiser-Meyer-Olkin (KMO; a measure of sampling adequacy) statistic value of 0.67, which suggests an acceptable goodness-of-fit. Following are the factor loadings for the index components:

1.2 Adaptive capacity index

The adaptive capacity index is constructed from eight indicators, some of which are indices themselves. The indicators and calculation explanations are as follows.

1. Bridging social capital. The bridging social capital index is based on the responses to two questions: one asking whether the household would be able to get help from various categories of people living outside of their community if they need it and one asking whether the household would be able to give help to people in need living outside of their community. The possible responses are "relatives", "non-relatives within my ethnic/caste group", "non-relatives of other ethnic/caste groups" and "no one". An additive index ranging from 0 to 6 is calculated based on these responses.

Survey questions: R202, R204

2. Linking social capital. The linking social capital index is based on answers to questions regarding whether household members know a government official and/or NGO leader, how well they know them, and whether they believe the official/leader would help their family or community if help was needed. The index ranges from 0 to 6.

Survey questions: R205-R210

3. Human capital. This binary (dummy) variable is equal to 1 if any household adult has a primary or higher education.

Survey questions: BL21.

4. Livelihood diversification. The total number of livelihood activities engaged in in the last year. The question asked to identify these livelihoods is "What were the sources of your household's food/income over the whole last 12 months?" The possible options are:

- Farming/crop production and sales;
- Livestock production and sales;
- Wage labor;
- Salaried work;
- Sale of wild/bush products (eg., honey, charcoal);
- Other self-employment/own business;
- Rental of land;
- Remittances;
- Other.

Survey questions: R501.

5. Exposure to information. The number of topics the respondent has received information on in the last year, out of a total of 15.

Survey questions: R401a-o

6. Adoption of improved practices. This binary (dummy) variable is equal to 1 if respondents report adopting three or more improved practices for crop production (including vegetables) OR respondents report adopting three or more improved practices for livestock production OR respondents report following one natural resource management practice or technique not related directly to on-farm production OR respondents report using any improved storage method.

Survey questions: BL G3b, BL G16, BL G18, BL G21

7. Asset ownership index. See above.

8. Access to financial resources. The variable is equal to zero if there is no institution in a household's community providing credit or savings support, to one if there is one only, and to two if there are institutions that provide both types of support.

Survey questions: R701a,b

Combine the indicators into an index using polychoric factor analysis. The factor used to compute the index has a KMO statistic value of 0.67, which suggests an acceptable goodness-of-fit. Following are the factor loadings for the index components:

	Factor Loading
Bridging social capital	0.226
Linking social capital	0.528
Human capital	0.279
Livelihood Diversification	0.196

Exposure to information	0.494
Asset index	0.478
Access to financial resources	0.327

1.3 Transformative capacity index

The transformative capacity index is constructed from nine indicators, some of which are indexes themselves. The indicators and calculation explanations are as follows.

1. Access to formal safety nets. This community-level variable is based on a binary (dummy) variable equal to 1 if the household response to the following question is "yes": Are there any programs available to this community that help households with food or income when they are faced with a shock? The information from the household-level responses is used to compute a binary (dummy) variable equal to 1 if there are programs available in the community that help with food or income in response to shocks.

Survey questions: R703

2. Access to markets. This community-level variable is the number of markets available within 10 kms of the household's community, as determined from households' responses to questions asking whether the following markets are available in their community:

- Markets for selling agricultural products
- Markets for purchasing agricultural inputs
- Livestock market
- Market for selling forest products.

Survey questions: R704-R707

3. Access to basic services. This community-level variable is the number of basic services available in the households' community, as determined from households' responses to questions asking whether the following services are available in their community:

- A primary school within 5 km
- A health center within 5 km
- Access to safe drinking water.

Survey questions: R701c,d, BL F4-F10

4. Access to infrastructure. This community-level variable is the number of types of infrastructure available in the households' community, as determined from households' responses to questions asking whether the following types are available in their community:

- Electricity
- Cell phone service

- Public telephone
- Paved road.

Survey questions: R701f,g,h, R702

5. Access to agricultural services. This community-level variable is based on a binary (dummy) variable equal to 1 if the household reports that agricultural extension services are available in their community. The information from the household-level responses is used to compute a binary (dummy) variable equal to 1 if agricultural extension services are available in the community.

Survey questions: R701e

6. Bridging social capital. See above.

7. Linking social capital. See above.

8. Active participation in local decision-making bodies. A score variable ranging between zero and 42. A weighted sum of the number of community groups in which the respondent reports any household member's level of participation in any group's decision-making as "leader", "very active", or "somewhat active". A group is weighted as one if an adult male in the household reports participating, a weight of two is applied if any male youths participate, and a weight of three for any household females that actively participate in any of the 14 groups.

Survey questions: R602, R603

Combine the indicators into an index using polychoric factor analysis. The factor used to compute the index has a KMO statistic value of 0.64, which suggests an acceptable goodness-of-fit. Following are the factor loadings for the index components:

	Factor Loading
Formal safety nets	0.449
Access to markets	0.192
Access to basic services	0.237
Access to infrastructure	0.500
Access to ag services	0.645
Bridging social capital	0.108
Linking social capital	0.284
Participation in local bodies	0.330

1.4 Exposure to shock

Exposure to shock is measured as the number of shocks or stresses experienced in the last 12 months. The shock exposure index ranges from 0-9. The nine shocks and stresses include

floods/landslides, drought/insufficient rainfall, earthquake, land/forest degradation, crop disease and pests, hailstorm, severe illness of household member, market price fluctuations, and theft/conflict.

Survey questions: R101

1.5 Recovery from shock

Recovery from shock is based on the question: "To what extent has your household's ability to meet food needs returned to the level it was before all the shocks and stressors experienced in the last 12 months?" The variable is ordinal ranging from 0-2: 0=Ability to meet food needs worse before the shock(s), 1=Ability to meet food needs is the same before the shock(s), 2= Ability to meet food needs is better than before the shock.

Survey questions: R107

1.6 Coping strategies

Five coping strategies employed as responses to shock are calculated for this study:

- Use of savings – a binary variable that equals one if a household used its savings in the past 12 months to recover from shocks and stresses
- Use of remittances – a binary variable that equals one if a household uses remittances to recover from shocks and stresses
- Social capital – a binary variable that equals one if the household received help from relatives, non-relatives within their caste group, or non-relatives outside their caste groups with food, money, supplies/materials, livestock, or labor in the past 12 months
- Formal assistance – a binary variable that equals one if the household received assistance from NGO or government to cope with the impact of any shock within the past 12 months
- Formal assistance for earthquake – a binary variable that equals one if the household received assistance from NGO or government to cope with the impact of the earthquake within the past 12 months

Annex B. Supplemental Tables and Figures

Table 12: Relationship between resilience capacity indexes and poverty

Dependent Variables (D.V.): Poverty; Probit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-2.097***		
Adaptive capacity		-2.303***	
Transformative capacity			-0.618**
Shock exposure	-0.0425*	-0.038	-0.0653**
Household demographics (/Percent 30+)			
Percent 0-15	1.093***	0.911***	1.040***
Percent 16-30	-0.349**	-0.334**	-0.345**
Household size	0.180***	0.198***	0.178***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	-0.448*	-0.415*	-0.421*
Male and Female Adults	-0.0344	-0.0162	-0.0534
Child No Adults	-0.15	0.175	-0.0223
Caste (/Brahmin or Chhetri)			
Janajati	0.0384	0.0221	0.0657
Muslim	N/A	N/A	N/A
Dalit	0.260***	0.237***	0.276***
Newar	-0.209	-0.261	-0.21
Other	N/A	N/A	N/A
Project (/Sabal)			
Pahal	0.817***	0.856***	1.009***
Asset ownership index (0-12)	-0.271***	-0.240***	-0.347***
No impact from earthquake	0.00811	-0.0145	0.0136
Livelihood: Agriculture-only	0.0468	0.0227	0.0602
Livelihood: Remittances from outside Nepal	-0.00807	0.0215	0.0101
Constant	-1.763***	-1.714***	-1.993***
Observations	5967	5967	5967
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 13: Relationship between resilience capacity indexes and per-capita expenditures

Dependent Variables (D.V.): Per capita expenditures; OLS estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	1.012***		
Adaptive capacity		0.724***	
Transformative capacity			0.850***
Shock exposure	0.0197	0.0205	0.0344**
Household demographics (/Percent 30+)			
Percent 0-15	-1.667***	-1.637***	-1.666***
Percent 16-30	-0.527***	-0.548***	-0.542***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.134	0.102	0.112
Male and Female Adults	-0.401***	-0.414***	-0.393***
Child No Adults	-0.118	-0.215	-0.222*
Caste (/Brahmin or Chhetri)			
Janajati	-0.151***	-0.149***	-0.0715
Muslim	-0.198**	-0.194*	-0.331***
Dalit	-0.197***	-0.192***	-0.151***
Newar	0.153**	0.168**	0.187***
Other	0.432***	0.464***	0.530***
Project (/Sabal)			
Pahal	-0.711***	-0.783***	-0.669***
Asset ownership index (0-12)	0.111***	0.112***	0.144***
No impact from earthquake	0.00552	0.00809	0.0498
Livelihood: Agriculture-only	-0.0198	-0.0106	-0.0259
Livelihood: Remittances from outside Nepal	0.0832***	0.0752**	0.0681**
Constant	4.035***	4.126***	3.686***
Observations	6042	6042	6042
R2	0.392	0.391	0.33

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 14: Relationship between resilience capacity indexes and HDDS

D.V: HDDS; OLS estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	2.588***		
Adaptive capacity		2.361***	
Transformative capacity			1.299***
Shock exposure	0.0719***	0.0671**	0.0839***
Household demographics (/Percent 30+)			
Percent 0-15	-0.127	0.0197	-0.151
Percent 16-30	0.329**	0.291**	0.292**
Household size	0.0403**	0.0268*	0.0305*
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.117	0.0256	0.0829
Male and Female Adults	0.269***	0.249***	0.293***
Child No Adults	0.758	0.469	0.515
Caste (/Brahmin or Chhetri)			
Janajati	-0.527***	-0.507***	-0.654***
Muslim	-0.774	-0.653	-0.825
Dalit	-0.700***	-0.669***	-0.701***
Newar	-0.143	-0.0864	-0.0586
Other	-0.00512	0.0882	0.177
Project (/Sabal)			
Pahal	-0.556***	-0.764***	-0.668***
Asset ownership index (0-12)	0.180***	0.156***	0.296***
No impact from earthquake	0.0214	0.0296	0.0564
Livelihood: Agriculture-only	-0.0677	-0.0303	-0.106*
Livelihood: Remittances from outside Nepal	0.101*	0.0822	0.0449
Constant	5.008***	5.145***	5.592***
Observations	5850	5850	5850
R2	0.32	0.324	0.255

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 15: Relationship between resilience capacity indexes and hunger

D.V: Severe or Moderate Hunger; Probit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-2.398***		
Adaptive capacity		-1.775***	
Transformative capacity			-0.0688
Shock exposure	0.109**	0.109***	0.0813*
Household demographics (/Percent 30+)			
Percent 0-15	0.261	0.126	0.219
Percent 16-30	-0.603**	-0.606**	-0.607**
Household size	-0.0161	-0.00098	-0.0133
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	-0.0732	-0.0165	-0.0335
Male and Female Adults	0.276**	0.280**	0.246**
Child No Adults	0.471	0.771	0.619
Caste (/Brahmin or Chhetri)			
Janajati	0.0483	0.0328	0.0724
Muslim	N/A	N/A	N/A
Dalit	0.658***	0.626***	0.652***
Newar	N/A	N/A	N/A
Other	0.483**	0.361	0.435**
Project (/Sabal)			
Pahal	0.646*	0.789**	0.914***
Asset ownership index (0-12)	-0.0724	-0.0774*	-0.170***
No impact from earthquake	-0.203*	-0.219*	-0.179
Livelihood: Agriculture-only	-0.121	-0.139	-0.107
Livelihood: Remittances from outside Nepal	-0.186*	-0.149	-0.168
Constant	-1.871***	-2.023***	-2.341***
Observations	5654	5654	5654
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 16: Relationship between resilience capacity indexes and CSI

D.V.: CSI; Tobit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-24.63***		
Adaptive capacity		-23.27***	
Transformative capacity			-17.01***
Shock exposure	2.502***	2.582***	2.422***
Household demographics (/Percent 30+)			
Percent 0-15	9.063***	7.579***	9.577***
Percent 16-30	-0.276	0.183	-0.126
Household size	-0.415*	-0.192	-0.488**
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	1.981	2.622	1.421
Male and Female Adults	1.011	1.166	0.493
Child No Adults	1.372	4.464	-1.037
Caste (/Brahmin or Chhetri)			
Janajati	-0.533	-0.846	-0.198
Muslim	7.055	6.518	7.946
Dalit	8.414***	8.004***	8.712***
Newar	-6.255**	-6.728**	-5.262***
Other	5.96	4.461	1.032
Project (/Sabal)			
Pahal	19.15***	21.00***	3.697
Expenditure quintiles (/lowest)			
Quintil 2	-3.212***	-2.901**	-3.285***
Quintil 3	-5.247***	-4.752***	-5.585***
Quintil 4	-5.007***	-4.610***	-4.730***
Quintil 5	-5.645***	-5.061***	-4.895***
No impact from earthquake	-3.408***	-3.384***	-3.449***
Livelihood: Agriculture-only	0.811	0.544	2.114**
Livelihood: Remittances from outside Nepal	-2.823***	-2.571***	-3.077***
Constant	-7.177**	-8.404***	-8.551***
Observations	6042	6042	6042
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 17: Relationship between resilience capacity indexes and recovery from shock

D.V.: Recovery; Ordered Logit	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	0.641**		
Adaptive capacity		0.609***	
Transformative capacity			0.372
Shock exposure	-0.243***	-0.245***	-0.236***
Household demographics (/Percent 30+)			
Percent 0-15	-0.113	-0.0771	-0.102
Percent 16-30	0.0226	0.0106	0.0314
Household size	0.0199	0.0143	0.0236*
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.0754	0.0506	0.0667
Male and Female Adults	-0.0242	-0.0328	-0.0108
Child No Adults	0.114	0.0231	0.0925
Caste (/Brahmin or Chhetri)			
Janajati	-0.0705	-0.0595	-0.0813
Muslim	-0.441	-0.444	-0.467
Dalit	-0.282***	-0.270***	-0.297***
Newar	0.00379	0.0214	0.011
Other	-0.345**	-0.322*	-0.356**
Project (/Sabal)			
Pahal	-0.578***	-0.595***	-0.631***
Expenditure quintiles (/lowest)			
Quintil 2	0.0863	0.0782	0.103*
Quintil 3	0.0882	0.0728	0.112
Quintil 4	0.149**	0.138*	0.181**
Quintil 5	0.226***	0.210**	0.255***
No impact from earthquake	0.313***	0.319***	0.314***
Livelihood: Agriculture-only	-0.0525	-0.041	-0.0631
Livelihood: Remittances from outside Nepal	0.0915**	0.0844*	0.0887*
Constant (cut 1)	-1.140***	-1.151***	-1.174***
Constant (cut 2)	1.544***	1.538***	1.509***
Observations	6042	6042	6042
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 18: Relationship between resilience capacity components and income proxy outcomes

	D.V.: Poverty	Per Capita Expenditures
	(1)	(2)
Informal safety nets (mean, 0-14)	-0.0259	0.0281***
Bonding SC (mean, 0-6)	-0.0574**	0.0255**
% HH with savings	-0.184**	0.0494
% HH receiving remittances	0.0101	0.0305
Asset index (mean, 0-100)	-0.278***	0.130***
Shock preparedness and mitigation index (mean, 0-2)	0.173**	-0.118***
% HH with agricultural hazard insurance	-0.0189	0.0892
Bridging SC (mean, 0-6)	-0.00596	0.0109
Linking SC (mean, 0-6)	-0.0790***	0.0345***
Human capital (mean, 0-100)	-0.134**	-0.0940***
Livelihood Diversity (mean, 0-8)	-0.0296	-0.00375
Exposure to Information (mean, 0-15)	-0.0601***	0.0187***
Access to financial services (mean, 0-2)	0.0341	-0.0174
% HH access to formal safety nets	0.158	0.0755
% HH access to markets	0.212***	-0.0244
Access to basic services (mean, 0-3)	-0.0267	0.0506**
Access to infrastructure (mean, 0-4)	-0.105	0.108***
% HH access to ag extension	0.0884	-0.00284
Active participation in community groups (mean, 0-42)	-0.00534	0.00615
Shock exposure	-0.0343	0.0396***
Household demographics (/Percent 30+)		
Percent 0-15	1.237***	-1.672***
Percent 16-30	-0.275	-0.546***
Household size	0.154***	
Gendered HH type (/Adult Female No Adult Male)		0.167
Adult Male No Adult Female	-0.392	-0.362***
Male and Female Adults	-0.00888	-0.0737
Child No Adults	-0.0275	
Caste (/Brahmin or Chhetri)		
Janajati	0.0766	-0.0812*
Muslim	N/A	-0.291***
Dalit	0.209***	-0.171***

Table 18: Relationship between resilience capacity components and income proxy outcomes

D.V.:	Poverty	Per Capita Expenditures
Newar	-0.234	0.167**
Other	N/A	0.577***
Project (/Sabal)		
Pahal	0.873***	-0.557***
No impact from earthquake	-0.0907	0.05
Livelihood: Agriculture-only	0.0315	-0.0215
Constant	-1.433***	3.220***
Estimator	Probit	OLS
Observations	5967	6042
R2	N/A	0.35

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 19: Relationship between resilience capacity components, food security, and recovery outcomes

D.V.:	Recovery from Shock	Household Hunger	HDDS	Coping Strategies Index
	(1)	(2)	(3)	(4)
Informal safety nets (mean, 0-14)	-0.00393	-0.0244	0.0199	0.272
Bonding SC (mean, 0-6)	-0.0783***	-0.0605*	0.0204	-0.266
% HH with savings	0.0371	-0.293***	0.0504	-3.979***
% HH receiving remittances	0.0969**	-0.104	0.0998*	-2.434***
Asset index (mean, 0-100)	0.110***	-0.127***	0.252***	-1.473***
Shock preparedness and mitigation index (mean, 0-2)	0.00589	0.111	-0.0513	1.221
% HH with agricultural hazard insurance	-0.044	-0.104	0.298*	-0.883
Bridging SC (mean, 0-6)	-0.0291	-0.0243	-0.00201	-1.051***
Linking SC (mean, 0-6)	0.0148	-0.0152	0.0429***	-0.705***
Human capital (mean, 0-100)	0.0508	-0.199**	0.220***	-2.397***
Livelihood Diversity (mean, 0-8)	-0.028	-0.069	0.00527	0.605
Exposure to Information (mean, 0-15)	-0.011	-0.0274	0.0428***	0.00405
Access to financial services (mean, 0-2)	-0.00684	0.0325	0.0723*	-0.688
% HH access to formal safety nets	0.164	-0.212	-0.0769	-3.612*
% HH access to markets	0.209***	0.157	-0.118	1.552
Access to basic services (mean, 0-3)	0.0869*	0.0683	0.0243	-2.100**
Access to infrastructure (mean, 0-4)	0.00371	0.0745	0.143***	0.101
% HH access to ag extension	-0.0587	-0.00683	0.0669	-1.45
Active participation in community groups (mean, 0-42)	-0.00135	-0.0225*	0.0300***	-0.0676
Shock exposure	-0.243***	0.121***	0.0453	2.530***
Household demographics (/Percent 30+)				
Percent 0-15	-0.0774	0.158	-0.082	9.463***
Percent 16-30	-0.0449	-0.547**	0.241*	1.089
Household size	0.00618	0.00681	0.0136	0.155
Gendered HH type (/Adult Female No Adult Male)				
Adult Male No Adult Female	0.0965	-0.118	0.154	0.889
Male and Female Adults	-0.0149	0.279**	0.292***	1.093
Child No Adults	-0.0756	0.462	0.454	0.959
Caste (/Brahmin or Chhetri)				
Janajati	-0.0708	0.0376	-0.573***	-1.4
Muslim	-0.4	N/A	-0.623	5.074
Dalit	-0.288***	0.628***	-0.633***	7.084***
Newar	-0.0812	N/A	-0.00428	-4.251**
Other	-0.349**	0.400*	0.236	-0.486

Table 19: Relationship between resilience capacity components, food security, and recovery outcomes

D.V.:	Recovery from Shock	Household Hunger	HDDS	Coping Strategies Index
Project (/Sabal)				
Pahal	-0.943***	0.623*	-0.389*	1.382
No impact from earthquake	0.289***	-0.252**	0.079	-3.758***
Livelihood: Agriculture-only	-0.0534	-0.190*	-0.0586	2.256**
Constant	-1.570***	-1.917***	5.092***	-4.968
Estimator	Ordered Probit	Probit	OLS	Tobit
Observations	6042	5654	5850	6042
R2	N/A	N/A	0.273	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 20: Change in predicted probability table

	Poverty		HHS		Recovery		Expenditures		CSI		HDDS	
Absorptive capacity index	-0.0994	***	-0.023	***	0.046	***	0.35376	***	-1.73797	***	0.723986	***
Adaptive capacity index	-0.1022	***	-0.021	***	0.049	***	0.32342	***	-1.85961	***	0.699667	***
Transformative capacity index	-0.0243		-0.003		0.019		0.14928	***	-0.71388	***	0.231303	***
Informal safety nets (mean, 0-14)	-0.0098		-0.004		-0.003		0.04238	***	0.1937		0.120348	*
Bonding SC (mean, 0-6)	-0.0291	***	-0.010	**	-0.075	***	0.07673	*	-0.0514		0.1328	
Asset index (mean, 0-1)	-0.0792	***	-0.011	***	0.071	***	0.26383	***	-1.18947	***	0.44975	***
Shock preparedness and mitigation index (mean, 0-2)	0.0248	**	0.004		0.004		-0.09801		0.35764		-0.03354	
Bridging SC (mean, 0-6)	0.0017		-0.003		-0.029	*	0.07948		-0.92357	***	0.066862	
Linking SC (mean, 0-6)	-0.0337	***	-0.002		0.011		0.11362	***	-0.68071		0.141346	
Livelihood Diversity (mean, 0-8)	-0.0111		-0.003		-0.017		0.02998		-0.05368		0.05329	
Exposure to Information (mean, 0-15)	-0.0385	***	-0.004		-0.013		0.08215	***	0.24334		0.182168	
Access to basic services (mean, 0-3)	-0.0071		0.003		0.024		0.02497		-1.09993	***	-0.03266	
% HH with savings	-0.0293	***	-0.018	***	0.013		0.0737	***	-1.28206	***	0.175743	*
% HH receiving remittances	0.0079		-0.004		0.037	***	0.05719	*	-0.66529	***	0.119437	
% HH with agricultural hazard insurance	-0.0168		-0.005		-0.019		0.15293		-0.03416		0.274613	*
Human capital (mean, 0-1)	0.0012	**	-0.011	**	0.017		-0.12013		-0.86889	***	0.210235	***
% HH access to formal safety nets	0.0218		-0.008		0.043		0.05187		-1.10022	***	-0.06293	
% HH access to markets	0.0353	***	0.007		0.069	***	0.01678		0.54641		-0.0128	
% HH access to ag extension	0.0147		-0.001		-0.017		-0.06197		-1.08787	***	0.002259	
Access to infrastructure (mean, 0-4)	-0.0501	**	-0.002		0.023		0.13368	***	-0.96136		0.019883	
Access to financial services (mean, 0-2)	-0.0173		-0.006		0.018		0.01008		-0.51302		0.030387	

Note: change in predicted probabilities are computed by taking the difference in probability when moving the explanatory variable from the 25th percentile to 75th percentile, except in the case of binary variables where the difference is computed based on a change from 0 to 1; green highlighted cells are those with strong, statistically significant relationships while yellow highlighted are statistically significant with weaker magnitude effects

Table 21: Relationship between coping strategies and recovery from shock

D.V.: Recovery from shock; Ordered logit	Coping strategies for shock				
	(1)	(2)	(3)	(4)	(5)
Savings	0.196***				
Social Capital		-0.267***			
Remittances			0.221**		
Formal Assistance (any)				-0.227**	
Formal Assistance (earthquake)					-0.237**
Shock exposure	-0.235***	-0.229***	-0.235***	-0.237***	-0.233***
Household demographics (/Percent 30+)					
Percent 0-15	-0.109	-0.0921	-0.0948	-0.106	-0.107
Percent 16-30	0.032	0.0321	0.0393	0.0295	0.00121
Household size	0.0249**	0.0235*	0.0250**	0.0267**	0.0282**
Gendered HH type (/Adult Female No Adult Male)					
Adult Male No Adult Female	0.0759	0.07	0.0706	0.0634	0.0835
Male and Female Adults	-0.0129	-0.00561	-0.00124	-0.00768	-0.00246
Child No Adults	0.0911	0.0725	0.0989	0.112	0.276
Caste (/Brahmin or Chhetri)					
Janajati	-0.09	-0.103	-0.0921	-0.0917	-0.0861
Muslim	-0.465	-0.541	-0.479	-0.461	-0.617
Dalit	-0.296***	-0.300***	-0.301***	-0.294***	-0.284***
Newar	0.0147	0.0118	0.01	0.0345	0.0382
Other	-0.317*	-0.331**	-0.327*	-0.291*	-0.288*
Project (/Sabal)					
Pahal	-0.640***	-0.639***	-0.648***	-0.859***	-2.049***
Expenditure quintiles (/lowest)					
Quintil 2	0.102*	0.119**	0.108**	0.116**	0.118**
Quintil 3	0.120*	0.139*	0.127*	0.134*	0.138*
Quintil 4	0.186***	0.204***	0.196***	0.198***	0.197**
Quintil 5	0.276***	0.302***	0.286***	0.292***	0.291***
No impact from earthquake	0.308***	0.311***	0.311***	0.278***	0.290***
Livelihood: Agriculture-only	-0.0709	-0.0713	-0.0622	-0.0695	-0.0831
Livelihood: Remittances from outside Nepal	0.0869*	0.0764	0.0621	0.0903*	0.0955*
Constant	-1.277***	-1.281***	-1.269***	-1.504***	-1.488***
Observations	6042	6042	6042	6042	5203
R2	N/A	N/A	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 22: Relationship between coping strategies and resilience capacities

D.V.: coping strategies for shock; Probit	Savings	Social Capital	Remittances	Formal Assistance (any)	Formal Assistance (earthquake)
	(1)	(2)	(3)	(4)	(5)
Informal safety nets (mean, 0-14)	-0.0248	-0.0105	-0.0239	0.00786	0.00897
Bonding SC (mean, 0-6)	0.0208	0.0718**	0.00272	0.0438	0.0648*
% HH with savings		-0.0155	0.0187	0.0939	0.115
% HH receiving remittances	-0.361**	0.0713	0.835***	0.123	0.163
Asset index (mean, 0-100)	0.0407**	-0.0743***	0.0617***	-0.102***	-0.112***
Shock preparedness and mitigation index (mean, 0-2)	0.192**	0.0398	0.267***	-0.095	-0.166*
% HH with agricultural hazard insurance	-0.293*	0.21	-0.459	-0.0543	-0.0692
Bridging SC (mean, 0-6)	0.168***	-0.0412	0.126***	-0.110***	-0.127***
Linking SC (mean, 0-6)	0.0562***	0.027	0.0195	0.0868***	0.0901***
Human capital (mean, 0-100)	0.0735	0.0392	0.0656	0.00642	0.0134
Livelihood Diversity (mean, 0-8)	0.0671	0.0954**	0.118***	0.077	0.0973*
Exposure to Information (mean, 0-15)	-0.0623***	0.0557***	-0.101***	0.0243	0.0245
Access to financial services (mean, 0-2)	0.110*	-0.0159	0.00129	0.0775	0.077
% HH access to formal safety nets	-0.127	0.166	0.0202	-0.136	-0.286
% HH access to markets	0.109	0.228***	0.0738	-0.610***	-0.676***
Access to basic services (mean, 0-3)	0.02	0.0102	-0.0356	0.0253	0.00434
Access to infrastructure (mean, 0-4)	-0.0277	0.158**	-0.105	-0.206**	-0.204**
% HH access to ag extension	0.278***	-0.175*	0.11	-0.139	-0.172
Active participation in community groups (mean, 0-42)	0.0484***	0.00473	-0.00215	0.0202*	0.0278***
Shock exposure	0.0319	0.0947***	0.0369	-0.0880**	-0.138***
Household demographics (/Percent 30+)					
Percent 0-15	0.283**	0.0323	-0.229	-0.217	-0.207
Percent 16-30	0.143	-0.1	-0.257	-0.0414	-0.022
Household size	-0.0462***	-0.0340**	-0.0324	0.0514**	0.0591***
Gendered HH type (/Adult Female No Adult Male)					
Adult Male No Adult Female	-0.743***	0.179	-0.338	0.165	0.162
Male and Female Adults	0.125	-0.0612	-0.275***	-0.0663	-0.0707
Child No Adults	N/A	N/A	N/A	1.050***	N/A
Caste (/Brahmin or Chhetri)					
Janajati	0.0191	-0.1	-0.146	0.117	0.138
Muslim	N/A	N/A	N/A	0.12	0.0987
Dalit	-0.0437	0.0421	0.0331	0.196	0.301**
Newar	0.0264	0.0442	0.0396	0.570*	0.599**
Other	-0.447	0.0817	-0.0459	0.861*	0.669

Table 22: Relationship between coping strategies and resilience capacities

D.V.: coping strategies for shock; Probit	Savings	Social Capital	Remittances	Formal Assistance (any)	Formal Assistance (earthquake)
Project (/Sabal)					
Pahal	-0.0496	0.606***	-0.463*	-3.807***	-3.918***
No impact from earthquake	0.151	0.00478	-0.0142	-0.930***	-1.137***
Livelihood: Agriculture-only	0.157*	0.0897	-1.085***	0.0134	0.0467
Livelihood: Remittances from outside Nepal	0.308**	-0.295**	0.00056	-0.0858	-0.0976
Constant	-2.777***	-2.769***	-1.753***	2.298***	2.463***
Observations	6017	5990	6027	4635	3212
R2	N/A	N/A	N/A	N/A	N/A

Note: Equations include community dummies to control for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 23: Relationship between WASH and agricultural practice variables, recovery from shock and absorptive capacity index

D.V.:	Recovery	Recovery	Absorptive Index
	(1)	(2)	(3)
% of farming HH using at least one financial service in past 12 months	0.0677	0.0316	0.0991***
% of farmer HH that practiced at least one value chain activity in past 12 months	0.121*	0.118	0.00934**
% of farming HH practicing at least three sustainable crop practices	0.0221	0.0194	0.00626
% of farming HH practicing at least three sustainable livestock practices	-0.133*	-0.140*	0.0173***
% of farming HH practicing at least three sustainable NRM practices	-0.278***	-0.284***	0.0126**
% of farming HH practicing at least three (PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices	0.0668	0.0604	0.0193***
% of farming HH who used any improved storage practice in the past 12 months	0.260***	0.261***	-0.00321
% of HH with improved water source	0.0426	0.0397	0.00834**
% of HH within 30 minutes walking of water	-0.0813	-0.0852	0.0111**
% of HH following correct water treatment practices	0.0956	0.0856	0.0286***
% of HH with improved sanitation	0.0851	0.0844	0.00192
% of HH practicing open defecation	-0.0192	-0.00708	-0.0338***
% of HH practicing proper handwashing practices	0.394***	0.389***	0.0156***
Absorptive capacity index		0.361	
Shock exposure	-0.233***	-0.235***	0.00655***
Household demographics (/Percent 30+)			
Percent 0-15	-0.0343	-0.0376	0.00806
Percent 16-30	0.048	0.0442	0.0124*
Household size	0.00395	0.00263	0.00359***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.13	0.131	-0.00583
Male and Female Adults	0.00609	-0.00026	0.0172***
Child No Adults	0.105	0.115	-0.0267*
Caste (/Brahmin or Chhetri)			
Janajati	-0.0821	-0.0745	-0.0229***
Muslim	-0.345	-0.337	-0.0196

Table 23: Relationship between WASH and agricultural practice variables, recovery from shock and absorptive capacity index

D.V.:	Recovery	Recovery	Absorptive Index
Dalit	-0.255***	-0.251***	-0.0113**
Newar	-0.0085	-0.0154	0.0188*
Other	-0.405**	-0.411**	0.0149
Project (/Sabal)			
Pahal	-0.994***	-0.947***	-0.134***
Expenditure quintiles (/lowest)			
Quintil 2	0.0694	0.0626	0.0188***
Quintil 3	0.0486	0.0343	0.0384***
Quintil 4	0.106	0.0891	0.0448***
Quintil 5	0.173**	0.152*	0.0572***
No impact from earthquake	0.295***	0.294***	0.000849
Livelihood: Agriculture-only	-0.0653	-0.0585	-0.0191***
Livelihood: Remittances from outside Nepal	0.0578	0.0608	-0.00846***
Constant	N/A	N/A	0.193***
Estimator	Ordered Logit	Ordered Logit	OLS
Observations	6042	6042	6042
R2	N/A	N/A	0.485

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 24: Relationship between WASH and agricultural practice variables, recovery from shock and adaptive capacity index

D.V.:	Recovery	Recovery	Adaptive Index
	(1)	(2)	(3)
% of farming HH using at least one financial service in past 12 months	0.0677	0.0445	0.0622***
% of farmer HH that practiced at least one value chain activity in past 12 months	0.121*	0.119*	0.00785
% of farming HH practicing at least three sustainable crop practices	0.0221	0.019	0.00707
% of farming HH practicing at least three sustainable livestock practices	-0.133*	-0.143*	0.0237***
% of farming HH practicing at least three sustainable NRM practices	-0.278***	-0.287***	0.0199***
% of farming HH practicing at least three (PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices	0.0668	0.0561	0.0324***
% of farming HH who used any improved storage practice in the past 12 months	0.260***	0.260***	-0.00071
% of HH with improved water source	0.0426	0.0404	0.00673
% of HH within 30 minutes walking of water	-0.0813	-0.0863	0.0132**
% of HH following correct water treatment practices	0.0956	0.0824	0.0377***
% of HH with improved sanitation	0.0851	0.0818	0.00827*
% of HH practicing open defecation	-0.0192	-0.00771	-0.0320***
% of HH practicing proper handwashing practices	0.394***	0.383***	0.0315***
Adaptive capacity index		0.362*	
Shock exposure	-0.233***	-0.236***	0.00909***
Household demographics (/Percent 30+)			
Percent 0-15	-0.0343	-0.0196	-0.0394***
Percent 16-30	0.048	0.0356	0.0381***
Household size	0.00395	-0.00055	0.0120***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.13	0.117	0.0301***
Male and Female Adults	0.00609	-0.00576	0.0322***
Child No Adults	0.105	0.0696	0.0933***
Caste (/Brahmin or Chhetri)			
Janajati	-0.0821	-0.0679	-0.0420***
Muslim	-0.345	-0.337	-0.0189
Dalit	-0.255***	-0.245***	-0.0317***
Newar	-0.0085	-0.00591	-0.00535
Other	-0.405**	-0.398**	-0.0207
Project (/Sabal)			

Table 24: Relationship between WASH and agricultural practice variables, recovery from shock and adaptive capacity index

D.V.:	Recovery	Recovery	Adaptive Index
Pahal	-0.994***	-0.950***	-0.125***
Expenditure quintiles (/lowest)			
Quintil 2	0.0694	0.0571	0.0351***
Quintil 3	0.0486	0.0243	0.0662***
Quintil 4	0.106	0.0816	0.0676***
Quintil 5	0.173**	0.141	0.0879***
No impact from earthquake	0.295***	0.298***	-0.00751
Livelihood: Agriculture-only	-0.0653	-0.0507	-0.0403***
Livelihood: Remittances from outside Nepal	0.0578	0.0568	0.00344
Constant	N/A	N/A	0.190***
Estimator	Ordered Logit	Ordered Logit	OLS
Observations	6042	6042	6042
R2	N/A	N/A	0.416

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 25: Simultaneous equation modeling relationship between WASH and agricultural practice variables, absorptive capacity index and recovery from shock

D.V.:	Absorptive Index	Recovery	Absorptive Index	Recovery
	(1)	(2)	(3)	(4)
% of farming HH using at least one financial service in past 12 months	0.101***		0.101***	
% of farming HH practicing at least three sustainable crop practices	0.006		0.00603	
% of farming HH practicing at least three (PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices	0.0303***		0.0301***	
% of HH within 30 minutes walking of water	0.0157***		0.0157***	
% of HH following correct water treatment practices	0.0310***		0.0313***	
% of HH practicing open defecation	-0.0390***		-0.0393***	
Absorptive index		0.386**		1.228**
Shock exposure	0.00691***	-0.0888***	0.00692***	-0.280***
Household demographics (/Percent 30+)				
Percent 0-15	0.00705	-0.0438	0.00707	-0.118
Percent 16-30	0.0119*	0.0023	0.0119*	0.025
Household size	0.00399***	0.00622	0.00399***	0.0171
Gendered HH type (/Adult Female No Adult Male)				
Adult Male No Adult Female	-0.00743	0.037	-0.00741	0.0989
Male and Female Adults	0.0190***	-0.016	0.0190***	-0.0421
Child No Adults	-0.0271*	0.0919	-0.0271*	0.241
Caste (/Brahmin or Chhetri)				
Janajati	-0.0238***	-0.0232	-0.0238***	-0.0573
Muslim	-0.0181	-0.122	-0.0181	-0.379
Dalit	-0.0134***	-0.103***	-0.0134***	-0.306***
Newar	0.0193*	0.00792	0.0193*	0.0313
Other	0.019	-0.150*	0.019	-0.448**
Project (/Sabal)				
Pahal	-0.140***	-0.208***	-0.140***	-0.637***

Table 25: Simultaneous equation modeling relationship between WASH and agricultural practice variables, absorptive capacity index and recovery from shock

D.V.:	Absorptive Index	Recovery	Absorptive Index	Recovery
Expenditure quintiles (/lowest)				
Quintil 2	0.0205***	0.0206	0.0205***	0.0642
Quintil 3	0.0404***	0.0128	0.0404***	0.0474
Quintil 4	0.0478***	0.0344	0.0478***	0.114
Quintil 5	0.0619***	0.0362	0.0619***	0.125
No impact from earthquake	0.00194	0.124***	0.00193	0.413***
Livelihood: Agriculture-only	-0.0195***	-0.00552	-0.0195***	-0.0298
Livelihood: Remittances from outside Nepal	-0.00796**	0.0325**	-0.00797**	0.0900*
Constant	0.205***	0.904***	0.205***	1.191***
Estimator	2sls (first-stage)	2sls (IV regress)	IV Probit (first-stage)	IV Probit
Observations	6042	6042	6042	6042
Sargan-Hansen statistic	N/A	8.04	N/A	N/A
R2	0.475	0.224	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Sargan-Hansen test is chi-square distributed with r-1 degrees of freedom, where r equals the number of instruments. This test of over-identification restrictions indicates that the anticipated program variables used as instruments are valid and are not correlated with recovery from shock. Equations (3) and (4) utilize an IV probit estimator, as an additional check because recovery from shock is a binary dependent variable, with comparable results.

Table 26: Simultaneous equation modeling relationship between WASH and agricultural practice variables, adaptive capacity index and recovery from shock

D.V.:	Adaptive Index	Recovery	Adaptive Index	Recovery
	(1)	(2)	(3)	(4)
% of farming HH using at least one financial service in past 12 months	0.0651***		0.0653***	
% of farming HH practicing at least three sustainable crop practices	0.00705		0.00711	
% of farming HH practicing at least three (PAHAL) or five (SABAL) sustainable crop, livestock, or NRM practices	0.0480***		0.0474***	
% of HH within 30 minutes walking of water	0.0201***		0.0200***	
% of HH following correct water treatment practices	0.0427***		0.0430***	
% of HH practicing open defecation	-0.0447***		-0.0453***	
Adaptive index		0.417**		1.327**
Shock exposure	0.00942***	-0.0900***	0.00944***	-0.283***
Household demographics (/Percent 30+)				
Percent 0-15	-0.0428***	-0.0212	-0.0428***	-0.0438
Percent 16-30	0.0372***	-0.00767	0.0371***	-0.00673
Household size	0.0131***	0.00218	0.0131***	0.00399
Gendered HH type (/Adult Female No Adult Male)				
Adult Male No Adult Female	0.0271**	0.0214	0.0271**	0.0515
Male and Female Adults	0.0346***	-0.0232	0.0347***	-0.0644
Child No Adults	0.0959***	0.0337	0.0961***	0.0561
Caste (/Brahmin or Chhetri)				
Janajati	-0.0441***	-0.0133	-0.0441***	-0.0253
Muslim	-0.0163	-0.12	-0.0163	-0.374
Dalit	-0.0365***	-0.0915***	-0.0365***	-0.271***
Newar	-0.00577	0.0185	-0.00582	0.0654
Other	-0.0153	-0.135*	-0.0154	-0.400*
Project (/Sabal)				
Pahal	-0.133***	-0.213***	-0.133***	-0.648***
Expenditure quintiles (/lowest)				
Quintil 2	0.0379***	0.0128	0.0379***	0.04
Quintil 3	0.0699***	-0.0011	0.0699***	0.00327
Quintil 4	0.0729***	0.0223	0.0729***	0.0761
Quintil 5	0.0961***	0.0196	0.0961***	0.0718

Table 26: Simultaneous equation modeling relationship between WASH and agricultural practice variables, adaptive capacity index and recovery from shock

D.V.:	Adaptive Index	Recovery	Adaptive Index	Recovery
No impact from earthquake	-0.00631	0.128***	0.00193	0.424***
Livelihood: Agriculture-only	-0.0408***	0.00377	-0.00633	0.000237
Livelihood: Remittances from outside Nepal	0.00451	0.0275*	-0.0407***	0.0742
Constant	0.211***	0.898***	0.211***	1.163***
Estimator	2sls (first-stage)	2sls (IV regress)	IV Probit (first-stage)	IV Probit
Observations	6042	6042	6042	6042
Sargan-Hansen statistic	N/A	9.3	N/A	N/A
R2	0.400	0.221	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels. Sargan-Hansen test is chi-square distributed with r-1 degrees of freedom, where r equals the number of instruments. This test of over-identification restrictions indicates that the anticipated program variables used as instruments are valid and are not correlated with recovery from shock. Equations (3) and (4) utilize an IV probit estimator, as an additional check because recovery from shock is a binary dependent variable, with comparable results.

Table 27: Relationship between interaction of shock exposure with resilience capacity indexes and poverty

D.V.: Poverty; OLS estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-1.916***		
Adaptive capacity		-2.607***	
Transformative capacity			-1.316*
Shock exposure	-0.0555		
Absorptive capacity * shock exposure		0.0876	
Adaptive capacity * shock exposure			0.211
Transformative capacity * shock exposure	-0.0274	-0.0664	-0.128**
Household demographics (/Percent 30+)			
Percent 0-15	1.093***	0.910***	1.037***
Percent 16-30	-0.349**	-0.335**	-0.348**
Household size	0.180***	0.198***	0.179***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	-0.448*	-0.417*	-0.419*
Male and Female Adults	-0.0345	-0.0157	-0.0551
Child No Adults	-0.143	0.179	-0.0303
Caste (/Brahmin or Chhetri)			
Janajati	0.0384	0.0221	0.0662
Muslim	N/A	N/A	N/A
Dalit	0.260***	0.237***	0.277***
Newar	-0.209	-0.259	-0.208
Other	N/A	N/A	N/A
Project (/Sabal)			
Pahal	0.815***	0.858***	1.004***
Asset ownership index (0-12)	-0.271***	-0.239***	-0.348***
No impact from earthquake	0.0066	-0.0135	0.0178
Livelihood: Agriculture-only	0.0469	0.0225	0.0632
Livelihood: Remittances from outside Nepal	-0.00801	0.0217	0.012
Constant	-1.808***	-1.623***	-1.788***
Observations	5967	5967	5967
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 28: Relationship between interaction of shock exposure with resilience capacity indexes and per-capita expenditures

Dependent Variables (D.V.): Per capita expenditures; OLS estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	1.246***		
Adaptive capacity		0.818***	
Transformative capacity			0.678**
Shock exposure	-0.0695		
Absorptive capacity * shock exposure		-0.0268	
Adaptive capacity * shock exposure			0.0509
Transformative capacity * shock exposure	0.0423	0.0311	0.0173
Household demographics (/Percent 30+)			
Percent 0-15	-1.668***	-1.637***	-1.665***
Percent 16-30	-0.527***	-0.548***	-0.543***
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.135	0.102	0.113
Male and Female Adults	-0.401***	-0.414***	-0.393***
Child No Adults	-0.107	-0.215	-0.227*
Caste (/Brahmin or Chhetri)			
Janajati	-0.152***	-0.149***	-0.0723
Muslim	-0.203**	-0.196*	-0.329***
Dalit	-0.197***	-0.192***	-0.151***
Newar	0.154**	0.168**	0.187***
Other	0.431***	0.465***	0.533***
Project (/Sabal)			
Pahal	-0.713***	-0.783***	-0.669***
Asset ownership index (0-12)	0.111***	0.112***	0.144***
No impact from earthquake	0.00339	0.00761	0.0508
Livelihood: Agriculture-only	-0.0198	-0.0102	-0.0252
Livelihood: Remittances from outside Nepal	0.0829***	0.0752**	0.0684**
Constant	3.964***	4.090***	3.740***
Observations	6042	6042	6042
R2	0.392	0.391	0.331

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 29: Relationship between interaction of shock exposure with resilience capacity indexes and HDDS

D.V: Severe or Moderate Hunger; Probit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	3.058***		
Adaptive capacity		2.983***	
Transformative capacity			2.128***
Shock exposure	0.117*	0.136**	0.166***
Absorptive capacity * shock exposure	-0.139		
Adaptive capacity * shock exposure		-0.176	
Transformative capacity * shock exposure			-0.244
Household demographics (/Percent 30+)			
Percent 0-15	-0.128	0.0188	-0.153
Percent 16-30	0.328**	0.288**	0.296**
Household size	0.0404**	0.0268*	0.0305*
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.121	0.0267	0.0765
Male and Female Adults	0.269***	0.248***	0.291***
Child No Adults	0.78	0.472	0.542
Caste (/Brahmin or Chhetri)			
Janajati	-0.529***	-0.508***	-0.650***
Muslim	-0.785	-0.666	-0.836
Dalit	-0.701***	-0.669***	-0.699***
Newar	-0.142	-0.0812	-0.0578
Other	-0.00583	0.093	0.166
Project (/Sabal)			
Pahal	-0.561***	-0.768***	-0.670***
Asset ownership index (0-12)	0.180***	0.154***	0.295***
No impact from earthquake	0.0168	0.026	0.0512
Livelihood: Agriculture-only	-0.0681	-0.0281	-0.110**
Livelihood: Remittances from outside Nepal	0.101*	0.0821	0.0432
Constant	4.864***	4.904***	5.333***
Observations	5850	5850	5850
R2	0.320	0.324	0.255

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 30: Relationship between interaction of shock exposure with resilience capacity indexes and hunger

D.V: Severe or Moderate Hunger; Probit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-2.352**		
Adaptive capacity		-3.424***	
Transformative capacity			0.212
Shock exposure	0.112	-0.0388	0.14
Absorptive capacity * shock exposure	-0.0135		
Adaptive capacity * shock exposure		0.450*	
Transformative capacity * shock exposure			-0.187
Household demographics (/Percent 30+)			
Percent 0-15	0.261	0.131	0.221
Percent 16-30	-0.603**	-0.609**	-0.608**
Household size	-0.0161	-0.0014	-0.0143
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	-0.0729	-0.0157	-0.0446
Male and Female Adults	0.276**	0.285**	0.247**
Child No Adults	0.473	0.807	0.619
Caste (/Brahmin or Chhetri)	N/A	N/A	N/A
Janajati	0.0484	0.0334	0.0677
Muslim	N/A	N/A	N/A
Dalit	0.659***	0.623***	0.656***
Newar	N/A	N/A	N/A
Other	0.482**	0.372	0.456**
Project (/Sabal)			
Pahal	0.646*	0.794**	0.898**
Asset ownership index (0-12)	-0.0724	-0.0756	-0.160***
No impact from earthquake	-0.204*	-0.206*	-0.187
Livelihood: Agriculture-only	-0.121	-0.144	-0.111
Livelihood: Remittances from outside Nepal	-0.186*	-0.145	-0.167
Constant	-1.883***	-1.529***	-2.430***
Observations	5654	5654	5654
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 31: Relationship between interaction of shock exposure with resilience capacity indexes and CSI

D.V.: CSI; Tobit estimator	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-29.81***		
Adaptive capacity		-30.07***	
Transformative capacity			-27.00***
Shock exposure	2.043**	1.884**	1.506*
Absorptive capacity * shock exposure	1.48		
Adaptive capacity * shock exposure		1.864	
Transformative capacity * shock exposure			2.822
Household demographics (/Percent 30+)			
Percent 0-15	9.091***	7.592***	9.568***
Percent 16-30	-0.255	0.208	-0.179
Household size	-0.416*	-0.186	-0.484**
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	1.944	2.595	1.486
Male and Female Adults	1.013	1.168	0.501
Child No Adults	1.177	4.529	-1.233
Caste (/Brahmin or Chhetri)			
Janajati	-0.518	-0.838	-0.229
Muslim	7.156	6.647	8.066
Dalit	8.421***	8.001***	8.700***
Newar	-6.264**	-6.729**	-5.237***
Other	5.94	4.431	1.23
Project (/Sabal)			
Pahal	19.20***	21.03***	3.738
Expenditure quintiles (/lowest)			
Quintil 2	-3.194***	-2.878**	-3.248***
Quintil 3	-5.223***	-4.696***	-5.528***
Quintil 4	-4.987***	-4.561***	-4.684***
Quintil 5	-5.625***	-5.023***	-4.899***
No impact from earthquake	-3.359***	-3.347***	-3.390***
Livelihood: Agriculture-only	0.813	0.52	2.150**
Livelihood: Remittances from outside Nepal	-2.815***	-2.561***	-3.053***
Constant	-5.666	-5.875	-5.534
Observations	6298	6298	6298
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 32: Relationship between interaction of shock exposure with resilience capacity indexes and recovery from shock

D.V.: Recovery; Ordered Logit	Resilience Capacity Indexes		
	(1)	(2)	(3)
Absorptive capacity	-0.435		
Adaptive capacity		-0.242	
Transformative capacity			-0.518
Shock exposure	-0.351***	-0.344***	-0.325***
Absorptive capacity * shock exposure	0.326*		
Adaptive capacity * shock exposure		0.250**	
Transformative capacity * shock exposure			0.265*
Household demographics (/Percent 30+)			
Percent 0-15	-0.105	-0.0733	-0.0988
Percent 16-30	0.0258	0.0147	0.0287
Household size	0.0195	0.0143	0.0237**
Gendered HH type (/Adult Female No Adult Male)			
Adult Male No Adult Female	0.0668	0.0472	0.0726
Male and Female Adults	-0.0215	-0.0311	-0.0086
Child No Adults	0.0539	0.0136	0.063
Caste (/Brahmin or Chhetri)			
Janajati	-0.0717	-0.0608	-0.0867
Muslim	-0.434	-0.442	-0.468
Dalit	-0.282***	-0.271***	-0.299***
Newar	0.00721	0.0207	0.0111
Other	-0.328*	-0.316*	-0.337**
Project (/Sabal)			
Pahal	-0.570***	-0.592***	-0.631***
Expenditure quintiles (/lowest)			
Quintil 2	0.0906*	0.0821	0.106**
Quintil 3	0.0944	0.0802	0.117*
Quintil 4	0.152**	0.143**	0.186***
Quintil 5	0.227***	0.213**	0.255***
No impact from earthquake	0.322***	0.324***	0.320***
Livelihood: Agriculture-only	-0.0526	-0.0454	-0.0594
Livelihood: Remittances from outside Nepal	0.0917**	0.0841*	0.0908**
Constant	-1.457***	-1.463***	-1.455***
Observations	6042	6042	6042
R2	N/A	N/A	N/A

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 33: Relationship between child wasting (weight-to-height) and resilience capacity

D.V: Weight to height z score; OLS	Resilience Capacity			
	(1)	(2)	(3)	(4)
Absorptive capacity	0.0328			
Adaptive capacity		0.0874		
Transformative capacity			0.00392	
Informal safety nets (mean, 0-14)				0.00797
Bonding SC (mean, 0-6)				0.00511
% HH with savings				0.00205
% HH receiving remittances				0.00297
Asset index (mean, 0-100)				0.0106
Shock preparedness and mitigation index (mean, 0-2)				-0.0807
% HH with agricultural hazard insurance				-0.111
Bridging SC (mean, 0-6)				0.00977
Linking SC (mean, 0-6)				-0.00084
Human capital (mean, 0-100)				0.0297
Livelihood Diversity (mean, 0-8)				0.0194
Exposure to Information (mean, 0-15)				-0.00061
Access to financial services (mean, 0-2)				-0.0066
% HH access to formal safety nets				-0.0845
% HH access to markets				0.0343
Access to basic services (mean, 0-3)				0.0101
Access to infrastructure (mean, 0-4)				-0.0192
% HH access to ag extension				0.0061
Shock exposure	0.0162	0.015	0.0166	0.0224
Livelihood: sale of bush products in community	0.380***	0.377***	0.380***	0.372***
Livelihood: sale of bush products out of community	0.15	0.147	0.15	0.172
Livelihood: non-ag self-employment in community	0.131**	0.128**	0.133**	0.124*
Livelihood: non-ag self-employment out of community	-0.309**	-0.311**	-0.307**	-0.299**
Child had diarrhea in the prior 2 weeks	-0.0845**	-0.0839*	-0.0851**	-0.0805*
HH using improved water source	-0.0730*	-0.0738*	-0.0731*	-0.0847
HH using improved sanitation facility	-0.026	-0.029	-0.0248	-0.0386
Caste (/Brahmin or Chhetri)				
Janajati	0.310***	0.314***	0.308***	0.322***
Dalit	-0.132***	-0.128**	-0.133***	-0.129**
Newar	0.314***	0.315***	0.315***	0.324***
Other	0.00877	0.00842	0.00944	-0.0286
Project (/Sabal)				
Pahal	-0.0576	-0.0545	-0.0603	-0.0384

Table 33: Relationship between child wasting (weight-to-height) and resilience capacity

D.V: Weight to height z score; OLS	Resilience Capacity			
HH size	0.000762	-0.00024	0.000809	-0.00268
Total children under 5 in the HH	0.0754**	0.0763**	0.0751**	0.0752**
Age in months of child	-0.00119	-0.00115	-0.00119	-0.00106
Constant	-0.445***	-0.461***	-0.436***	-0.593***
Observations	3205	3205	3205	3200
R2	0.0525	0.0527	0.0525	0.0569

Note: Equations include community controls (dummies) for unobserved covariates (coefficients are not reported in this table). Asterisks represent statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Annex C. Multivariate specifications

The principal specification treats resilience capacity, in the face of shocks and stressors, as a key determinant of well-being outcomes. Other determinants, used as controls, include shock exposure, structural household characteristics, and community characteristics (unobservables – EA or district "dummies")[20]:

$$\boldsymbol{Outcomes} = f\left[\begin{array}{c} \boldsymbol{Shock\ exposure} \\ \\ \boldsymbol{Household\ resilience\ capacities} \\ (assets, human\ capital, bonding, bridging, and\ linking\ social\ capital \\ access\ to\ information, number\ of\ livelihoods) \\ \\ \boldsymbol{Community\ resilience\ capacities} \\ (market\ access, public\ services, safety\ nets, natural\ resouces,) \\ \\ \boldsymbol{Household\ characteristics} \\ (gendered\ household\ type, size\ of\ household, wealth, \\ household\ demographics, caste) \\ \\ \boldsymbol{Community\ characteristics} \end{array}\right]$$

Household and community resilience are included in regression equations as the primary explanatory variables of interest both in their index form (i.e., absorptive capacity index, adaptive capacity index, and transformative capacity index) and decomposed into components (i.e., bonding social capital, human capital, access to markets, etc.).

The relationships between response to shock, outcomes, and resilience capacities are also explored. First, shock coping strategies are treated as determinants of outcomes:

[20] Sometimes referred to as "fixed-effects"; however, to be clear, this analysis is cross-sectional in nature (i.e., not a panel).

$$\boldsymbol{Outcomes} = f\left[\begin{array}{c} \boldsymbol{Shock\ exposure} \\ \\ \boldsymbol{Shock\ coping\ strategies} \\ (use\ of\ savings, social\ capital, \\ formal\ assistance) \\ \\ \boldsymbol{Household\ characteristics} \\ (gendered\ household\ type, size\ of\ household, wealth, \\ household\ demographics, caste) \\ \\ \boldsymbol{Community\ characteristics} \end{array}\right]$$

The specification above helps us determine which shock coping strategies are "positive", in that they lead to better recovery and well-being outcomes, and alternatively, which are "negative" in that they lead to worse recovery and poor well-being outcomes.

Next, resilience capacities are treated as determinants of shock coping strategies. A general hypothesis is that absorptive, adaptive, and transformative capacities influence households to adopt "positive" coping strategies that promote better recovery and other well-being outcomes and conversely avoid "negative" coping strategies that inhibit recovery and lead to worse well-being outcomes.

$$\boldsymbol{Shock\ coping\ strategies} = f\left[\begin{array}{c} \boldsymbol{Shock\ exposure} \\ \\ \boldsymbol{Household\ resilience\ capacities} \\ (absorptive, adaptive) \\ \\ \boldsymbol{Community\ resilience\ capacities} \\ (transformative) \\ \\ \boldsymbol{Household\ characteristics} \\ (gendered\ household\ type, size\ of\ household, wealth, \\ household\ demographics, caste) \\ \\ \boldsymbol{Community\ characteristics} \end{array}\right]$$

An important, additional specification treats certain indicators related to sanitation, WASH, and adoption of agricultural practices, collected as part of the programs' M&E system, ("anticipated program variables") as key determinants of recovery from shock. It is important to note that the data used in this

study is sourced from a baseline survey, thus the WASH and sanitation behaviors and agricultural practice adoption measures are only a proxy for what will ultimately be program interventions in the coming years. Again, other determinants, used as controls, include shock exposure, structural household characteristics, community characteristics, and in this specification, household resilience capacity is now included as a control:

$$\boldsymbol{Recovery} = f\left[\begin{array}{c} \boldsymbol{Shock\ exposure} \\ \\ \boldsymbol{Anticipated\ program\ variables} \\ (agricultural\ practices, WASH\ practices\ and\ characteristics) \\ \\ \boldsymbol{Household\ resilience\ capacities} \\ (social\ capital, human\ capital, etc.) \\ \\ \boldsymbol{Household\ characteristics} \\ (gendered\ household\ type, size\ of\ household, wealth, \\ household\ demographics, caste) \\ \\ \boldsymbol{Community\ characteristics} \end{array}\right]$$

As the lone resilience outcome available for this analysis, the above specification tests the hypothesized positive relationship between anticipated programming activities and resilience as an outcome.

The final specification explores the hypothesis that (household) resilience capacity acts as a mediator between anticipated program variables and recovery from shock – or, stated differently – potential programming activities (represented by "anticipated program variables") serve to improve household resilience capacity (i.e., absorptive and adaptive capacity) which in turn improves recovery from shock. This regression model is specified as a simultaneous equation:

$$\boldsymbol{Recovery} = f\left[\begin{array}{c} \boldsymbol{Shock\ exposure} \\ \\ \boldsymbol{Anticipated\ program\ variables} \\ (agricultural\ practices, WASH\ practices\ and\ characteristics) \\ \\ \boldsymbol{Household\ resilience\ capacities} \\ f[\boldsymbol{Anticipated\ program\ variables}(ag\ practices, WASH)] \\ \\ \boldsymbol{Household\ characteristics} \\ (gendered\ household\ type, size\ of\ household, wealth, \\ household\ demographics, caste) \\ \\ \boldsymbol{Community\ characteristics} \end{array}\right]$$

The simultaneous equation model is estimated using a two-stage least square (2sls) and instrumental variable probit (IV probit) estimator.[21] These instrumental techniques have the advantage of eliminating any endogeneity bias that may result from the inherent interdependence between recovery from shock and resilience capacity (i.e., better recovery promotes greater resilience and alternatively higher resilience promotes increased recovery).[22]

[21] A binary version of recovery is tested with the appropriate IV probit estimator, while the ordinal version of recovery used in earlier specifications (0=not recovered, 1=recovered to the same level, 2=recovered to a better level) is tested using 2sls with nearly equivalent results. The advantage of using 2sls is two-fold: 1) the ordinal variable has more "information" and greater variation, and 2) over-identification tests can be performed to test the statistical validity of the program variables as instruments.

[22] An excellent description, and example in practice, of using instrumental variable techniques to establish the existence of a mediating variable is available in Acemoglu, Johnson and Robinson's seminal article: *Reversal of Fortune* (Acemoglu 2002).

Annex D. Resilience Capacity Tables (scaled 0-100)

Table 34: Absorptive capacity index and components, SABAL vs. PAHAL

Indicator	SABAL	PAHAL		All
Absorptive capacity index (mean; range 0-100)	34.6	27.5	***	32.4
Index components:				
Access to informal safety nets	39.9	32.8	***	37.9
Bonding social capital score	71.1	68.0	*	70.2
% HH that regularly save cash	68.5	51.4	***	63.6
% HH receiving remittances	24.7	41.2	***	29.4
Asset score	26.5	19.1	***	24.4
Shock preparedness and mitigation score	18.9	16.6		18.3
% HH w/ agricultural hazard insurance	2.2	1.4		1.9
n	3112	3186		6298

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 35: Adaptive capacity index and components, SABAL vs. PAHAL

Indicator	SABAL	PAHAL		All
Adaptive capacity index (mean; range 0-100)	38.5	35.7	***	37.7
Index components:				
Bridging social capital score	56.7	54.0		56.0
Linking social capital score	18.9	19.8		19.2
% HH w/ one or more adults in HH w/primary education or higher	66.5	65.3		66.2
Livelihood diversity score	28.3	29.5	*	28.6
Exposure to information	21.9	18.0	***	20.8
Asset score	26.5	19.1	***	24.4
Access to financial services score	81.6	71.6	**	78.8
Adoption of sustainable agricultural practices	53.1	74.2		59.1
n	3112	3186		6298

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Table 36: Transformative capacity index and components, SABAL vs. PAHAL

Indicator	SABAL	PAHAL		All
Transformative capacity index (mean; range 0-100)	34.1	30.6	**	33.1
Index components:				
% HH w/ access to formal safety nets	3.2	2.3		3.0
% HH w/ access to markets w/in 10 km	37.3	23.4	***	33.3
Access to basic services score	79.8	78.1		79.3
Access to infrastructure score	50.9	48.9		50.3
% HH w/ access to agricultural extension	20.6	13.6	**	18.6
Bridging social capital score	56.7	54.0		56.0
Linking social capital score	18.9	19.8		19.2
Active decision making score	16.1	13.6	***	15.4
n	3112	3186		6298

NOTE: Asterisks represent statistical significance between projects at the 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Annex E: Additional Descriptives, Resilience Capacities

	mean	25th percentile	75th percentile
Absorptive capacity index	0.304	0.22	0.38
Adaptive capacity index	0.372	0.27	0.46
Transformative capacity index	0.316	0.24	0.34
Informal safety nets (mean, 0-14)	4.711	3	6
Bonding SC (mean, 0-6)	4.180	3	6
Asset index (mean, 0-12)	2.742	2	3
Shock preparedness and mitigation index (mean, 0-2)	0.355	0	1
Bridging SC (mean, 0-6)	3.345	2	5
Linking SC (mean, 0-6)	1.175	0	3
Livelihood Diversity (mean, 0-8)	3.029	2	4
Exposure to Information (mean, 0-15)	2.995	1	5
Access to basic services (mean, 0-3)	2.363	2	3
% HH with savings	0.597	0	1
% HH receiving remittances	0.332	0	1
% HH with agricultural hazard insurance	0.017	0	0*
Human capital (mean, 0-1)	0.688	0	1**
% HH access to formal safety nets	0.028	0	0*
% HH access to markets	0.309	0	1
% HH access to ag extension	0.166	0	0*
Access to infrastructure (mean, 0-4)	1.986	2	2**
Access to financial services (mean, 0-2)	1.533	1	2

*Values predicted at 0 and 1 because the measure is binary; **Values predicted at 1 and 2 to allow for variation

Annex F. Coping Strategy Severity Weights and Computation

The Coping Strategy Index uses the following severity and frequency weights (Table 15 and Table 4, respectively). The severity weights are based on average severity weights across several coping strategies conducted in countries around the world, applied to the frequency of reported use of each coping strategy (from Table 4) using the following formula:

CSI = Σ(frequency response * severity weight)i
where i = 1 to 16

Table 37: Coping strategy severity weights

Strategy	Severity weight
1. Skip entire day without eating	8
2. Limit portion size at meal times	6
3. Reduce number of meals eaten in a day	6
4. Borrow food from a friend or relative	2
5. Rely on less preferred and less expensive foods	1
6. Purchase food on credit	3
7. Harvest immature crops	4
8. Send children to eat with neighbors or relatives	3
9. Send household members to beg	8
10. Reduce adult consumption in order for small children to eat	6
11. Gather wild food or hunt	1
12. Consume seed stock held for the next season	4
13. Pull children from school for work	7
14. Use a social mechanism (such as a rotating credit association) as emergency food relief	2
15. Pawn household assets (such as jewelry, land)	4
16. Feed working members of the household at the expense of non-working members	6

Annex G. Agricultural Practices and Adoption Indicators

Table 38: Agricultural practices included in adoption of agricultural practice indicators

	SABAL	PAHAL
Sustainable crop practices		
Target:	3 of 8	3 of 7
Compost	X	X
Mulching	X	X
Crop rotation	X	X
Early planting	X	
Use of improved crop varieties	X	X
Contour planting	X	
Use of improved seeds	X	X
Micro-irrigation	X	X
Integrated pest management		X
Sustainable livestock practices		
Target:	3 of 8	3 of 5
Improved animal shelters	X	X
Vaccinations	X	X
Deworming	X	X
Castration	X	X
Animal feed (supplied by stockfeed manufacturer)	X	
Artificial insemination	X	
Pen feeding	X	
Use of paravets/ community animal health worker services	X	X
Sustainable NRM practices		
Target:	3 of 6	3 of 4
Management or protection of watersheds/ catchments	X	X
Agroforestry	X	X
Management of forest plantation	X	X
Regeneration of natural landscapes	X	
Sustainable harvesting of forest products	X	X
Hedgerow planting	X	

Source: ICF Macro (2016)