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The U.S. Government's Global Hunger & Food Security Initiative

Resilience in the Sahel-Enhanced (RISE) Project Impact Evaluation

Volume I

Baseline Survey

Resilience Analysis

February 2016

USAID

FROM THE AMERICAN PEOPLE

Prepared for the U.S. Agency for International Development, USAID Contract Number GS-23F-8144H/AID-OAA-M-12-00006, Feed the Future FEEDBACK

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Acknowledgements

TANGO would like to thank numerous individuals for the support they provided to this RISE Impact Evaluation Baseline Survey Resilience Analysis. They include Emily Hogue, Sally Rey, and Tatiana Pulido (Bureau for Food Security, USAID), David Ratliff, Isabelle Mulin, Greg Collins, and Tiffany Griffin (USAID). We also want to thank Stephen Reid, COP SAREL Project, and The Mitchell Group. We also wish to thank Steve Durako, Detra Robinson, Rodney Knight, Tom Scialfa, and Jason Ives of Westat for their assistance. In addition, we wish to acknowledge the staff at The Institut de Management, Conseils et Formations (IMC) for their work in collecting the quantitative and qualitative data and supporting the logistics for this survey. We are grateful to Justin Sheffield at the Department of Civil and Environmental Engineering of Princeton University for his help in accessing the Africa Flood and Drought Monitoring data for the 100 survey villages. Stephanie Martin and Halimatou Alaofe are acknowledged for their work on the data analysis, and Elizabeth Cuellar for formatting assistance. Lastly, we wish to thank all of the gracious people in the villages of the RISE program areas in Burkina Faso and Niger that took the time to be interviewed for this survey.

Tim Frankenberger, President
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List of Acronyms

ACDI/VOCA	Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance
AFDM	African Flood and Drought Monitor
CFA	West African *Communauté Financière d'Afrique* franc
CFW	Cash-for-work
CRC	Community resilience capacity
CRS	Catholic Relief Services
CSPS	*Centre de santé et de promotion sociale*
CVD	Village Development Committee, *Comité Villagois de Developpément*
DDS	Dietary diversity score
DRR	Disaster risk reduction
EWS	Early warning systems
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agriculture Organization of the United Nations
FASO	Families Achieving Sustainable Outcomes
FEWS NET	Famine Early Warning Systems Network
FFP	Food for Peace
FFW	Food-for-work
FGD	Focus group discussion
FICOD	Fonds d'Investissement pour les Collectivités Décentralisées
FTF	Feed the Future
GIS	Geographical Information System
HFIAS	Household Food Insecurity Access Scale
HHS	Household Hunger Scale
HRC	Household resilience capacity
IE	Impact evaluation
IMC	Institut de Management et Conseils
KIIs	Key informant interviews
LAHIA	Livelihoods, Agriculture and Health Interventions in Africa
MFI	Microfinance institution
NDVI	Normalized Difference Vegetation Index

NGO	Non-governmental organization
NRM	Natural Resources Management
OLS	Ordinary least squares
PCA	Principal components analysis
RC	Resilience capacity
REGIS-AG	Resilience and Economic Growth in the Sahel–Accelerated Growth
REGIS-ER	Resilience and Economic Growth in the Sahel–Enhanced Resilience
RISE	*Resilience in the Sahel Enhanced*
SAREL	Sahel Resilience Learning Platform
SPI	Standardized Precipitation Index
TANGO	Technical Assistance to NGOs
TLU	Tropical Livestock Unit
UN-SPIDER	United Nations Platform for Space-Based Information for Disaster Management and Emergency Response
USAID	United States Agency for International Development
VIM	Victory Against Malnutrition Project
WASH	Water, sanitation and hygiene
WFP	World Food Programme

Executive Summary

This report documents the resilience analysis of the baseline data collected for the impact evaluation (IE) of the *Resilience in the Sahel Enhanced* (RISE) initiative. The overarching goal of RISE is to increase the resilience of chronically vulnerable populations in agro-pastoral and marginal agriculture livelihood zones of the Sahel. The 5-year project is being implemented in targeted zones of Burkina Faso and Niger in West Africa.

The overall objective of the RISE IE is to provide insight into how the package of RISE interventions impacts (1) households' resilience; (2) households' and communities' resilience capacities (factors that enhance resilience); and (3) household food security. Using both qualitative and quantitative data, this resilience analysis sets out the baseline status of the objectives above, and undertakes exploratory analysis to understand how shocks and households' resilience capacities combine to affect the food security of households in the RISE area. The analysis employs data collected in May 2015 from a representative sample of 2,492 households residing in 100 villages.

Methodologically, the report is based on both descriptive and regression analysis of the quantitative data. For the descriptive analysis, indicators of resilience, resilience capacities, well-being outcomes, and shock exposure are reported by three key population subgroups:

- RISE program area: Burkina Faso and Niger

  The targeted Sahelian zones of Burkina Faso are its Eastern, Northern Central, and Sahel regions. The targeted Sahelian zones of Niger are Zinder, Maradi, and Tillabery.

- Predominant livelihood: Pastoralism, agriculture, or "other"

  The classification of households is based on survey respondents' reports of the proportion of food/income derived from various types of livelihood activities. The "other" group is dominated by households engaged in relatively non-climate sensitive activities such as retailing, artisanal mining, and receiving remittances from migration. The agriculture group makes up 68.4 percent of the RISE area, the pastoralism group 9.1 percent, and the "other" group 22.5 percent. All of these groups lie on the agro-pastoralism spectrum.

- Intervention group: high exposure or low exposure

  The high exposure group consists of households residing in villages slated to benefit from a set of Food for Peace (FFP) projects, and/or specialized resilience and economic growth projects introduced by the RISE initiative. The low exposure group, which will serve as the control group in the final IE analysis, consists of households residing in villages not slated to receive support from any of these projects.

The regression analysis employs area fixed-effects ordinary least squares (OLS) regression to investigate the relationships between resilience capacity, on the one hand, and food security and households' ability to recover from shocks, on the other. Given the nature of the data collected, the analysis is exploratory rather than causal.

The qualitative data collection took place in six villages in each of the program areas, in 12 villages in total, through focus group discussions (FGDs), positive deviant interviews, and key informant interviews (KIIs). The information from the three sources is triangulated and integrated with the quantitative results in order to provide contextual interpretation and give voice to the people living in the RISE program areas.

Resilience and Resilience Capacity. Resilience and resilience capacity are both key concepts on which this report's analysis is based. The RISE IE conceptualizes resilience according to the USAID definition, which states that resilience is "the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth."[1] According to this definition, household resilience is the ability of a household to mitigate, adapt to, and recover from shocks and stresses. While resilience itself is an ability to manage or recover, resilience capacities are a set of conditions that are thought to enable households to achieve resilience in the face of shocks. At the household level, these conditions can be classified into three categories: absorptive capacity, adaptive capacity, and transformative capacity.

Household Shock Exposure and Food Security

The quantitative and qualitative data corroborate prior information that the RISE program area is highly shock-prone. The most commonly experienced shocks are drought and its downstream impacts, including food price increases, animal disease, and conflict among herders and farmers and between villages. Other environmental shocks are floods, and insect and bird invasions. Less common shocks, but those nevertheless felt by a large number of households, are the unavailability and increased prices of productive inputs and serious illnesses of household members.

Specifically with respect to drought, African Flood and Drought Monitor (AFDM) satellite remote sensing data and information from Famine Early Warning Systems Network (FEWS NET) *Food Security Outlook* reports show that, overall, rainfall levels in the RISE area did not deviate greatly from the norm in the year prior to the baseline survey. However, it was a year of erratic conditions and rainfall volatility that was disruptive to the agricultural cycle and livestock rearing. Further, over a quarter of the population was exposed to prolonged

[1] USAID (2012).

agricultural drought—drought leading to visible loss of vegetation due to soil water deficiency and subsequent plant water stress for 6 months or more.

Data from both the baseline household survey and the AFDM indicate that exposure to drought was similar for the Burkina Faso and Niger program areas. Overall shock exposure (including climate, economic, and conflict shocks), was higher in the Niger area, however, due to higher incidences of insect invasions and economic shocks, particularly food price increases. Households whose predominant livelihood is pastoralism were more likely to be exposed to drought, animal disease outbreaks, and food price increases than the other livelihood groups, and less likely to be exposed to insect invasions.

According to FGD interviews, people living in the RISE area identify changing rainfall patterns—marked by a shortened rainy season and increased flooding—and increases in insect and bird invasions as a major disturbance. These changes, combined with increased land scarcity due to population pressure, conflict between pastoralist and farming communities, and water shortages are making the population more vulnerable through time. Historical timelines documenting the major shocks that occurred in the last 10 years show a pattern of repeated exposure to multiple shocks, many of which occurred simultaneously. An increasing stressor in the Burkina Faso area is armed attacks in areas where artisanal gold mining exists, which are not only threatening human life but are disrupting the local economy.

Qualitative interviews in the Burkina Faso area point to a stronger impact of drought on women than men, as women are responsible for providing water. Drought means their water fetching duties take more time, leaving less time for women's other care activities. While it impacts all children's school attendance, it is girls who tend to be taken out of school most often. Further, men's frustration with increased drought and other recurrent shocks is leading to an increase in domestic violence. Niger FGD participants reported that drought conditions often lead men to migrate in search of work, leaving women with a greater work burden.

The report employed three indicators to understand the food security situation of households. The first is an index of food security that takes into account both sufficiency of food and its quality, the second is an index of household hunger, and the third is a dietary diversity score (DDS). Not unsurprisingly given the multiple shocks to which households are exposed, the large majority of households in the RISE program area, a full 76.4 percent, were food insecure at the time of the baseline survey. Thirteen percent suffered from hunger, the most severe form of food insecurity. The low quality of households' diets is also an issue. Strong differences in the food security indicators across the Burkina Faso and Niger program areas and the livelihood groups are not apparent.

Regression analysis of the relationship between shock exposure and food security indicates that shock exposure has a soundly *negative* impact on food security. This finding holds for all three

measures of food security and both household perceptions-based measures of drought exposure and those based on AFDM satellite data.

Household Resilience to Shocks, Shock Coping Strategies, and Community Responses

Were households in the RISE area in fact able to recover from the shocks they experienced in the year prior to the baseline survey? In the absence of actual data on households' food security before and after the shocks occurred, this question is explored using households' own reports of their ability to recover from individual shocks. The data indicate very low resilience among households in the RISE area: the majority of households that experienced a shock were not able to recover from it. Only one-fifth of households were able to recover from drought and food prices increases, the most commonly-experienced shocks, for example. Summary measures of households' resilience to shocks show no differences across the Burkina Faso and Niger program areas and the three livelihood groups.

The quantitative household survey data indicate that the most common strategy used by households to cope with shocks, by far, is to sell livestock (employed by two-thirds of households), followed by reducing food consumption, and borrowing money from friends or relatives. Other commonly-employed strategies are: migration of some family members, drawing down on savings, receiving money or food from friends or relatives, and consuming seed stocks. Reducing food consumption and consuming seed stocks are particularly negative coping strategies. Fortunately, few households were forced to resort to other negative coping strategies, including selling productive assets, slaughtering livestock, taking children out of school, and sending children to work for money. One negative coping strategy, borrowing money from a money lender, was utilized as a coping strategy by over 10 percent of households, however. Households in the Niger program area were more likely than those in the Burkina Faso program area to use a number of coping strategies, consistent with the fact that they were more shock-exposed overall.

The *qualitative* data confirm that selling livestock was a predominant strategy for coping with shocks in both the Burkina Faso and Niger program areas. Coping strategies other than selling livestock emphasized by FGD participants in the Burkina Faso program area are: changing eating habits (e.g., switching from millet to rice); borrowing food, money, or land; and migration of entire families. The remittances of extended family members living and working abroad were identified as essential for surviving harvest losses and flooding damage.

Coping strategies other than selling livestock emphasized by FGD participants in the Niger program area are migration of male family members and selling labor. Begging was identified as a strategy used by the most vulnerable. Livelihood diversification, including diversifying both within and across risk environments (e.g., being involved in both farming and off-farm income generating activities), was seen as a way to prepare for and/or respond to shocks. Finally,

sharing resources among extended family members and receiving money from children or relatives living elsewhere, especially those living in cities, was noted as important for coping with shocks.

With regard to responses to shocks at the community level, the qualitative data point to strong practices of intra-communal help for dealing with shocks. This is seen as a key mechanism for preventing hunger and deprivation. Examples cited in Burkina Faso FGDs are village residents banding together to purchase rice in bulk after the failure of the millet crop. In both program areas, respondents pointed to better-positioned households lending food, land, and money and providing labor to others in need following a climate shock.

Female FGD respondents, but not male FGD respondents, pointed to an erosion of trust and solidarity among households in their villages over time. They indicate that the increasing frequency and severity of shocks is the key factor eroding solidarity and hampering the ability of households to help each other in times of need. The breakdown of community cohesion has a negative impact on household resilience.

Resilience Capacity

The findings from the quantitative and qualitative data on a wide range of characteristics that contribute to households' and communities' resilience capacities were presented. Following, indexes of the three key aspects of household resilience capacity—absorptive, adaptive and transformative capacity—were presented along with an index of community resilience capacity.

Social Capital. Social capital is the quantity and quality of social resources (e.g., networks, membership in groups, social relations, and access to wider institutions in society) upon which people draw in pursuit of livelihoods and is thought of as the "glue" that binds people in society together. Respondents to the quantitative survey reported receiving informal support, mainly in the form of loans, gifts and remittances from relatives, neighbors, or friends far more often than formal sources of support such as food aid, cash transfers, and capacity-building support.

Data were examined on three types of social capital: *bonding social capital*, the links between community members; *bridging social capital*, which connects members of one community or group to other communities or groups; and *linking social capital*, which is founded on vertical linkages between households/communities and some form of higher authority or power. While bonding social capital is higher in the Burkina Faso program area than the Niger area, there is no significant difference in bridging and linking social capital. However, a pattern of greater bonding and bridging social capital among pastoralists, and greater linking social capital among households falling into the "other" group, who tend to gain their livelihoods outside of their own homes and villages, were found. Qualitative data reveal the primary importance of the social cohesion and communal support associated with bonding social capital for coping with

shocks, of bridging social capital through remittances, and of linking social capital for receiving public aid and services.

Aspirations and Confidence to Adapt. Aspirations and confidence to adapt are psychosocial capabilities that are thought to give people greater resilience in the face of shocks. They are examined in this report using three indicators—absence of fatalism, belief in individual power to enact change, and exposure to alternatives of the status quo—combined into an overall index. According to the index, this aspect of resilience capacity is slightly higher in the Burkina Faso program area than the Niger program area due to somewhat lower fatalism and stronger belief in individual power to enact change in the Burkina Faso program area; there is very little difference across the livelihood groups.

Economic Sources of Resilience Capacity. An important economic source of resilience capacity is diversity of livelihood sources which allows flexibility, thereby reducing households' vulnerability in the face of shocks. In general, livelihood diversity is quite low in the RISE program area, with the average household engaging in 2.6 out of a total of 18 activities. It is slightly higher for households in the Burkina Faso program area and tends to be slightly lower among those falling into the pastoralism-predominant group. FGDs in both program areas reveal that people recognize that being able to diversify into economic activities that are not climate sensitive—especially gold mining in Burkina Faso and seasonal migration to urban areas in Niger—improves their capacity to manage shocks. Respondents in both areas also pointed to livestock rearing, which provides wealth and savings, and off-season and irrigated vegetable gardening as important manners in which to diversify one's livelihood. In Burkina Faso, the most resilient households were identified by FGDs to be those that diversify livelihoods by growing staple crops, cash crops, rearing livestock, gold mining, and engaging in off-farm activities such as commerce or skilled-based employment. In the Niger area the most resilient households were identified to be those who engage in both rain-fed and irrigated agriculture, rearing animals, relying on remittances, and accumulating savings.

Other economic sources of resilience capacity examined using the quantitative data were ownership of assets and access to financial resources (e.g., credit and savings). Asset ownership is slightly higher among households in the Burkina Faso program area and among the pastoralism-dominant livelihood group, the latter due to greater animal ownership. Access to credit, but not savings support, is more widely available in the Burkina Faso program area. Few differences were found in access to financial resources across the livelihood groups.

Access to Markets, Infrastructure, Services, and Communal Natural Resources. All four of these resources (markets, services, infrastructure, and commercial natural resources) are important elements of households' resilience to shocks. As features of transformative capacity, they enable more lasting and sustainable resilience.

Access to markets is not universal in the RISE program area: only 53 percent of households have access to a livestock market, 60 percent to a market for agricultural products, and 43 percent to markets for agricultural inputs. There is little difference across the Burkina Faso and Niger program areas in access, but the "other" livelihood groups tend to have greater access, perhaps because of the reliance on petty commerce, which often takes place in organized markets, as a source of many households' livelihoods. According to the qualitative data, men in the Burkina Faso area participate more in market activities than do women, while in the Niger area participation is more equal. In both areas, women's freedom of mobility is an issue.

Access to infrastructure (e.g., cell phone service, paved roads, piped water, and electricity) and basic services (e.g., schools, health centers, and financial services) differs little across the RISE program areas, with the exception of households in the Niger area having greater access to paved roads. However, pastoralist-focused households tend to live in areas with lower access to infrastructure, most particularly to paved roads and piped water for drinking.

Both communal grazing areas and communal water sources for livestock are available to 63 percent of households, while access to communal sources of firewood available to 74 percent. A large difference in access to communal grazing areas can be seen across the program areas, with over 90 percent of households in the Niger area having such access compared to only 41 percent of households in the Burkina Faso area. Pastoralism-focused households have somewhat lower access to communal grazing areas, and agriculture-focused households have greater access to communal water sources for their livestock.

Human Capital and Access to Information. Human capital, measured here using literacy, education levels, and trainings received, endows people with the ability to use information and other resources to cope with shocks and stressors. Access to information allows people to put such human capital to use. Human capital is equally very low across the two RISE program areas and is particularly low among pastoralism-focused households. Access to information shows no overall differences across the program areas or livelihood groups. According to FGDs, trainings on such subjects as agro-ecological techniques, setting up savings groups, and child feeding are highly valued, and some have transformed communities.

Safety Nets and Disaster Risk Reduction. Safety nets, both formal and informal, as well as specific support for households related to disaster risk reduction (DRR) are important sources of resilience capacity for coping in the aftermath of shocks. According to the quantitative survey data, the most highly available formal safety net is food assistance. Informal safety nets at the village level such as women's groups, credit or microfinance groups, savings groups, mutual help groups, and religious groups tend to be more widely available than the formal safety nets other than food assistance, but not universal. There is little difference in access to safety nets across the RISE program areas or livelihood groups. FGDs point to food distribution to vulnerable households in the aftermath of a shock as critical to avoiding extreme suffering and famine.

Disaster preparedness and mitigation are very low in the RISE program area. Availability of other elements of disaster risk reduction (hazard insurance and conflict mitigation support) is higher but far from universal. The only apparent difference across the program areas is that households in the Niger area are much more likely to live in a village with a disaster planning group. Pastoralism-focused households have lower access to these groups, but greater access to institutions providing conflict mitigation. According to the qualitative data, formal early warning systems (EWS) are not in place in the RISE area except in places where the RISE project has started to set up systems. Households rely on local shamans to interpret environmental signs to predict when the rainy season will start or end.

Summary Indexes of Household Resilience Capacity: Absorptive Capacity, Adaptive Capacity, and Transformative Capacity. As seen for many of the measures described above that are used to construct these indexes, differences across the program areas and livelihood groups are not strong. For the former, absorptive capacity is somewhat higher in Burkina Faso than in Niger. Pastoralism-focused households have somewhat greater absorptive capacity than the other groups, and households falling into the "other" group have moderately greater adaptive and transformative capacity. The overall index of resilience capacity indicates that this "other" group has somewhat greater resilience than the other two groups. The underlying sources of this greater resilience are the group's stronger linking social capital, more diverse livelihoods, greater access to infrastructure and financial services, and greater human capital.

Community Resilience Capacity. A defining feature of community resilience is community capacity for collective action as well as for collective problem solving and building consensus in order to negotiate coordinated response. Community resilience is measured using data on five possible types of collective action: (1) communal natural resource management (NRM); (2) disaster risk reduction; (3) social protection; (4) managing and maintaining public goods; and (5) conflict management. The only difference across the RISE program areas in these five types of collective actions are that there is a higher presence of disaster planning groups in the Niger program area and social protection is somewhat greater in villages in the Burkina Faso program area. Overall, an index of community resilience capacity shows no significant difference across the program areas.

FGD participants in both the Burkina Faso and Niger areas generally spoke positively about the leaders and governance institutions in their villages, with some exceptions linked to coerced participation and family conflicts with leaders. FGDs also raised numerous examples of collective action to deal with shocks, some supported by RISE project interventions. Note however, that some villages in Niger reported no tradition of recurrent, collective community actions in the face of shocks such as drought and flooding.

The Links Between Resilience Capacity, Ability to Recover From Shocks, and Household Food Security

In the regression analysis exploring the effect of resilience capacity on households' food security and their resilience to shocks, shock exposure was controlled for using three measures: (1) overall shock exposure, including climate, conflict, and economic shocks; (2) drought-specific shock exposure, which includes exposure to drought itself and its downstream impacts; and (3) drought shock exposure as measured using satellite data from the AFDM on the number of months of agricultural drought. The first two measures are perceptions-based measures calculated using the RISE baseline data.

The regression results confirm that greater household resilience capacity—including absorptive, adaptive and transformative capacity—is associated with better food security overall, reduced hunger, and increased dietary diversity. The results are robust to the measure of shock exposure. Community resilience capacity, on the other hand, was not found to have a statistically significant relationship with households' food security. As noted, the limitations of the data and statistical technique employed preclude any definitive conclusion regarding this relationship, but do suggest that each household's own degree of resilience capacity is more important to its food security than the resilience capacity of the village in which it resides.

Does resilience capacity actually help households to recover from shocks, that is, bolster their resilience to shocks? This question is explored using households' perceived ability to recover from shocks, an experiential measure of resilience. As for food security, the results indicate that all three aspects of household resilience capacity bolster their resilience in the face of shocks, including drought shocks. The specific factors contributing to household resilience capacity (index sub-components) that are found to have likely supported their ability to recover are:

- Bonding social capital;
- Bridging social capital;
- Aspirations and confidence to adapt;
- Human capital;
- Access to formal safety nets; and
- Availability of disaster preparedness and mitigation support.

Additional factors that were found to be important in Burkina Faso were linking social capital and access to infrastructure; additional factors found to be important in Niger were access to financial resources and availability of a conflict mitigation group.

No statistically significant relationship between households' ability to recover and community resilience capacity was found.

A final analysis using the data on drought shock exposure from the AFDM indicates that greater household resilience capacity reduces the negative impact of agricultural drought on food security. This is further confirmation of its protective role in the face of climate shock, the most commonly experienced type of shock in the RISE program area.

Differences in Resilience and Resilience Capacity Across the RISE IE Intervention Groups

An analysis of the differences in resilience and resilience capacity, across the intervention groups in the RISE IE finds a slightly higher ability to recover from shocks among the high exposure group of households and higher household resilience capacity. There are specifically higher values of the following indicators:

- Access to infrastructure;
- Human capital;
- Access to information;
- Availability of formal safety nets;
- Availability of informal safety nets; and
- Disaster preparedness and mitigation.

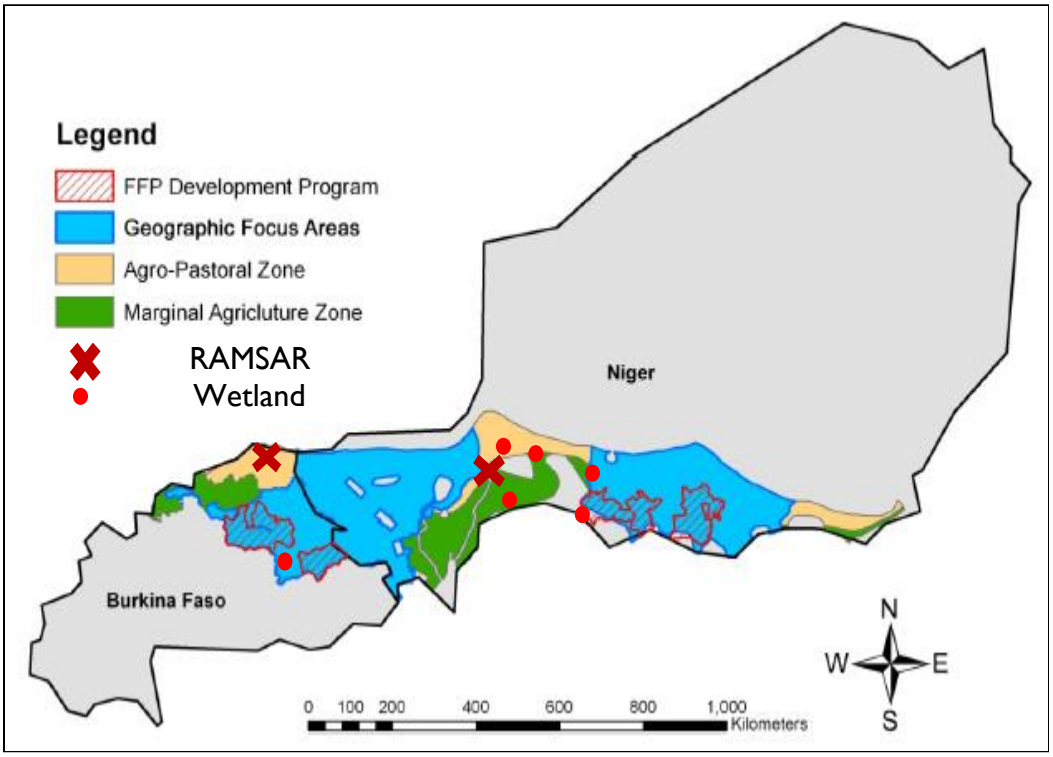
It will be particularly important to take these differences into account in the course of the RISE IE in order to overcome the problem of selection bias.

1. Introduction

This report documents the resilience analysis of the baseline data collected for the impact evaluation (IE) of the *Resilience in the Sahel Enhanced* (RISE) initiative. The overarching goal of RISE is to increase the resilience of chronically vulnerable populations in agro-pastoral and marginal agriculture livelihood zones of the Sahel. The Sahel is the focus of RISE because it is has a mix of deeply-rooted chronic poverty, food insecurity, recurrent drought, conflict, and violent extremism that drives vulnerable communities into recurrent crises. Most recently, the region experienced three droughts over the course of a decade, one in 2008, one in 2010, and one in 2012.

An initiative of the United States Agency for International Development (USAID), the RISE program combines humanitarian and development efforts to end the region's vicious cycle of crises, helping vulnerable communities to stay firmly on the path to development despite such events (USAID, 2015). The 5-year project is being implemented in targeted zones of Burkina Faso and Niger, including areas within the Eastern, Northern Central, and Sahel regions of Burkina Faso, and the Zinder, Maradi, and Tillabery zones in Niger (see Figure 1.1). The total population of these areas combined is 11 million.

Figure 1.1. Map of the RISE area



Source: USAID (2013).

The overall objective of the RISE IE, of which this report is a part, is to provide insight into how the package of RISE interventions impacts (1) households' resilience; (2) households' and communities' resilience capacities (factors that enhance resilience); and (3) household resilience outcomes, which include income, assets, food security, and nutritional status. Using both qualitative and quantitative data, this resilience analysis sets out the baseline status of all three of the above and undertakes exploratory analysis to understand how shocks and households' resilience capacities combine to affect the resilience outcomes among households in the RISE area. The analysis is based on data collected from a representative sample of 2,492 households in May 2015.

The main baseline report complementing this resilience analysis was written under the auspices of the Sahel Resilience Learning Platform (SAREL), which provides monitoring, evaluation, collaboration, and learning support to the RISE initiative (SAREL, 2015). It provides background information about the demographic characteristics and economic conditions of households, women's empowerment, household poverty, and community governance in the program area. It also documents in detail the degree of malnutrition among children under 5, along with feeding and breastfeeding practices.

1.1 The Program Area: Sahelian Zones of Burkina Faso and Niger

The RISE program area is located in the Sahel, an ecologically fragile transition zone of grasslands and shrubs between the Saharan Desert to the north and the savanna to the south that is highly susceptible to climate and economic shocks.[2] The dominant livelihood activities in the area are farming and livestock rearing. Given the semi-arid climate, the most commonly-grown crops and staple foods are millet and sorghum.

The chronic vulnerability of households in the program area is marked by high levels of poverty—an estimated 36.1 percent of all people live on less than $US 1.25 per day (SAREL, 2015)—water scarcity, weak governance, and gender inequality. A complex set of drivers have resulted in a large and growing resilience deficit such that households are increasingly unable to mitigate, adapt to, and recover from shocks and stresses in a manner that does not further exacerbate their vulnerability.

Three main drivers are at the root of the area's resilience deficit. The first is population growth, which exerts pressure on social and economic systems and strains already degraded natural resources, increasing conflicts over water, pasture rights, and agricultural land. Both Burkina Faso and Niger have among the world's highest population growth rates.

[2] The sources for this section are: FEWS NET (2010), USAID (2013), USAID/Senegal (2013), Refugees International (2013), Burkina Faso FEWS NET *Food Security Outlook* reports from April 2014-August 2015, and Niger FEWS NET *Food Security Outlook* reports from April 2014-July 2015 (2015).

The second driver to the area's resilience default is climate change and variability. Climate change is already causing temperature and rainfall extremes that exceed historical patterns across the Sahel. Climate models predict increasing temperatures, more variable rainfall, and more frequent extreme events, such as droughts and floods, over the coming decades. Given that the large majority of households' livelihoods are dependent on rainfall, the result is more uncertain production levels, food price volatility, income variability, asset depletion, and increased indebtedness.

The third driver is a growing reliance on markets to meet households' food needs, leading to increased *vulnerability* to food price volatility. The area is structurally in food deficit, being increasingly dependent on the market for staple cereals from more productive areas to the south.

Together, these drivers underlie a trend towards populations in former pastoralist areas becoming increasingly involved in agriculture as well as wage labor and other cash income – generating activities such as petty commerce. Faced with repeated crises, more and more poor households are finding themselves with no other choice but to leave their villages in search of other forms of income. In Burkina Faso this "distress migration" often is to work in gold mines, while in Niger it is to seek employment in urban areas or even to beg.

Among the RISE program areas most vulnerable are its children under 5. According to the baseline data, the prevalence of chronic undernutrition (stunting) in the area is 42.5. That of acute undernutrition (wasting) is 17.2, far higher than the 10 percent deemed by the World Health Organization (WHO) to signify serious concern (WHO, 2000).[3] Such high malnutrition is caused by the area's excessive levels of food insecurity, which will be described in Chapter 3 of this report, poor child feeding practices, and unsanitary conditions.[4]

[3] In comparison, the stunting prevalence in Burkina Faso as a whole was 32.9 percent in 2012. That of Niger as a whole was 43.0 percent. The wasting prevalence of Burkina Faso was 10.9 percent and that of Niger was 18.7 percent (UNICEF, WHO, & World Bank, 2015).

[4] According to the SAREL baseline report (SAREL, 2015), only 5.4 percent of children 6-23 months in the program area receive a minimum acceptable diet, and 34 percent of children 0-6 months are exclusively breastfed. With respect to sanitation, although 66 percent of households use an improved drinking water sources, only 18 percent have a sanitation system for human waste that is covered or otherwise intended to prevent contamination.

1.2 The RISE Initiative

To reach its overall goal of increased resilience, the RISE initiative has three specific objectives. They are:

1. Increased and sustainable economic well-being through
   - Diversified economic opportunities;
   - Intensified production and marketing;
   - Improved access to financial services; and
   - Increased access to market infrastructure.
2. Strengthened institutions and governance through
   - Strengthened natural resources management (NRM);
   - Disaster risk management;
   - Strengthened conflict management; and
   - Strengthened government and regional capacity and coordination.
3. Improved health and nutritional status through
   - Increased access to potable water; and
   - Improved health and nutrition practices.

In addition to longer-term development activities, when needed USAID's Office of Food for Peace (FFP) and Office of the U.S. Foreign Disaster Assistance programming target the most vulnerable with life-saving interventions. These include direct food provision through the World Food Programme (WFP) as well as cash transfers, temporary employment, improved access to seeds, and training in more effective livestock and agricultural practices.

The initiative includes three sets of projects: ongoing FFP projects underway since 2012,[5] and two new projects launched with the start of RISE. These latter projects are Resilience and Economic Growth in the Sahel–Enhanced Resilience (REGIS-ER), launched in 2014, and Resilience and Economic Growth in the Sahel–Accelerated Growth (REGIS-AG), launched in 2015.

[5] In Burkina Faso the projects are Families Achieving Sustainable Outcomes (FASO), Catholic Relief Services (CRS), and Victory Against Malnutrition Project (VIM) (Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance [ACDI/VOCA]). In Niger, they are Pasam-Tai (CRS), Sawki (Mercy Corps), and Livelihoods, Agriculture and Health Interventions in Africa (LAHIA, Save the Children).

1.3 What Are Resilience and Resilience Capacity?

Resilience and resilience capacity are both key concepts on which this report's analysis is based. It is thus important to understand what each is and, importantly, the distinction between them.

The RISE IE conceptualizes resilience according to the USAID definition, which states that resilience is "the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth."[6] According to this definition, household resilience is the ability of a household to mitigate, adapt to, and recover from shocks and stresses. In addition to *household* resilience, this report considers the baseline state of *community* resilience. Community resilience is defined as follows: "A community is resilient when it can function and sustain critical systems under stress; adapt to changes in the physical, social, and economic environment; and be self-reliant if external resources are limited or cut off."[7] A defining feature of community resilience is the extent to which communities can effectively combine social capital and collective action in response to shocks and stresses.

While resilience itself is an ability to manage or recover, resilience capacities are a set of conditions that are thought to enable households to achieve resilience in the face of shocks. At the household level, resilience capacities can be classified into three categories:

- A*bsorptive capacity* is the ability to minimize exposure to shocks and stresses (*ex ante*) where possible and to recover quickly when exposed (*ex post*).[8]
- *Adaptive capacity* involves making proactive and informed choices about alternative livelihood strategies based on changing conditions.
- *Transformative capacity* relates to governance mechanisms, policies/regulations, infrastructure, community networks, and formal safety nets that are part of the wider system in which households and communities are embedded. Transformative capacity refers to system-level changes that enable more lasting resilience.

Given their complexity, measuring the resilience capacities requires combining a variety of indicators of the underlying concepts relevant in a particular setting into one overall indicator.

The measurement of household resilience itself, and of absorptive, adaptive and transformative capacity, for the RISE IE are described in detail in Chapters 4 and 5, respectively. The measurement of community resilience capacity is described in Chapter 6.

[6] USAID (2012).
[7] Frankenberger, T., Mueller M., Spangler T., and Alexander S. (2013).
[8] The descriptions in the paragraph of absorptive, adaptive, and transformative capacity are from Frankenberger et al. (2012b).

1.4 Objectives of this Report

Among the well-being outcomes that are targets of the RISE initiative, this report focuses on household food security.

The objectives of the report are to:

1. Describe the shock exposure of households, including the degree of shock exposure and the types of shocks households are exposed to;
2. Explore how shock exposure affects household food security;
3. Describe household resilience to shocks using a measure of their perceived ability to recover from the shocks they experienced in the year prior to the baseline survey;
4. Describe the baseline status of household resilience capacities, including absorptive, adaptive and transformative capacity;
5. Describe the baseline status of community resilience capacities and examine the relationship between household and community resilience capacities; and
6. Explore the relationship between resilience capacity (both household and community) and food security. A key question is whether resilience capacities reduce the negative impact of shocks on food security.

1.5 Organization of the Report

Chapter 2 of this report presents the RISE IE baseline survey data collection and analysis methodologies. Chapter 3 presents that data on the degree of exposure to shocks of the population in the RISE area using data from both the baseline survey and from external sources as well as the baseline data on food security. It also explores the relationship between shock exposure and household food security. Chapter 4 then reports on the degree of resilience of households to the shocks they faced in the year prior to the baseline survey as reported by households on the degree to which they were able to recover from them. Chapter 5 lays out the baseline data on household and community resilience capacity. In Chapter 6, regression analysis is undertaken to explore how household and community resilience capacity affects their food security in the face of shocks. Chapter 7 summarizes the differences found in resilience and resilience capacity across the RISE IE intervention groups, which is important information needed for conducting the final impact evaluation after the endline data are collected. Finally, the concluding chapter presents key findings of this resilience analysis.

2. Methodology

This section outlines the methodologies used for collecting and analyzing the *Resilience in the Sahel Enhanced* (RISE) impact evaluation (IE) baseline data, both quantitative and qualitative.

2.1 Quantitative Data Collection and Analysis

2.1.1 Data Collection

The quantitative data were collected from April 29, 2015 through May 30, 2015. Both household and community (village) surveys were conducted, simultaneously in Burkina Faso and Niger, over this period. Data were collected from a representative sample of households/villages in the entire RISE operational area (see Figure 1.1). Quantitative data were collected by SAREL.

The sampling design was planned with the need to collect data for two intervention groups—high exposure and low exposure—in order to evaluate the impact of RISE interventions. The high exposure group consists of households residing in villages slated to benefit from a set of Food for Peace (FFP) projects,[9] the Resilience and Economic Growth in the Sahel–Enhanced Resilience (REGIS-ER) project or the Resilience and Economic Growth in the Sahel–Accelerated Growth (REGIS-AG) project. The low exposure group, which will serve as the control group in the final IE analysis, consists of households residing in villages not slated to receive support from these programs.

The household survey followed a two-stage, stratified sampling design with the intervention groups serving as the strata. In the first stage, 50 villages were randomly selected within each of the groups. In the second, 25 households[10] were randomly selected within each village to reach the desired sample size of 2,500. Data were collected from a total of 2,492 out of the 2,500 households, giving a 99.7 percent response rate. The community surveys were conducted in all 100 household sample villages.

Further details of the quantitative data collection, including pre-testing of the instruments, survey logistics, enumerator training, and data processing can be found in a report by The Mitchell Group (2015). The survey instruments are in Appendices 1 and 2 at the end of this report.

[9] These include FASO (implemented by CRS) and VIM (ACDI/VOCA) in Burkina Faso and Pasam-Tai (CRS), Sawki (Mercy Corps) and LAHIA (Save the Children) in Niger.

[10] The actual number of households sampled was 28 in order to reach the target of 25 needed to achieve the desired sample size.

2.1.2 Data Analysis

The quantitative data analysis was conducted in STATA using both descriptive and multivariate analysis techniques.

Descriptive Analysis

In the report, the baseline household and community survey data are used to conduct descriptive analysis of indicators describing households' shock exposure, food security, perceived ability to recover from shocks, and resilience capacities, as well as community resilience capacity. Indicator values are mainly reported as percentages and means.

- **Percentages.** For values provided in nominal scales (e.g., yes/no responses), percentages were computed using the weighted number of cases that provided a given response as the numerator, and the total weighted number of cases as the denominator. Single response variables add up to a maximum of 100 percent, while multiple response variables may total to more than 100 percent.
- **Means.** For variables calculated in a continuous scale format (e.g., number of household members), means were computed using the weighted sum of values as the numerator and the total weighted number of cases as the denominator.

Indicators are reported by key population subgroups, and tests for statistically significant differences in the indicators across the groups are undertaken. Differences are considered significant if statistically significant at the 0.05 level. The population subgroups for which values of variables are reported differ when household-level data are reported than when community-level data are reported.

For household-level data, the population subgroups are:

- RISE program area: Burkina Faso or Niger;
- Predominant livelihood: Pastoralism, agriculture, or "other"; and
- Intervention group: higher exposure or low exposure.

For community-level data, the population subgroups are:

- RISE program area: Burkina Faso or Niger; and
- Intervention group: higher exposure or low exposure.

The classification of households into predominant livelihood groups is based on survey respondents' reports of the proportion of food/income derived from various types of livelihood activities. The pastoralism group contains households reporting that "Livestock production and sales" provides the greatest proportion of their food/income. The agriculture group contains households reporting that "Farming/crop production and sales" provides the greatest

proportion of their food/income. The "other" group contains all other households. For these households some combination of the following activities provides a greater proportion of their food/income than either "Livestock production and sales" or "Farming/crop production and sales":

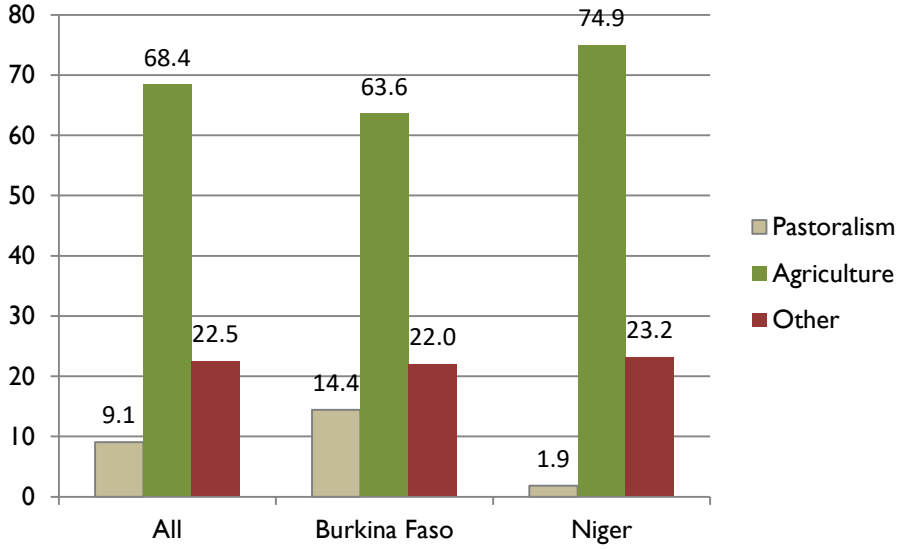
- Farm laborer;
- Production and sale of seedlings, seeds, or animal feed;
- Production and sale of firewood, charcoal, poles, or timber;
- Sale of wild products;
- Employed in an agricultural and animal product processing and marketing company;
- Private agricultural service providers;
- Petty commerce (retailing);
- Non-agricultural service delivery agent;
- Technical and professional activities;
- Artisanal mining;
- Non-agricultural worker;
- Domestic help;
- Crafts;
- Carrier, docker;
- Migration (remittances); and
- Gifts or inheritance.

The livelihoods of households in the "other" group are dominated by retailing (engaged in by 24.6 percent of households), remittances from migration (24.2 percent), and artisanal mining (14.4 percent). The occupations of this group tend to not be as climate-dependent as those of the pastoralism and agriculture-predominant groups.

It is important to keep in mind that while the predominant livelihood groups distinguish among households based on the main source of their food and income, most households derive some of their food and income from some combination of animal rearing, farming, and the more *non*-climate-dependent occupations, lying somewhere along the spectrum of agro-pastoralism.

Figure 2.1 reports the percentage of households falling into each livelihood group, broken down by program area. Agriculture dominates in both the Burkina Faso and Niger program areas. The main difference between the program areas is that pastoralism is more prevalent, and agriculture less prevalent, in the Burkina Faso area.

Figure 2.1. Percent of households falling into predominant livelihood groups, by program area



The sample size was chosen such that the number of observations used in each calculation is in most cases sufficient for calculation of these statistics. Any cases where the number of observations is too small for reliable measurement (n<=30) are denoted in the tables, and variable values are not reported.

Both household and community survey sampling weights were calculated to take into account the differing probabilities of households/villages being included in the sample across the high and low exposure RISE IE intervention groups. Representativeness of the RISE operational area is maintained by weighting any statistics that apply to the survey population as a whole by these sampling weights.

Some important variables of interest (e.g., resilience capacities) are composite measures based on multiple other measures. In many of these cases principal components analysis (PCA) or polychoric factor analysis are used to construct an index. These techniques reduce a set of "input" variables that are hypothesized to be related to one another to a single variable by detecting structure in the relationships among the input variables from their correlation matrix. PCA is appropriate to use when all of the input variables are continuous. Polychoric factor analysis[11] is the PCA analog that is appropriate to use when some variables are binary or ordinal. For both, the variables are combined using weights that represent their correlations

[11] Kolenikov and Angeles (2004).

with the single variable produced. Indexes are constructed using this technique only if the signs of the weights for the input variables are as expected (positive or negative) given our conceptual understanding of the relationships between the input variables and the indicator being measured.

Multivariate Analysis

In Chapters 3 and 6 of this report, multivariate regression analysis is used to investigate the relationships that are hypothesized to exist between key variables of interest to this resilience analysis. Specifically, the following questions are investigated:

1. How is household food security affected by household shock exposure?
2. How is food security affected by household and community resilience capacities?
3. How was households' ability to recover from the shocks experienced in the year prior to the baseline survey influenced by their own and their communities' resilience capacities?
4. Does greater household resilience capacity reduce the negative impact of shocks on food security?

To investigate Question (1), the following equation is used:

( ) ( )

where *foodsec* represents current household food security, SE is an index of shock exposure over the previous year, and the household characteristics controlled for are household demographic characteristics (adult equivalents, age-sex composition, and gendered household type); education; predominant livelihood; and an index of asset ownership. The term μ represents a set of dummy variables controlling for the area of residence of each household, which indirectly controls for factors in households' broader area of residence that influence their food security, such as elevation and cultural or political factors. When shock exposure is measured at the household level, the area is each household's village. When shock exposure is measured at the village level, the area is the program area (Burkina Faso or Niger).

The regression equations used to investigate Question (2) regarding household resilience capacity (HRC) and community resilience capacity (CRC) are:

( ) ( )

( ) (3)

In equation (2) the μ term represents the same geographical areas as in equation (1), while in equation (3) it represents province or program area.[12] The regression equations used to investigate Question (3) are the same as those to investigate Question (2), but the dependent variable is a measure of households' ability to recover from the shocks experienced in the previous year.

Finally, the regression equations used to investigate Question (4) are:

$$(\qquad\qquad\qquad\qquad\qquad\qquad) (\quad)$$

$$(\qquad\qquad\qquad\qquad\qquad\qquad) (\quad)$$

The interaction terms between shock exposure and the measures of resilience capacity help to determine whether greater resilience capacity reduces the negative impact of recent shocks on current well-being outcomes.

Important Caveat Regarding Causality. Given the nature of the data collected, the regression techniques available to analyze the data do not allow analysis of *causal* impacts of shocks and resilience capacity on households' food security and resilience to shocks.[13] Thus the results of the regression analysis presented in Chapters 3 and 6 must be considered exploratory and "suggestive." The goal is to determine whether the relationships between the dependent and independent variables (as identified by the signs of regression coefficients) are in the hypothesized directions and deemed to be statistically significant, while controlling for other factors known to influence the dependent variables. Keeping this caveat in mind, the methods employed do take one much further down the road of understanding than simple descriptive analysis.

2.2 Qualitative Data Collection and Analysis

2.2.1 Data Collection

The qualitative component of data collection focused on capturing contextual information about resilience and the impact of shocks in order to understand and explain outcomes, as well as to interpret the quantitative findings. In particular, qualitative findings help explain how households and communities perceive change, how they define resilience, and how they view the challenges to livelihoods posed by shocks and stresses. Topical outlines were developed by Technical Assistance to NGOs (TANGO) in conjunction with United States Agency for

[12] It is not possible to employ village-level dummy variables when including another control variable measured at the village level, in this case community resilience capacity. Province is employed to control for area of residence when shock exposure is measured at the household level. Program area is employed to control for area of residence when shock exposure is measured at the province level, as it is when Africa Flood and Drought Monitor data are employed to measure drought exposure (see Chapters 3 and 6).

[13] Inferring causality more directly would involve the use of different techniques (for example, experimental or instrumental variables methods), typically applied in the context of panel data, and/or a careful triangulation of multiple sources of quasi-experimental and non-experimental data (Smith et al., 2013).

International Development (USAID) staff and included questions on coping strategies, social capital, and aspirations in order to provide in-depth information about how households use community resources to manage shocks.

The qualitative survey was carried out in a sample 12 villages in total, six in Burkina Faso and six in Niger under the FTF FEEDBACK project. The sample was drawn from the list of villages sampled for the quantitative survey. In each country, four villages were chosen from among the high exposure sites, and two from among the low exposure ones. Sample selection was also influenced by the need to cover the maximum variety of RISE partners' interventions and took into account environmental diversity, livelihood differences, and access to markets. Security considerations and accessibility also influenced selection. Villages in the Province of Gayeri in the East Region of Burkina Faso had to be excluded for security reasons. Due to seasonal inaccessibility to vehicles, villages originally selected in the Sahel region of Burkina Faso had to be substituted.

Qualitative data collection involved separate focus groups of men and women. Focus group discussions (FGDs) were conducted with representative groups from the primary livelihood systems and wealth ranking categories in the community. Groups varied somewhat in size, with efforts made to limit them to 8-10 individuals. Focus group facilitators used the topical outlines translated in the local language to guide discussion, with focus on the nature of shocks and stresses experienced by the community and common responses to them. Community maps and timelines were used to understand shocks and their impacts. Particular emphasis was given to individual and household engagement with formal and informal institutions and factors influencing the community's capacity for collective action. Venn diagrams were used to understand key actors in response to shocks. To understand household's perceptions of resilience, ranking exercises were carried out as well as positive deviant interviews. The positive deviant interviews enabled the team to identify local resources and capacities that were used to manage shocks.

Key informant interviews (KIIs), were conducted simultaneously or immediately following FGDs. They included interviews with village chiefs; religious leaders; members of community development committees; RISE project volunteers; local government administrators; technical public services field officers; doctors and traditional midwives; and RISE partner staff including Chiefs of Party, regional project managers responsible for monitoring and evaluation, and other field officers.

Team Composition and Training. The teams were composed of four national interviewers in each country plus one international consultant for coordination, who was also responsible for training, finalization of tools, and field work oversite in both countries. The *Institut de Management et Conseils* (IMC), a center for the provision of research services based in Ouagadougou, Burkina Faso, coordinated the selection of interviewers, the preparation of field

work (including obtaining official permits and communicating with relevant national and local government structures), and handled survey implementation expenditures.

Two 3-day trainings were conducted in the two capital towns after the final selection of candidates. The main objective of the training was to ensure that all members of the survey teams understood the objectives of the study, proper use of the survey tools, and the roles and responsibilities of each team member in data collection.

The training introduced the teams to the concepts of resilience and resilience capacity (including absorptive, adaptive and transformative capacity) and their meaning at individual, household and community levels, and introduced them to the theoretical frameworks underpinning the RISE initiative. The training modules included a presentation of the RISE initiative and its theory of change, elements of gender analysis, and ethics in human research.

The qualitative team in Burkina Faso had one female and three male team members (with a female team leader); in Niger two females and two males made up the team (with a male team leader), and one female international team member that was part of both teams.

Due to the linguistic complexity in the Burkina Faso program area, it was not possible to find four interviewers with good knowledge of all languages used in the visited areas. Therefore IMC also selected three interns who alternated in accompanying the team across the three regions and providing translation, according to their specific linguistic skills. An additional translator had to be hired for the visits in the Sahel region. In Niger, language did not represent a problem for the team as all consultants were fluent in French and Hausa and some also in Tamasheq.

Distances between villages were longer in Niger than in Burkina Faso, and long travel hours compressed the time available for transcription and debriefing while in the field. The field work that was carried out in Burkina Faso occurred during a coup attempt (September 17, 2015), which could have negatively impacted the survey. Fortunately IMC was able to continue to support the field effort.

Challenges and Limitations. Since only 12 villages were surveyed as part of the qualitative assessment, the information generated is not representative of the whole RISE program area. The qualitative data are to be used to understand in more depth the strategies used by households and communities to manage shocks and stresses and to aid in the interpretation of the quantitative results.

2.2.2 Data Analysis

The qualitative information from the FGDs, KIIs, and positive deviant interviews were transferred into topically-structured matrices. The information was then analyzed to identify patterns in responses and contextual information to help explain the quantitative findings. Responses from participants were triangulated across the three data sources to cross-check the reliability of information and to identify differences in perception between groups based on

gender, social or economic status, and ethnic group. The qualitative data analysis was used to interpret and supplement the quantitative results throughout this baseline resilience analysis report. It is integrated with quantitative findings to provide a more comprehensive and contextually-specific picture of resilience dynamics at the local level.

Research topics that were analyzed as part of the qualitative analysis included:

- Which shocks—particularly the recurrent ones—are the populations exposed to?
- What is the differentiated impact of these shocks on different population groups?
- What are gender differences in resilience capacities? What are the strategies in place at the collective level, and household and intra-household levels, to respond to these shocks?
- What are the livelihoods of the most resilient households and what are their strategies to respond to shocks?

The qualitative data give a voice to the people living in the RISE program area by reporting their own words on important topics addressed using quantitative techniques. For instance, qualitative analysis findings provide insight into government policies and programs influencing the resilience of target populations, local market dynamics, community social capital and relations with neighboring communities, savings and borrowing activity, spillover effects of other development projects, and social and economic characteristics of distinct populations. Qualitative analysis also complements quantitative findings at the community and household levels by describing how social capital functions in the wake of shocks, including ways in which unequal power relations and unequal access to resources influence the ability of households to build and draw upon social capital.

3. Household Shock Exposure and Food Security

This chapter first describes the exposure of households to shocks in the *Resilience in the Sahel Enhanced* (RISE) program area during the year preceding the baseline survey,[14] including climate shocks, conflict shocks, and economic shocks. The quantitative baseline data set itself is used to report on all three types of shocks as well as to create two "perceptions-based" shock exposure measures, one capturing overall shock exposure and another focused specifically on drought and its downstream impacts. Satellite remote sensing data from the African Flood and Drought Monitor (AFDM) as well information from Famine Early Warning Systems Network (FEWS NET) *Food Security Outlook* publications, are employed as sources of secondary data on climatic conditions. In a final section on drought exposure, the qualitative data representing people's own description of the shocks they face are presented. Following, the chapter reports on the food security situation of households at the time of the baseline survey. Lastly, a regression analysis is undertaken to explore how the shocks faced by households affect their food security.

3.1 Shock Exposure

3.1.1 Perceptions-Based Shock Exposure Data From the RISE Quantitative Baseline Survey

Table 3.1 reports the percent of households in the RISE program area who experienced various shocks in the year prior to the baseline survey. The most common shock reported was drought, by 57 percent of households. Other commonly-experienced shocks were sharp food price increases, experienced by about one-third of households; animal disease outbreaks, by about one-quarter; and exceptional health expenses and massive insect invasions. The latter two were experienced by about 20 percent of households. Less common shocks, but those nevertheless felt by a large number of households are: theft of assets or holdups, the unavailability of needed productive inputs; increases in the prices of such inputs; and serious illnesses of household members.

The overall index summarizing the degree of shock exposure helps to compare across population groups. It takes into account the number of shocks households reported being exposed to as well as their perceived severity. Perceived severity is measured using answers to the question "How severe was the impact on your income and food consumption?" The five possible responses range from "None" to "Worst ever happened." The index is calculated as a weighted average of the incidence of each shock (a dummy variable equal to 0 if not experienced and 1 if experienced) and its perceived severity as measured on the 5-point scale. It ranges from 0 to 53 and has a mean of 8.54 (see bottom of Table 3.1).

[14] The "past 5 years" data were collected to provide a comparison at endline, which will be implemented about 5 years after the baseline. Those data will be used then.

Table 3.1. Percent of households experiencing various shocks in the last year

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Climate shocks								
Excessive rains	4.4	2.7[a]	6.7[a]	3.1	4.4	4.9	4.4	4.4
Drought	56.9	60.0	52.7	70.7[ab]	57.0[a]	51.1[b]	65.8[a]	47.6[a]
Insect invasion	19.4	4.6[a]	39.4[a]	6.1[ab]	21.8[a]	17.7[b]	16.9	22.1
Animal disease outbreak	26.5	27.4	25.4	35.1[a]	28.3[b]	17.7[ab]	22.3[a]	31.0[a]
Bush fires	0.5	0.6	0.4	0.7	0.5	0.6	0.6	0.4
Conflict shocks								
Land conflicts	2.0	0.8[a]	3.5[a]	1.3	2.1	1.9	1.7	2.3
Conflict between farmers and herders	3.1	3.3	2.8	4.9	3.3	1.7	4.1	1.9
Conflict involving entire villages	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Theft of assets	8.1	8.7	7.3	9.7	8.7	5.8	7.3	9.0
Economic shocks								
Sharp food price increases	33.6	25.8[a]	43.9[a]	41.8[a]	34.5[b]	27.3[ab]	33.0	34.1
Unavailability of productive inputs	10.8	2.2[a]	22.3[a]	4.7[ab]	11.4[a]	11.3[b]	11.1	10.4
Drop in demand for products sold	2.0	1.1[a]	3.2[a]	2.8	1.9	2.0	1.6	2.4
Increase in price of productive inputs	8.6	5.7[a]	12.5[a]	8.0	9.6[a]	5.7[a]	8.5	8.7
Drop in price of products sold	3.5	3.1	3.9	10.2[a]	2.4[a]	4.1	4.6	2.3
Debt repayment	6.8	4.2[a]	10.3[a]	3.2[a,b]	6.9[a]	8.1[b]	5.8	7.9
Job loss by household member	0.5	0.3	0.7	0.0[a]	0.5[a]	0.7	0.6	0.3
Long-term unemployment	1.2	0.7	1.8	0.4	1.1	1.7	1.4	1.0
Abrupt end of assistance from outside of household	1.0	1.0	1.0	0.0[a,b]	0.9[a]	1.4[b]	1.0	1.0
Disease/exceptional health expense	21.2	18.4	24.9	19.6	22.0	19.2	20.0	22.4

Table 3.1. Percent of households experiencing various shocks in the last year (continued)

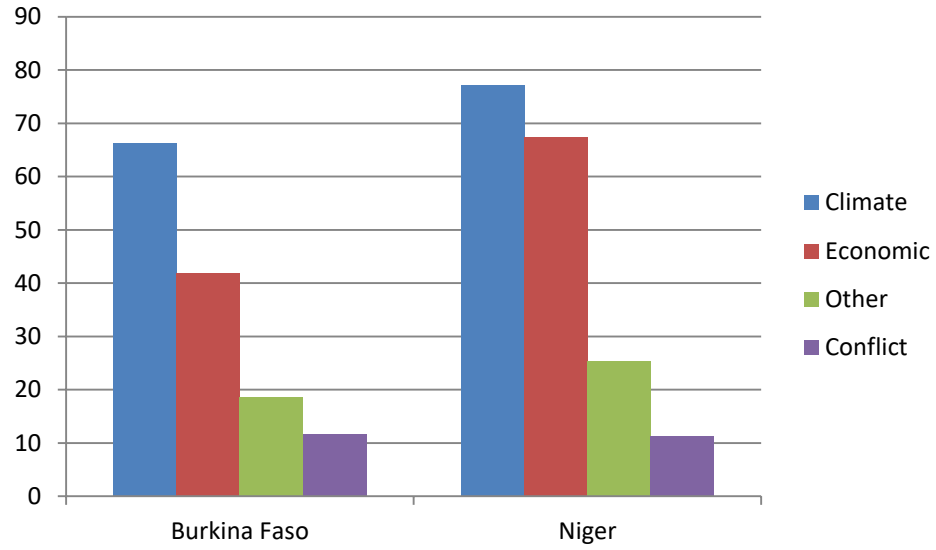
Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Other								
Death of household member	6.4	7.6[a]	4.9[a]	6.9	6.4	6.4	5.9	7.0
Serious illness of household member	10.9	10.6	11.3	8.8	10.0[a]	14.3[a]	11.4	10.4
Emigration of household member	4.2	0.9[a]	8.7[a]	0.9[a,b]	4.3[a]	5.3[b]	4.2	4.2
Fire (house…)	1.4	0.7[a]	2.3[a]	0.7[a]	1.0[b]	3.0[a,b]	1.4	1.4
Forced repatriation	0.2	0.1	0.3	0.0	0.2	0.2	0.1	0.2
Household dislocation	0.6	0.3	0.9	0.0[a]	0.6[a]	0.8	0.3	0.9
Sudden increase in household size	0.6	0.5	0.7	0.6	0.5	0.7	0.7	0.4
Shock exposure index	**8.54**	**6.87[a]**	**10.80[a]**	**8.55**	**8.91[a]**	**7.43[a]**	**8.45**	**8.65**
Drought shock exposure index	**5.43**	**5.05**	**5.94**	**6.38[a]**	**5.70[b]**	**4.22[a,b]**	**5.35**	**5.51**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Comparing across the program areas, the perceptions-based shock exposure index is substantially higher for households in the Niger area than the Burkina Faso area. This difference is driven by much greater exposure to insect invasions and to economic shocks in the Niger area. The main economic shocks that were more prevalent are sharp food price increases, unavailability of productive inputs, increases in the prices of inputs, and debt repayment.

Figure 3.1 gives an overview of the percent of households in the program areas experiencing climate, economic, conflict and other shocks, highlighting that Niger households were more exposed to both climate shocks and, especially, to economic shocks. Exposure to conflict shocks did not differ across the areas, affecting roughly 10 percent of households in each.

Figure 3.1. Percent of households experiencing climate shocks, economic shocks, conflict shocks, and other types of shocks, by program area



According to the overall shock exposure index, differences in shock exposure across the livelihood groups are not strong, yet some major differences in exposure to *individual* shocks are apparent, particularly climate shocks. Households whose predominant livelihood is pastoralism were substantially more likely to have been exposed to drought, and somewhat more likely to have been exposed to animal disease outbreaks, the latter being related to their dependence on animals for their livelihoods. On the other hand, they were less likely to be exposed to massive insect invasions due to their lesser dependence on crop production. In the case of economic shocks, pastoralism-focused households were more likely to be exposed to sharp food price increases than the other groups perhaps because of their greater need to purchase staple foods on the market. Consistent with FEWS NET reports (see Section 3.1.3 below), they were also more likely to be exposed to drops in the price of products sold, as livestock body conditions deteriorated in areas affected by drought.

The shock exposure index focused specifically on drought is calculated in the same manner as overall shock exposure, but only includes exposure to drought (insufficient rainfall) and its downstream impacts. The following typical downstream impacts of drought are as follows:[15]

- Animal disease outbreaks;
- Conflict between farmers and herders;
- Theft of assets;
- Sharp food price increases;

[15] Note that dummy variables representing all of these downstream shocks were found to have statistically significant correlations ($p>0.01$) with a dummy variable representing exposure to drought itself.

- Increases in the prices of productive inputs; and
- Drops in the prices of products sold.

Drought shock exposure was more severe in Niger than in Burkina Faso in the year prior to the baseline survey and highest for pastoralist-focused households. Note, however, that actual reports of insufficient rainfall associated with drought had essentially the same prevalence across the program areas, being 60 percent among Burkina Faso households and 52.7 among Nigerien households, a difference that is not statistically significant (see top of Table 3.1). It was the perceived severity of drought, and/or the incidence and perceived severities of the downstream impacts of the drought, then, that led to greater drought shock exposure of Nigerien households.

3.1.2 Climate Shock Exposure Information From the Africa Flood and Drought Monitor

The AFDM is a real-time, satellite-based, drought monitoring and seasonal forecast system for sub-Saharan Africa. Current conditions are compared to an historical, multi-decadal reconstruction of the terrestrial water cycle using data from 1950-2008. The AFDM allows Geographical Information System (GIS) coordinates to be employed to download data from the Internet for localized geographical areas with 0.25° spatial resolution (Sheffield et al., 2014).

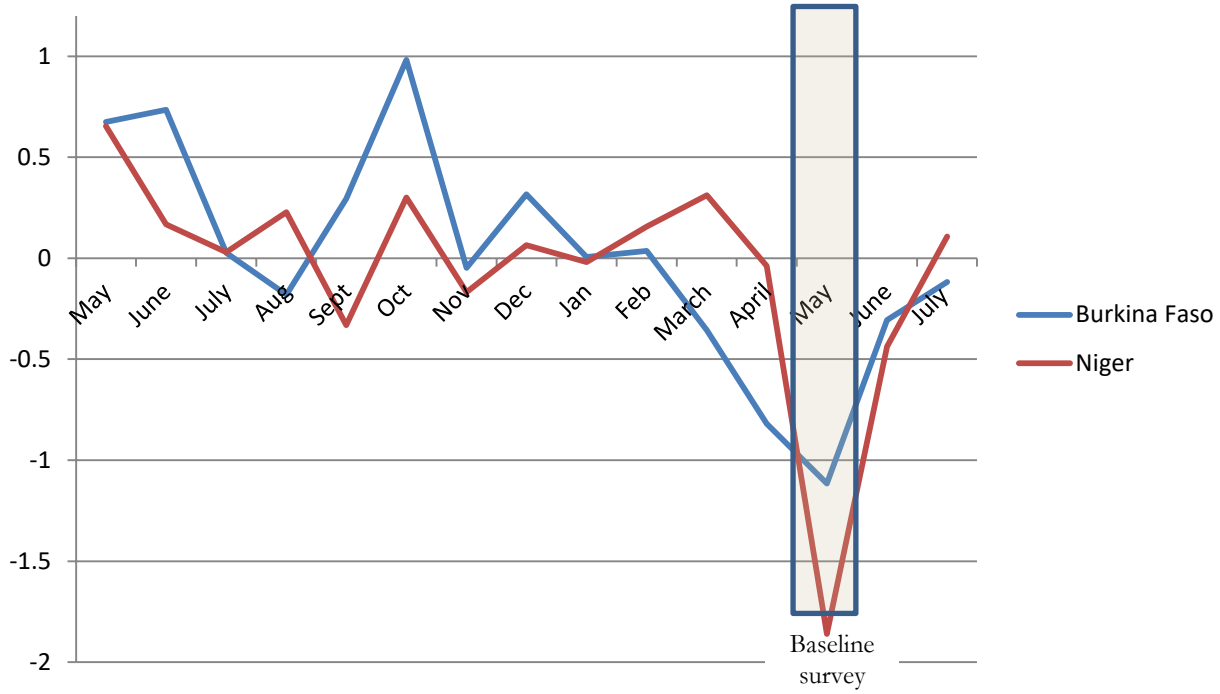
For this analysis, month-by-month AFDM data on measures of rainfall and vegetation coverage deviations from the norm for the year prior to the baseline survey (May 2014-May 2015) are employed, accessed using baseline GIS coordinates for each of the 100 sample villages. The specific measures employed are (1) the 1-month Standardized Precipitation Index (SPI), which is the number of standard deviations that observed 1-month cumulative precipitation deviates from the climatological average; and (2) the Normalized Difference Vegetation Index (NDVI) percentile, which measures the percentile of the norm of current vegetation coverage (the 50th percentile is the norm). The SPI is used to detect what are known as meteorological droughts, defined by rainfall deficiency over an extended period of time. Meteorological droughts can turn into agricultural droughts, which can be measured using vegetation indices such as the NDVI percentile. Agricultural droughts are characterized by soil water deficiency and subsequent plant water stress and reduced crop production (UN-SPIDER, 2016).

Figures 3.2 and 3.3 track the 1-month SPI and the NDVI percentile, respectively, in the year prior to the baseline survey for the Burkina Faso and Niger program areas. SPI values lying between -0.5 and -0.7 indicate "abnormally dry" conditions, and those below -0.8 indicate drought conditions.[16] Note that both program areas have a single rainy season. In the Burkina

[16] Values between -0.8 and -1.2 indicate moderate drought; Those between -1.3 and -1.5 indicate severe drought; those between -1.6 and -1.9 indicate extreme drought; and those -2.0 or less indicate exceptional drought (National Drought Mitigation Center, 2016).

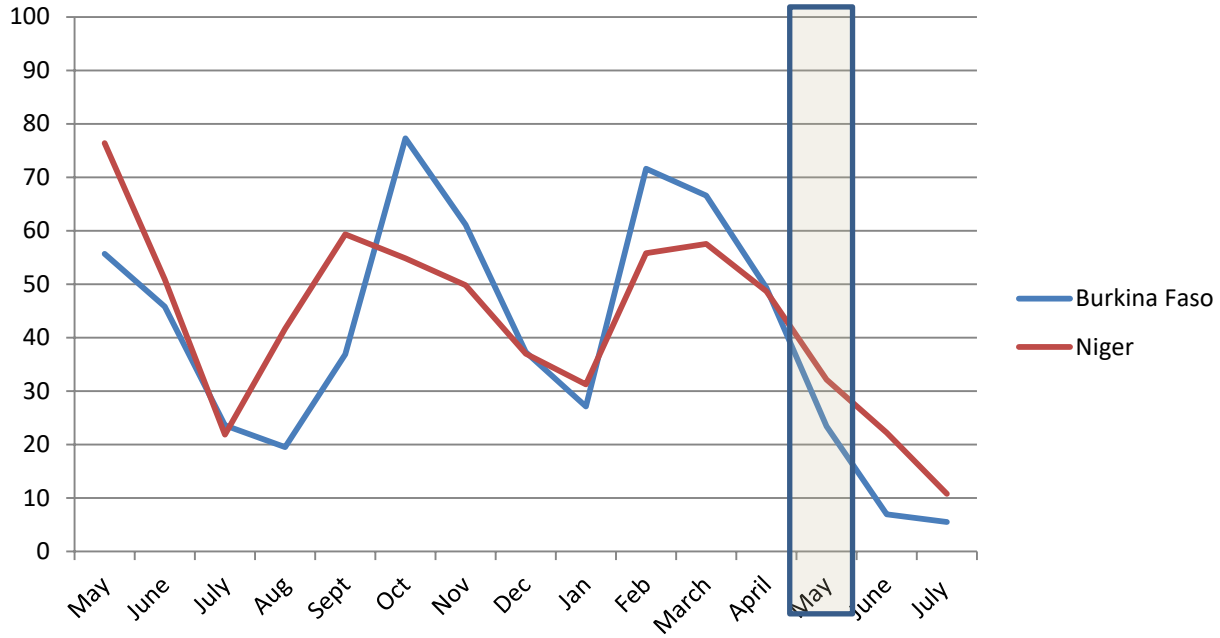
Faso program area it runs from May through October, while in the Niger program area is runs from July through September/October (FEWSNET *Food Security Outlook*, January 2013).

Figure 3.2. Rainfall deviation from norm in RISE program areas, May 2014-July 2015



Source: African Flood and Drought Monitor, 2015. Rainfall deviation is measured as the 1-month Standardized Precipitation Index, which is the number of standard deviations that observed 1-month cumulative precipitation deviates from the climatological average.

Figure 3.3. Normalized difference vegetation index percentile in RISE program areas



Source: African Flood and Drought Monitor, 2015. The NDVI percentile is the percentile of the norm of current vegetation coverage, where the 50th percentile is the norm.

According to the SPI data (Figure 3.2), while overall rainfall levels deviated little below the norm for most of the period, they began to drop into drought territory in the months prior to the baseline survey in both program areas. The corresponding NDVI data (Figure 3.3) indicate a year of erratic conditions with two periods in which vegetation coverage was at or below the 30th percentile compared to the norm. While these were offset by periods of better-than-normal vegetation coverage, the volatility was disruptive to the agricultural cycle and to livestock rearing, as described in FEWS NET reports (see below). The NDVI data concur with the rainfall data that there was a very dry period in the month of the baseline survey.

Table 3.2 provides summary measures of drought exposure derived from the AFDM data, including cumulative rainfall and vegetation coverage deficits[17] and the number of months of both meteorological and agricultural drought.[18] In agreement with the baseline survey data collected directly from households (See Table 3.1), all measures indicate no difference across the program areas in drought conditions from a climatic standpoint. The AFDM measures suggest that pastoralism-focused households experienced more drought exposure than the other livelihood groups.

Table 3.2. Climate shock indicators from the African flood and drought monitor

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Cumulative rainfall and vegetation deficits (previous 12 months)								
Rainfall	2.14	2.22	2.03	2.67[a]	2.20[b]	1.76[a,b]	2.22	2.06
Vegetation	123	130	114	163[a,b]	118[a]	123[b]	155[a]	89[a]
Number of months of drought								
Meteorological drought	0.75	0.81	0.68	1.14[a]	0.78[b]	0.49[a,b]	0.80	0.70
Agricultural drought	4.27	4.20	4.37	5.17[a,b]	4.18[a]	4.18[b]	5.10[a]	3.41[a]

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns. Source: African Flood and Drought Monitor, 2015.

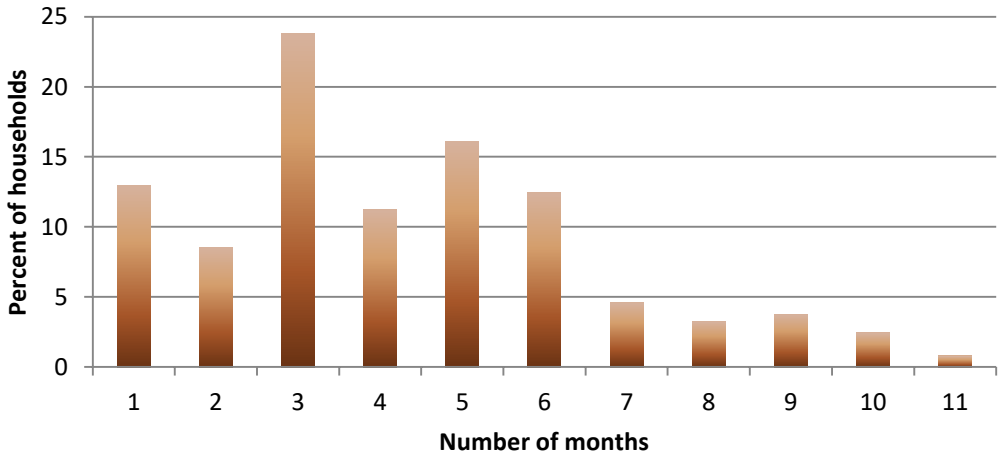
It is important to keep in mind that the figures reported in Table 3.2 represent group averages. Yet there was considerable variation around these averages in drought exposure for individual households and in localized areas. Figure 3.4 shows the percent of households that were exposed to agricultural drought in terms of how long (how many months) they were exposed. The least drought-exposed group of households in the RISE program area, which represent 13 percent of all households, experienced only 1 month of drought conditions. The most drought-exposed experienced an entire 11 months (0.8 percent of households), essentially the

[17] The cumulative rainfall deficit is calculated as the sum of the deviations below zero in the 1-month SPI across the 12-month period. The cumulative vegetation coverage deficit is calculated as the sum of the deviations below 50 in the NDVI percentile across the period.

[18] Meteorological drought is defined as the 1-month SPI being less than -0.8. Agricultural drought is defined as the NDVI percentile being less than 40.

entire year, in drought. A full 27.3 percent of households were exposed to prolonged agricultural drought, that is, for 6 months or more.

Figure 3.4. Number of months of agricultural drought in the year prior to the baseline survey (percent of households)



Source: African Flood and Drought Monitor, 2015.

3.1.3 FEWS NET Shock Exposure Information

FEWS NET *Food Security Outlook* reports[19] confirm that while the 2015 rainy season began on time or even early in some parts of the RISE area, and total seasonal rainfall did not fall substantially below the norm, unusually-timed dry spells and periods of erratic rainfall occurred. These irregularities necessitated crop replanting or caused complete crop failures in some areas. Pasture deficits meant that animals were in unusually poor physical condition, leading to abnormally low livestock prices in markets and limited availability of milk.

In Burkina Faso in particular, FEWS NET reported in April 2014 that the food stocks of many households were depleted early in the lean season due to below-average harvests in the 2013 crop cycle. Following, erratic rainfall in June of 2014 precluded an effective start of the rainy season, which explains the dip in vegetation coverage in July seen in Figure 3.3. By January 2015, FEWS NET reported that millet and sorghum that had been planted in northern parts of the program area had been attacked by grain-eating birds, leading to crop losses of greater than 80 percent in some areas. Note that this type of shock was not recorded in the baseline survey and thus not included in the perceptions-based shock exposure index.

[19] The reports reviewed for this section were published from April 2014 through July 2015 for both Burkina Faso and Niger.

In July 2015, shortly after the baseline survey was administered, FEWS NET reported that northern parts of the RISE area[20] had been experiencing a difficult pastoral lean season since February, with water shortages from April to June and above-average animal mortality rates. Households were resorting to emergency slaughters to purchase animal feed and food for their own consumption. Health center admissions of children under 5 with wasting were 16 percent higher than in the same period the year before.

Similar to the Burkina Faso area, in the Niger area the FEWS NET *Food Security Outlook* of April 2014, 1 year in advance of the baseline survey, reported that because of poor distribution of rainfall during the 2013 rainy season, crop harvests and pastoral conditions were unusually poor. As evidenced by the baseline data (Table 3.1), increases in staple food prices ensued, being 20-40 percent above average. The 2015 growing season started early, but the advanced rains in May were followed by long dry spells, causing planting failure in most areas planted. Consistent with the findings from the baseline data that insect infestations were a problem for nearly 40 percent of households in the Niger area, FEWS NET reported in July 2014 that in Zinder aphid infestations of cowpea and groundnut crops took place during the sprouting and growth stages, hampering production. While the situation had stabilized by October 2014 in most areas of Maradi and Zinder provinces, in Oudalan, which borders the Burkina Faso program area, the millet and sorghum crops did not develop normally because of the necessity of replanting at the beginning of the season and irregular rains during the reproductive phase.

3.1.4 Qualitative Data on Shock Exposure

All villages interviewed across the RISE program area identified changing rainfall patterns as the main disturbance to sufficient agricultural production, presenting two problems. First, the short rainy season (May to September) is becoming shorter—starting later and ending sooner. Second, excessive rain on dry hard soil is leading to more flooding in recent years. Droughts are very localized, causing rain-fed crops for some households to fail. Increases in insect or bird invasions was often mentioned by interviewees as a recurrent shock, and the extent of these invasions are reported to be so broad that crops for some villages are lost entirely.

Recurrent shocks such as droughts, when combined with other long-term stressors, are making the population in the program area more vulnerable through time. These additional stressors include land scarcity due to increasing population pressure, conflict between pastoralist and farming communities, and water shortages, which increase the time to fetch water.

[20] Note that the AFDM data indicate that it was the south-eastern parts of the program area, rather than the northern part, that experienced the greatest agricultural drought. Localized differences in the specific villages included in the sample may explain any difference from the situation as described in FEWS NET reports. For example, FEWSNET points to three departments (communes) in the northern provinces of Oudalan and Soum that were particularly hard-hit (Tin-Akoff in Oudalan, and Nassoumbou and Koutougou), but departments within these provinces included in the baseline survey were far to the south of these.

Burkina Faso

Burkina Faso FGD reports of the major shocks experienced by villages in the 10 years prior to the baseline survey are summarized in Table 3.3.

Table 3.3. Focus group discussion reports of major shocks in the last 10 years: Burkina Faso program area

	Northern central region		Sahel region		Eastern region	
	Village 1	Village 2	Village 3	Village 4	Village 5	Village 6
Drought/lowering of water reserves	2005 2008	2014	2010->2015	2009 2011	2010 2013 2015	2013
Flood		2013 2015	2013		2013	2013
Insects/birds invasion			2011			
Animal diseases		2013			2014 2015	2015
Health shocks		2014			2015 (malaria)	
Insecurity	2013 2014				Since 2010, and even end of Aug 2015	

In several villages surveyed, a drought and a flood were experienced in the same year. Severe droughts are negatively affecting the harvests of millet, sorghum and cowpeas. Droughts are also leading to increased death of livestock. Floods are devastating crops, killing animals, and destroying houses. In the villages that are experiencing both types of shocks, the cumulative effect is severe loss of many different assets. This is impacting even those households that have well-diversified livelihoods or diversified cultivation in plots of land in different locations (*bas fond* and *hautes terres*) (FGD in a village in the Eastern Region).

For the villages in the Sahel Region, droughts are lowering the level of all water reserves. Pits with water pumps cannot provide sufficient water for the needs of the village in all months of the year. As the water points in villages start to provide less water, they are either abandoned or overused till they break. Many villages are organized in collecting contributions from households for water system management but, with the exception of one village in the Northern Central Region, there is a mismatch between the amount collected (around 500 West African *Communauté Financière d'Afrique* franc [CFA] per household or per adult every year) and the actual amount of resources needed to keep enough water points functioning with sufficient capacity.

During FGDs it was pointed out that drought is having a stronger impact on women than on men. In the Eastern Region, a men's FDG noticed how food shortages were impacting lactating women's and their children's health. Many women often only cultivate marginal land, and

drought limits production considerably. In a village in the Eastern Region, women in FGDs noticed that while drought impacts all children's school attendance, it is primarily girls who are taken out of school. In a village in the Sahel Region, women suggested that the impact of drought is particularly hard felt by women, as they are the ones responsible within the household to provide water. Scarcity of water and lowering of natural water resources makes water fetching duties longer, which tightens women's time constraints on their multiple care activities, including food preparation.

> *It was women who were most affected by drought because men do not collect the water. Water shortages caused problems both at the household and at the community level. Women were no longer able to cook on time at home and husbands were angry each time.*
>
> -Male FGD Eastern Region.

The women stated that men's frustration with the drought is leading to an increase of domestic violence. When shocks jeopardize livelihoods, they also undermine the gendered identity of the man as the head of household.

The stress caused by recurrent shocks can have a strong negative impact on family relationships. Female interviewees in a FGD in a village in the Sahel Region revealed that recurrent shocks did take a toll on them and abated their trust, while their relationship with their husbands also worsened. Their husbands became more aggressive and violent against them, blaming them for situations they were not responsible for (i.e., the scarcity of water causing a delay in meal preparation). Men were turning to domestic violence as a result of their mounting frustration related to the loss of harvest or livestock, and a shortage of cash.

Gender-based violence caused by non-local residents was also mentioned as a serious concern in a village in the Northern Central Region and another village in Eastern Region. In the Northern Central Region, villagers complained about the higher incidence of rapes due to the increased presence of artisanal gold miners coming from other localities and resettling in temporary camps close to the village to exploit mines.

Villages in Northern Central Region and Eastern Region report that livestock diseases have been a significant problem over the past 2 years. Respondents were not certain what type of disease has been causing the problem. They indicated that livestock deaths are much higher due to disease outbreaks versus droughts (10-20 per household versus 1-3).

Insecurity is also a key stressor, with an increasing number and frequency of armed attacks in areas where artisanal gold mining exists, and particularly in the Eastern Region. Repeated armed attacks are now jeopardizing the local economy, as owners of small business are reconsidering their participation in village markets. The assaults have led to some deaths and several injured people, and there is now a high risk associated with carrying cash. People feel the threats they are facing can hardly be managed by the police forces (FGD Eastern Region).

Intra-village conflict was reported in both villages surveyed in the Eastern Region, where tensions between farmers and herders are increasing as grazing land is shrinking due to drought, and farming land is also endangered by recent and unprecedented floods. This change in intra-community relationships has led to new institutional instruments that are creating a governance problem. Municipal level monitors ("*pisteurs*") have been recruited to cite and fine herders who cut tree branches to give to their livestock on communal territory. Interviewees claim that because these monitors are compensated on the basis of the fines they levy, there is a tendency of some monitors to cut branches and accuse the herders, thus reducing reciprocal trust.

> *The rising insecurity is manifested through attacks at home, and attacks with weapons (Kalashnikovs). It was in this way that the market and the village centre de santé et de promotion sociale (CSPS) were attacked by bandits. The bandits killed people, seriously injured members of the community. The resources are not well secured. The market activities are compromised. The bandits are present in all the streets morning, noon, and night. Insecurity has a negative impact on the village. Their weapons are apparently superior to those of the police which means the police refuse to confront them.*
>
> -Male FGD Eastern Region.

Niger

Niger FGD reports of the major shocks experienced by villages in the 10 years prior to the baseline survey are summarized in Table 3.4.

Droughts are affecting all of the regions in the program area in Niger, especially in recent years. Additionally, floods are a recurring threat across all regions. Rainfall patterns are becoming less predictable, as rain starts later and ends earlier.

Pest invasions are also destroying millet crops. In a village in Maradi, a female focus group stated that insect invasions have become a persistent problem in recent years, ravaging entire millet harvests.

The combination of diverse shocks combined with recurrent droughts is leading to higher child malnutrition, especially in the regions of Tillabery and Maradi. In addition, drought conditions often lead men to migrate in search of work, leaving women behind to care for children, the elderly and disabled and increasing their work burden. A woman key informant in a village in Maradi stated that women forced to gather wild food and sell labor were pursuing negative coping strategies.

Table 3.4. Focus group discussion reports of major shocks in the last 10 years: Niger program area

Region	Zinder		Maradi		Tillabery	
	Village 7	Village 8	Village 9	Village 10	Village 11	Village 12
Drought/lowering of water reserves	recurrent		2010 (mostly) 2011 2012 2013 2015	2010 2011 2012 2013 2014 2015		2010 2011 2012 2013 2014 2015
Flood	2011 2014	2010	2010		2015	recurrent
Fire	2008	2014				
Insects/birds/plant invasion		2009 2010 2011 2012 2013 2014	2012 Sida Cordifolia	2013 2014 Sida Cordifolia	Insects continuously 2014 birds	since 2001 every year
Wild animals attack				2010 2011 2013	(Hippopotamos) 2010 2011 2012 2013 2014	
Bad quality of waters						
Animal diseases				2014		Since 2005
Health shocks						
Insecurity						

In terms of insecurity and crime, the villages surveyed in the RISE program area in Niger did not identify it as a major problem. Stealing livestock or food was considered a rare event. Acknowledgment of domestic violence was also rarely mentioned in the villages surveyed. Several of the FDGs stated that there was a strong community intolerance of violence against women. Prostitution as a coping strategy was not mentioned as well. In one village in the Zinder Region, men did not report any conflicts, but women reported conflicts between farmers and herders related to scarcity of grazing areas and plant cover due to long-term changes in climate trends.

3.2 Food Security

As seen above, there was no widespread, long-term drought in the RISE program area in the year prior to the baseline survey. However, erratic rainfall and bird and insect invasions in localized areas—along with their downstream conflict and economic impacts—in addition to idiosyncratic shocks affecting individual households, meant that the large majority of households experienced some shock exposure that was detrimental to their livelihoods. Over one-quarter of households experienced full-fledged, long-term drought. This section thus not unexpectedly

documents a high degree of food insecurity among RISE area households at the time of the baseline survey.

Food security exists "…when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."[21] Here, it is measured using of indicators of: (1) access to sufficient food of adequate quality; (2) hunger; and (3) dietary quality.

3.2.1 Measurement of Food Security

Household Access to Sufficient Food of Adequate Quality and Percent of Households Food Secure

The overall measure of food security relied on, capturing both dietary quantity and quality, is the inverse of an experiential indicator of food insecurity, the Household Food Insecurity Access Scale (HFIAS) (Coates, Swindale, & Bilinsky, 2007). The HFIAS is an index constructed from the responses to nine questions regarding people's experiences of food insecurity in the previous four weeks.[22] Responses range from worry about not having enough food to actual experiences of food deprivation associated with hunger.

Survey respondents indicate whether or not they or another household member experienced the event or feeling in question and, if yes, how often in the last 30 days (rarely, sometimes or often). A score is then calculated based on these frequency responses. The inverse of the score is taken for the analysis of this report so that the measure increases with increasing household food security. The HFIAS can also be used to identify which households can be categorize as food secure, defined as experiencing none of the nine conditions listed above, or just experiencing worry, but rarely.

[21] Food and Agriculture Organization of the United Nations (FAO) (2006).

[22] The nine experiences about which respondents are asked are:

1. Worry that the household would not have enough food.
2. Any household member was not able to eat the kinds of foods preferred because of a lack of resources.
3. Any household member had to eat a limited variety of foods due to a lack of resources.
4. Any household member had to eat some foods that they really did not want to eat because of a lack of resources to obtain other types of food.
5. Any household member had to eat a smaller meal than he/she felt they needed because there was not enough food.
6. Any household member had to eat fewer meals in a day because there was not enough food.
7. There was no food to eat of any kind in the household because of lack of resources to get food.
8. Any household member went to sleep at night hungry because there was not enough food.
9. Any household member went a whole day and night without eating anything because there was not enough food.

Household Hunger Scale (HHS) and Prevalence of Hunger

The HHS is a similar to the HFIAS but is only based on the three HFIAS questions pertaining to the most severe forms of food insecurity[23] (see questions 7-9 in previous footnote). Answers to the questions are used to construct a score on a scale of 0 to 6. The prevalence of hunger is then calculated as the percentage of households whose scale value is greater than or equal to two, which represents "moderate to severe hunger."

Dietary Diversity Score (DDS)

The DDS reflects the quality of households' diets and is the total number of food groups, out of 12, from which household members consumed food in the last day. The indicator employed and calculation methods were developed by the USAID-funded Food and Nutrition Technical Assistance (FANTA) project.[24] The 12 food groups are: Cereals; roots and tubers; vegetables; fruits; meat; eggs; fish and seafood; legumes; dairy and dairy products; fats and oils; sweets (sugar, sugar cane, tamarind or honey); and other foods.

3.2.2 Baseline Food Security in the RISE Area

According to the overall food security measure based on the HFIAS, food insecurity is a major problem in the RISE area: over three-quarters (76.4 percent) of households were food insecure at the time of the baseline survey (see Table 3.5). Thirteen percent of households suffered from hunger, the most severe form of food insecurity, being associated with an absolute lack of sufficient food to eat. A dietary diversity score of 5.2 food groups out of 12 indicates that dietary quality is also an issue. Food groups from which foods were consumed by less than 35 percent of households over the 24-hour period prior to the survey are: fruit, meat, eggs, fish and seafood, legumes, and dairy products.

[23] Ballard, Coates, Swindale, and Deitchler (2011).
[24] Swindale and Bilinsky (2006).

Table 3.5. Baseline food security in the RISE program area

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Access to sufficient food of adequate quality								
Household food security scale	20.1	19.8	20.7	19.6[a]	20.0[b]	20.9[a,b]	19.4[a]	20.9[a]
Percent of households food insecure	76.4	82.8[a]	67.8[a]	78.2	78.2[a]	70.2[a]	77.5	75.3
Hunger								
Household hunger scale	0.46	0.43	0.51	0.60	0.44	0.48	0.60[a]	0.33[a]
Percent of households experiencing hunger	12.9	12.7	13.2	18.9[a]	11.9[a]	13.4	16.5[a]	9.1[a]
Dietary quality								
Dietary diversity score	5.2	6.0[a]	4.0[a]	5.6[a]	5.0[a,b]	5.5[b]	5.3	5.1

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Strong differences in the food security indicators across the RISE program areas and the livelihood groups are not apparent from the data. The percent of households that are food insecure is somewhat higher among households in the Burkina Faso program area, however, and yet dietary quality tends to be higher than in the Niger program area.

With regards to the livelihood groups, those whose livelihoods are dominated by pastoralism tend to be more likely to experience hunger than the other groups. However, those whose livelihoods are dominated by agriculture have the lowest dietary diversity, being less likely to consume meat and dairy products than the other groups.

3.3 The Relationship Between Shock Exposure and Food Security

In this section, the team used regression analysis to explore the affect the shocks households were exposed to in the year prior to the baseline survey had on their food security. The methods employed are explained in Chapter 2. As discussed there, the results of these and all other regression analyses should be interpreted as exploratory rather than causal given the nature of the data and empirical techniques employed. What is explored in this chapter is whether the relationships in the data are consistent with our hypothesis that shock exposure has a *negative* effect on food security.

Table 3.6 presents the results using the perceptions-based measures of shock exposure calculated from the RISE IE baseline household survey data. Those employing the overall index of shock exposure—which includes the full range of climatic, conflict, economic, and other types of shocks—indicate that the greater is shock exposure, the lower is food security and the higher is the incidence of hunger. These results are highly statistically significant (at the 1 percent level). The results for dietary diversity indicate the possibility of a *positive* relationship

Table 3.6. Regression analysis of the relationship between shock exposure and household food security: Perceptions-based measures of shock exposure

	Overall index of shock exposure						Index of drought shock exposure					
	Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity	
Shock exposure	**-0.078**	***	**0.012**	***	**0.018**		**-0.165**	***	**0.025**	***	**0.026**	*
Adult equivalents	-0.479	***	0.032	*	-0.032		-0.478	***	0.032	*	-0.031	
AE-squared	0.020	***	-0.002	**	0.003	*	0.021	***	-0.002	**	0.003	
Percent females 0-16[a/]												
Females 16-30	-0.001		0.000		-0.001		-0.001		0.000		0.000	
Females 30 plus	0.011		-0.004		0.002		0.010		-0.003		0.002	
Males 0-16	0.000		-0.001		-0.006	**	0.000		-0.001		-0.006	**
Males 16-30	0.015	*	-0.002		-0.004		0.018	**	-0.002		-0.004	
Males 30 plus	0.000		0.002		-0.001		0.000		0.002		-0.002	
Education: None[a/]												
Primary	0.293		-0.011		0.187		0.274		-0.010		0.183	
Secondary	0.638	*	-0.140	**	0.251	*	0.572	*	-0.134	**	0.246	*
Female-adult-only hh	-1.647	***	0.209	*	-0.178		-1.531	***	0.197		-0.152	
Livelihood: Other[a/]												
Agriculture	-0.484		0.000		-0.290	**	-0.416		-0.011		-0.300	**
Pastoralism	-0.670		0.121		-0.264		-0.513		0.095		-0.285	
Asset index	0.154	***	-0.015	***	0.059	***	0.155	***	-0.015	***	0.059	***
Other shocks												
Insect invasion							0.594		-0.080		-0.073	
Economic stressor[b/]							-0.225		0.011		0.118	
Illness							0.445		-0.057		0.137	
Death							-1.062	**	0.115		-0.210	
Emigration							-0.965		0.057		-0.310	
Number of observations	2,492		2,492		2,492		2,492		2,492		2,492	
R-squared	0.345		0.238		0.373		0.353		0.242		0.375	

Notes: Village fixed-effects regression. *t*-statistics are robust to heteroskedasticity.

Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels.

[a/] Reference category.

[b/] Economic stressors include: Debt repayment, job loss by a household member, long-term unemployment, abrupt end of assistance from outside of the household, unavailability of productive inputs, and drop in demand for products sold.

with shock exposure, which was found previously for Ethiopian households (Smith et al., 2015).[25] However, the positive coefficient for the overall shock exposure measure is not statistically significant and that for the drought shock exposure measure is only significant at the 10 percent level.

To look at whether the findings hold for exposure to *drought* in particular, which was the most widespread shock in the year preceding the survey, the perceptions-based drought exposure index and AFDM drought-exposure measures are employed. The results using the perceptions-based measure confirm a negative effect of drought on food security and a positive effect on hunger, that is, drought exposure leads to greater hunger (Table 3.6).

Table 3.7 presents the results using the number of months of agricultural drought in the last year as measured using village-level AFDM data. When the actual village-level measure is employed, the regression coefficient on shock exposure is not statistically significant for any of the three food security indicators. However, when the shock exposure measure is aggregated to the province level,[26] the regression coefficients indicate that drought led to reduced food security, increased hunger, and reduced dietary diversity, consistent with the hypothesis. Perhaps the province-level measure is more strongly indicative of the impact of drought on households because it is more highly correlated with area-wide downstream economic impacts, particularly increases in staple food prices and reductions in livestock prices.

While not the focus of this resilience analysis, several other important results emerge from the regression analysis. First, as would be expected, education and asset ownership have a positive influence on household food security, a result robust to all measures of food security and shock exposure. Second, female-adult-only households have distinctly lower food security than other households. Finally, controlling for a variety of household characteristics that may differ across the program areas, households in the Niger area have worse dietary diversity than those in the Burkina Faso program area.

[25] For that population, some households diversified into previously uneaten food groups (increasing consumption of wild-grown roots and tubers) when under shock-related stress.

[26] There are 24 provinces in the RISE IE data set.

Table 3.7. Regression analysis of the relationship between shock exposure and household food security: Number of months of agricultural drought in the last year

	Village level drought measure						Province level drought measure					
	Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity	
Shock exposure	**-0.196**		**0.944**		**-0.031**		**-0.522**	**	**1.870**	**	**-0.100**	**
Adult equivalents	-0.586	***	0.702		-0.051		-0.553	***	0.576		-0.044	
AE-squared	0.021	***	-0.036		0.003		0.019	***	-0.029		0.002	
Percent females 0-16[a/]												
Females 16-30	-0.006		-0.030		0.004		-0.006		-0.028		0.004	
Females 30 plus	0.015		-0.062		0.006		0.014		-0.058		0.006	
Males 0-16	0.008		-0.064		-0.004		0.009		-0.066		-0.004	
Males 16-30	0.019	*	-0.069		0.001		0.021	**	-0.079		0.001	
Males 30 plus	0.001		0.025		0.004		0.003		0.017		0.004	
Education: None[a/]												
Primary	0.291		0.210		0.414	***	0.199		0.540		0.396	***
Secondary	1.305	**	-5.750	**	0.643	***	1.194	**	-5.370	**	0.621	***
Female-adult-only hh	-3.074	***	7.081		-0.269		-3.095	***	7.034		-0.275	
Livelihood: Other[a/]												
Agriculture	-1.012	***	-1.077		-0.520	***	-0.969	***	-1.246		-0.512	***
Pastoralism	-0.915	*	5.385	*	-0.603	***	-0.644		4.664		-0.544	***
Asset index	0.157	***	-0.475	***	0.070	***	0.161	***	-0.482	***	0.071	***
Other shocks												
Insect invasion	0.984	**	-3.482		0.341	*	0.861	**	-3.141		0.314	*
Economic stressor[b/]	0.279		-1.191		0.160		0.244		-1.120		0.152	
Illness	-0.282		-0.503		0.190		-0.218		-0.736		0.203	
Death	-0.535		2.262		-0.068		-0.501		2.128		-0.062	
Emigration	-0.522		-2.332		-0.549	*	-0.314		-2.911		-0.504	
Country: Niger	0.985		1.177		-1.896	***	1.047		1.087		-1.880	***
Number of observations	2,492		2,492		2,492		2,492		2,492		2,492	
R-squared	0.073		0.027		0.221		0.091		0.032		0.226	

Notes: Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels.

[a/] Reference category.

[b/] Economic stressors include: Debt repayment, job loss by a household member, long-term unemployment, abrupt end of assistance from outside of the household, unavailability of productive inputs, and drop in demand for products sold.

SUMMARY: Household Shock Exposure and Food Security

The quantitative and qualitative data corroborate prior information that the RISE program area is highly shock-prone. The most commonly experienced shocks are drought and its downstream impacts, including food price increases, animal disease, and conflict between herders and farmers and between villages. Other environmental shocks are floods and insect and bird invasions. Less common shocks, but those nevertheless felt by a large number of households, are the unavailability and increased prices of productive inputs and serious illnesses of household members.

Specifically with respect to drought, AFDM satellite data and information from FEWS NET Food Security Outlook reports show that, overall, rainfall levels did not deviate greatly from the norm in the year prior to the baseline survey in either of the program areas. However it was a year of erratic conditions and rainfall volatility that was disruptive to the agricultural cycle and livestock rearing. Furthermore, over a quarter of the population was exposed to prolonged agricultural drought—drought leading to visible loss of vegetation for 6 months or more.

Data from both the baseline household survey and the AFDM indicate that exposure to drought was similar for the Burkina Faso and Niger program areas. Overall shock exposure (including climate, economic, and conflict shocks) was higher in the Niger program area; however, due to higher incidences of insect invasions and economic shocks, particularly food price increases. Households whose predominant livelihood is pastoralism were more likely to be exposed to drought, animal disease outbreaks, and food price increases than the other livelihood groups, and less likely to be exposed to insect invasions.

According to the FGDs, people living in the RISE program area identify changing rainfall patterns—marked by a shortened rainy season and increased flooding—and increases in insect or bird invasions as a major disturbance. These changes, combined with increased land scarcity due to population pressure, conflict between pastoralist and farming communities, and water shortages are making the population more vulnerable through time. Historical timelines documenting the major shocks that occurred in the last 10 years show a pattern of repeated exposure to multiple shocks, many occurring simultaneously. An increasing stressor in the Burkina Faso area is armed attacks in areas where artisanal gold mining exists, which are not only threatening human life but are disrupting the local economy. Women also report an increase in domestic violence associated with recurrent shocks.

Qualitative interviews in the Burkina Faso program area point to a stronger impact of drought on women than men, as women are responsible for providing water. Drought means their water-fetching duties take more time, leaving less time for their other care activities. While drought impacts all children's school attendance, girls tend to be taken out of school most often. Further, men's frustration with drought is leading to an increase in domestic violence. Niger FGD participants pointed to the fact that drought conditions often lead men to migrate in search of work, leaving women with a greater work burden.

This report employs three indicators to understand the food security situation of households. The first is an index of food security, the second is an index of household hunger, and the third is a dietary diversity score. Not unsurprisingly given the multiple shocks to which households are exposed, the large majority of households in the RISE program area, a full 76.4 percent, were food insecure at the time of the baseline survey. Thirteen percent suffered from hunger, the most severe form of food insecurity. The low quality of households' diets is also an issue. Strong differences in the food security indicators across the Burkina Faso and Niger program areas and the livelihood groups are not apparent.

Regression analysis of the relationship between shock exposure and food security indicates that shock exposure has a soundly negative impact on food security. This finding holds for all three measures of food security and both household perceptions-based measures of drought exposure and those based on AFDM satellite data.

4. Household Resilience to Shocks, Shock Coping Strategies, and Community Responses

This chapter presents the data on households' perceived ability to recover from shocks—an experiential indicator of resilience—from the quantitative household survey. It then presents quantitative and qualitative data on the coping strategies households employed to deal with the shocks they faced in the recent past followed by qualitative data on responses to shocks at the community level.

4.1 Household Resilience to Shocks: Perceived Ability to Recover

As discussed in Chapter 1, household resilience is the ability of a household to manage or recover from shocks and stresses. Were households in the *Resilience in the Sahel Enhanced* (RISE) area in fact able to recover from the shocks they experienced in the year prior to the baseline survey? This is the question examined in this section.

Directly and objectively measuring resilience requires information on the shocks households are exposed to, including their intensity and duration, and monitoring how measures of well-being change over the course of a shock, especially before and after (Frankenberger & Smith, 2015). The appropriate information for such direct measurement will be collected as part of the RISE impact evaluation (IE) interim monitoring surveys planned to be launched in the program area in the event of a major shock, such as a widespread drought.

Here, resilience is measured using households' own reports of their ability to recover from the shocks they experienced, which allows construction of an experiential measure of resilience. Regarding each shock experienced, survey respondents were asked to answer the question: "To what extent were you and your household able to recover?" The following were the possible responses:

1. Did not recover;
2. Recovered some, but worse off than before;
3. Recovered to same level as before;
4. Recovered and better off; and
5. Not affected.

A household is classified as having recovered from the shock if the chosen answer to the question was #3, #4, or #5 above. [27]

Table 4.1 reports on the percent of households that experienced various shocks that were able to recover from them (see Table 3.1 for shock prevalence values). Note that the percentages are only reported if a shock was experienced by at least 30 households.

Table 4.1. Perceived ability to recover from shocks

Indicator	All	Program		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
(Percent of households experiencing each shock that was able to recover)								
Climate shocks								
Excessive rains	31.7	35.3	29.8	–	30.2	–	26.9	36.6
Drought	19.5	19.4	19.7	21.1	17.9	24.0	15.4[a]	25.5[a]
Insect invasion	16.3	11.3	17.1	–	19.1[a]	8.1[a]	11.4	20.2
Animal disease outbreak	15.1	16.1	13.7	17.5	14.2	17.6	12.9	16.8
Bush fires	–	–	–	–	–	–	–	–
Conflict shocks								
Land conflicts	32.7	–	27.4	–	34.5	–	–	–
Conflict between farmers and herders	47.0	56.3[a]	33.1[a]	–	52.7	–	50.8	–
Conflict involving entire villages	–	–	–	–	–	–	–	–
Theft of assets	18.2	19.9	15.5	–	18.5	11.8	16.7	19.5
Economic shocks								
Sharp food price increases	21.1	18.0	23.6	11.1[a,b]	20.8[a]	28.5[b]	16.7	25.6
Unavailability of productive inputs	17.5	32.3	15.6	–	16.3	16.5	9.8[a]	26.0[a]
Drop in demand for products sold	22.6	–	10.1	–	–	–	–	–
Increase in price of productive inputs	22.2	28.6	18.2	–	22.4	17.6	15.8	28.8
Drop in price of products sold	19.8	21.0	18.5	–	21.1	–	11.1	–
Debt repayment	33.0	33.2	32.8	–	39.0[a]	22.9[a]	28.9	36.1
Job loss by household member	–	–	–	–	–	–	–	–
Long-term unemployment	7.2	–	–	–	–	–	–	–
Abrupt end of assistance from outside of household	–	–	–	–	–	–	–	–
Disease/exceptional health-related expense	40.1	43.8	36.4	41.9	38.1	46.3	38.6	41.5

[27] The few households that responded that they were "not affected" (#5) reported that they actually did experience the shock (e.g., drought), but that it did not have a negative effect on their food security or income. Here we treat them as if they had the same experience as a household for whom the shock did have a negative effect but was able to recover from it.

Table 4.1. Perceived ability to recover from shocks (continued)

Indicator	All	Program		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Other								
Death of household member	24.0	19.1	33.8	–	21.5	30.3	20.7	27.0
Serious illness of household member	42.9	38.6	48.4	–	43.4	42.5	42.7	43.2
Emigration of household member	74.7	–	78.0	–	76.4	–	80.0	69.2
Fire (house…)	16.8	–	–	–	–	–	–	–
Forced repatriation	–	–	–	–	–	–	–	–
Household dislocation	–	–	–	–	–	–	–	–
Sudden increase in household size	–	–	–	–	–	–	–	–
Percent of households recovering from all shocks experienced[c/]	**13.7**	**13.7**	**13.7**	**13.5**	**12.5[a]**	**17.7[a]**	**11.1[a]**	**16.5[a]**
Severity-adjusted ability to recover index	**1.93**	**1.95**	**1.91**	**1.96**	**1.92**	**1.96**	**1.88**	**1.99**

Note: Blank cells indicate that results are not statistically representative (n<=30).

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] Calculated only for households experiencing at least one shock.

The general pattern seen in Table 4.1 is that the majority of households that experienced a shock were *not* able to recover from it. The percent able to recover from the most commonly-experienced shocks are:

- Drought: 19.5 percent;
- Sharp food price increases: 21.1;
- Animal disease outbreak: 15.1;
- Disease/exceptional health expense: 40.1; and
- Insect invasion: 16.3.

The shock with the highest recovery rate is "emigration of a household member," from which 75 percent of households recovered. The shock with the lowest recovery rate, at 7.2 percent, is long-term unemployment, which obviously puts households into economic distress over prolonged periods.

The bottom of Table 4.1 reports on two summary measures of households' ability to recover from shocks that can be used for comparison across population groups. The first is the percent of households recovering from all of the shocks they experienced. Here no difference is apparent across the program areas. However there is a pronounced difference between the

group of households whose predominant livelihood is agriculture and the "other" group (that not dependent on either pastoralism or agriculture), with the "other" group having a greater ability to recover. The difference is likely because this group was less shock exposed overall than the agriculture group (see Table 3.1).

The second summary measure takes into account the fact that different population groups have different shock exposure, in effect equalizing their shock exposure in order to single out differences in their general ability to recover. It is a "severity-adjusted ability to recover" index (see Appendix 1 for the calculation method). Here we find no statistically significant difference across the program areas or the predominant livelihood groups.

4.2 Household Coping Strategies

Table 4.2 reports on the coping strategies households used to deal with the shocks they faced in the year before the baseline survey was administered. The most common coping strategy by far is to sell livestock, reported by two-thirds of households. The next most common strategies, employed by around one-third of households, were to reduce food consumption, either by reducing the number of meals eaten in a day or limiting portion sizes, and borrow money from friends or relatives. Coping strategies mentioned by fewer, but still a substantial percentage (near 20 percent) of households are: migration of some family members, drawing down on savings, receiving money or food from friends or relatives, and consuming seed stocks. Reducing food consumption and consuming seed stocks are particularly negative coping strategies. Fortunately, few households were forced to resort to other negative coping strategies, including selling productive assets, slaughtering livestock, taking children out of school, and sending children to work for money. One negative coping strategy, borrowing money from a money lender, was utilized by over 10 percent of households.

Consistent with the fact that they were more shock-exposed overall (see Chapter 3), households in the Niger program area were more likely than those in the Burkina Faso program area to use a number of coping strategies. These include: slaughtering livestock, sending children to work for money, migration of family members, selling household items, selling productive assets, leasing out land, borrowing money from a money lender, receiving food aid from the government, and borrowing money, receiving money/food or receiving remittances from friends or relatives. Burkina Faso households were more likely to draw down on savings and receive money or food from friends or relatives, however.

Table 4.2. Coping strategies employed by households to deal with the shocks faced in the last year

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Management of livestock								
Send livestock in search of pasture	7.0	9.5[a]	4.2[a]	23.5[ab]	5.2[a]	5.7[b]	9.1[a]	4.7[a]
Sell livestock	66.6	70.8	61.9	78. 2[a]	70.8[b]	48.6[ab]	65.6	67.6
Slaughter livestock	4.5	2.7[a]	6.6[a]	4.2	4.7	4.2	4.5	4.6
Strategies to get more food or money								
Labor strategies								
Take up new wage labor	3.1	2.0	4.4	0.8[a]	3.7[a]	2.3	3.6	2.6
Send children to work for money	2.1	0.6[a]	3.8[a]	1.2	2.1	2.5	1.8	2.5
Migration								
Some family members	23.2	5.7[a]	42.9[a]	5.9[a,b]	24.2[a]	27.7[b]	22.4	24.1
Whole family	1.2	0.4[a]	1.9[a]	2.2	1.1	0.8	1.1	1.2
Send to stay with relatives	1.7	1.0	2.5	1.1	1.7	1.9	1.3	2.1
Sell or lease out assets								
Sell household items (e.g., radio)	9.0	1.3[a]	17.6[a]	2.6[a,b]	10.0[a]	8.7[b]	5.7[a]	12.6[a]
Sell productive assets (e.g., plough)	2.4	0.6[a]	4.3[a]	1.5	2.5	2.1	1.9	2.9
Lease out land	7.7	0.2[a]	16.0[a]	3.0[a,b]	8.2[a]	8.0[b]	6.1	9.4
Borrow money or rely on savings								
Borrow money from an NGO	2.8	1.9	3.8	4.1	2.7	2.6	1.9	3.8
Borrow money from a bank	1.5	2.1	0.8	0.8[a]	1.1[b]	3.1[a,b]	1.0	2.0
Borrow money from money lender	10.6	6.6[a]	15.1[a]	7.2[a]	11.6[a]	9.1	11.4	9.8
Draw down on savings	20.6	31.9[a]	8.1[a]	14.3[a]	20.2	24.7[a]	18.6	22.8
Rely on formal assistance								
Food aid from government	6.5	3.7[a]	9.6[a]	2.3[a]	7.3[a]	6.0	6.0	7.1
Food aid from an NGO	7.7	5.5	10.2	5.0	7.9	8.1	6.2	9.3
Food/cash-for-work	4.5	3.0	6.2	3.6	4.2	5.9	5.4	3.5

Table 4.2. Coping strategies employed by households to deal with the shocks faced in the last year (continued)

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Rely on assistance from friends/relatives								
Receive money/food	22.3	27.1[a]	17.1[a]	28.7	19.5[a]	28.4[a]	24.6	19.9
Receive remittances	9.7	6.8[a]	12.9[a]	6.8	9.5	11.3	11.9[a]	7.2[a]
Borrow money	35.0	26.0[a]	45.1[a]	24.8[a,b]	36.1[a]	36.1[b]	34.0	36.2
Strategies to reduce current expenditure								
Reduce food consumption/change source								
Eat lean season food (Anza, etc.)	3.6	2.8	4.4	4.0	3.4	3.9	4.6	2.5
Excavation of termite mounds	0.2	0.3	0.2	0.0	0.2	0.4	0.3	0.1
Hunting, gathering	4.9	2.5[a]	7.6[a]	3.3	4.6	6.5	6.2	3.5
Consume seed stock	18.5	15.1	22.3	18.3	17.2	22.5	19.3	17.6
Reduce number of meals in a day	32.0	32.9	30.9	44.0[a]	30.0[a]	33.1	36.0	27.6
Limit portion sizes at mealtimes	34.2	31.3	37.4	45.8[a,b]	33.1[a]	32.6[b]	39.8[a]	28.1[a]
Take children out of school	1.2	1.1	1.3	1.2	1.0	1.9	1.1	1.3
Move to less expensive housing	0.4	0.3	0.6	0.4	0.2	1.1	0.4	0.4

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

With respect to differences across the livelihood groups, pastoralist-focused households were more likely than the other groups to send livestock in search of pasture as a coping strategy, and pastoralist and agriculture-focused households were more likely to resort to selling livestock than those in the "other" group. Pastoralist-focused households were less likely to use migration of family members and to employ financial strategies, both drawing down on savings and borrowing money from friends or relatives. Another noticeable difference is that pastoralist-focused households were more likely to reduce food consumption than the other groups, a sign of their greater shock exposure.

Evidence From the Qualitative Data: Burkina Faso Program Area. The qualitative data confirm that selling livestock was a predominant strategy for coping with shocks in both the Burkina Faso and Niger program areas.

Coping strategies other than selling livestock emphasized by focus group discussion (FGD) participants in the Burkina Faso program area are: changing eating habits (e.g., switching from millet to rice); borrowing food, money, or land (in villages where only part of the village was affected by the shock); and migration of entire families. Migration of entire families after a shock was so common in one village that FGD participants considered it a livelihood option, rather than a coping strategy. Seasonal migration of adult males, though, is seen by one village chief as having negative impacts. Extended family members living and working abroad are transferring remittances to family members in the villages as a key adaptation practice. Such support is viewed as essential in order to survive harvest losses and damages due to flooding.

Withdrawing children from school was not reported in FGDs, likely because very few children attend school, in large part due to high school fees and job opportunities in nearby artisanal gold mines. In a village in the Eastern Region and one in Northern Central Region, female FGD participants mentioned how sometimes households would ask for help from their relatives in other villages (most likely in the case that women would ask for help from their family, as villages visited are mainly patrilocal).

Some strategies are focused on reducing risk before shocks occur. For example, men and women from the same household work together on family fields (i.e., men's fields). Agro-ecological techniques introduced by RISE projects are used to improve soil quality, yields, and improve resistance to drought. This work has an additional benefit of increasing men's awareness of women's work and capacities.

Evidence From the Qualitative Data: Niger Program Area. Two coping strategies other than selling livestock emphasized by FGD participants in the Niger program area are migration of male family members and selling labor. Begging was also reported in all villages as an activity used by the most vulnerable. Livelihood diversification was also seen as a way to prepare for and/or respond to shocks.

Proactive land management was observed in one village in the Eastern Region. Women in the village were aware of the interdependence of agriculture and livestock, deforestation and drought. To combat desertification, they were working to reforest areas in collaboration with the Commune and have a committee that manages the forest. Cultivation of local plants and purchase of livestock feed contributes to reduced livestock pressure on grazing lands.

Sharing resources among households in extended families is more common (within a concession) than within one's village. All villagers mentioned the importance of money received from children or relatives living elsewhere, especially in cities.

4.3 Community Response to Shocks: Evidence From the Qualitative Data

> *We help each other after shocks through donations of provisions, seeds, lands, through lending which favors the most vulnerable.*
>
> -FGD Zinder Region.

Across the RISE program areas participants in the qualitative survey referred often to strong practices of intra-communal help, perceived as being an effective way of dealing with different shocks and as the main mechanism to prevent hunger and deprivation. The obligation to provide help to people in need was often presented in the Niger villages as if it was a moral and religious obligation. In the Burkina Faso program area, communal support was presented as a more nuanced situation. In both countries, differences were evident in the narrative of men and women.

Burkina Faso. All community FGD participants in the Burkina Faso program area cited the importance of intra-communal support to manage shocks. For example in a village in the Northern Central Region, FGD participants discussed how the community banded together to purchase food in bulk. Because the millet crop had failed, the community was forced to eat purchased rice. By purchasing it together, they were able to buy a large quantity at a reduced price which also permitted the community to provide for those who did not have enough cash to buy their portions.

In most villages surveyed in Burkina Faso, it is common for households to lend food (part of the harvest), land, or money to other villagers in need. In all villages, some labor is offered to cultivate the fields of others in need or rebuild flooded houses. However, men in a FGD in a village in the Sahel Region and women in a FGD in the Eastern Region pointed out that to help someone else, one needs to be able to provide for his/her own needs, which is unfortunately not the most common situation in their villages.

In a village in the Eastern Region, the community received support (food or a loan of land) from neighboring villages after a flood. The loan could be repaid with money or in kind, normally after the following harvest, especially if the borrower was given some land because his/hers was

not accessible or usable. Pure donations to families in need do not seem to be prevalent, mostly due to the limited resources of families providing support. Villages make a clear distinction between support provided from other villagers that should be repaid, and support provided by a non-governmental organization (NGO) that is likely not to be repaid (FGD in a village in the Sahel Region).

> *To overcome famine, the community was obligated to become more united. We collectively contributed to purchasing and sharing rice to be able to nourish ourselves.*
>
> -FGD Northern Central Region.

Perceptions of social cohesion and solidarity in relation to shocks are different according to gender. Women in several villages surveyed in the Burkina Faso program area stated that trust and solidarity are eroding over time. They indicate that the frequency and severity of shocks is responsible for shrinking solidarity. Men are less likely to acknowledge this trend. In fact in one village in the Sahel Region, the men said that the solidarity among men is much stronger than among women in the village.

In another village in the Eastern Region, trust is beginning to break down due to conflict over scarce resources. Pastoralist and farming households are competing over access to land resources, with conflicts increasing.

Niger. In the villages surveyed in the Niger program area, men's FGDs consistently stated that solidarity and reciprocal support was the norm in all of their villages. Food, money, land, and seeds were regularly shared. The wealthiest households regularly provided resources to the poorest. Villagers in Zinder, Maradi, and Tillabery engaged in collective action to help with farm work and in support of the vulnerable.

Gender differences in the perception of solidarity and communal support were not as divided in the Niger villages as they were in the Burkina Faso villages, although there were some stated differences. In half of the sampled villages, and in both the villages of Tillabery, women tended to highlight the magnitude of the current challenges as key factors hampering people's solidarity. Women pointed to the growing pressure of recurrent shocks as the key factor hampering the ability of households to help each other. More and more individual households are coping on their own. Men did not see this breakdown of social support as clearly, stating that they still receive support when it is available (FGD in a village in Zinder).

> *Despite what people say, social support has eroded over time.*
>
> -Female FGD Sahel Region.

To counteract the erosion of social support in the villages, young people migrating for work are providing support to family members and other vulnerable households in the village in need of support (FGD in a village in Tillabery).

SUMMARY: Household Resilience to Shocks, Shock Coping Strategies, and Community Responses

Were households in the RISE program area in fact able to recover from the shocks they experienced in the year prior to the baseline survey? In the absence of actual data on households' food security before and after the shocks occurred, this chapter starts by exploring this question using households' own reports of their ability to recover from individual shocks. The data indicate very low resilience among households in the RISE area: the majority of households that experienced a shock were not able to recover from it. Only one-fifth of households were able to recover from drought and food prices increases, the most commonly-experienced shocks, for example. Summary measures of households' resilience to shocks show no differences across the Burkina Faso and Niger program areas and the three livelihood groups.

The quantitative household survey data indicate that the most common strategy used by households to cope with shocks, by far, is to sell livestock (employed by two-thirds of households), followed by reducing food consumption, and borrowing money from friends or relatives. Other commonly-employed strategies are: migration of some family members, receiving money or food from friends or relatives, drawing down on savings, and consuming seed stocks. Reducing food consumption and consuming seed stocks are particularly negative coping strategies. Fortunately, few households were forced to resort to other negative coping strategies, including selling productive assets, slaughtering livestock, taking children out of school, and sending children to work for money. One negative coping strategy, borrowing money from a money lender, was utilized as a coping strategy by over 10 percent of households, however. Households in the Niger program area were more likely than those in the Burkina Faso program area to use a number of coping strategies, consistent with the fact that they were more shock-exposed overall.

The qualitative data confirm that selling livestock was a predominant strategy for coping with shocks in both the Burkina Faso and Niger program areas. Coping strategies other than selling livestock emphasized by FGD participants in the Burkina Faso program area are: changing eating habits (e.g., switching from millet to rice); borrowing food; money, or land; and migration of entire families. The remittances of extended family members living and working abroad were identified as essential for surviving harvest losses and flooding damage.

Coping strategies other than selling livestock emphasized by FGD participants in the Niger area are migration of male family members and selling labor. Begging was identified as a strategy used by the most vulnerable. Livelihood diversification was seen as a way to prepare for and/or respond to shocks. Finally, sharing resources among extended family members and receiving money from children or relatives living elsewhere, especially cities, was noted as important for coping with shocks.

With regard to responses to shocks at the community level, the qualitative data point to strong practices of intra-communal help for dealing with shocks. It is seen as a key mechanism for preventing hunger and deprivation. Examples cited in Burkina Faso FGDs are village residents banding together to purchase rice in bulk after the failure of the millet crop. In both program areas respondents pointed to better-positioned households lending food, land, money and providing labor to others in need following a climate shock.

Female FGD respondents, but not male, pointed to an erosion of trust and solidarity among households in their villages over time. They indicate that the increasing frequency and severity of shocks is the key factor eroding solidarity and hampering the ability of households to help each other in times of need.

5. Resilience Capacity

While resilience itself is an ability to manage or recover from shocks, resilience capacities are a set of conditions, attributes, or skills that enable households and communities to achieve resilience in the face of shocks.

5.1 Household Resilience Capacity

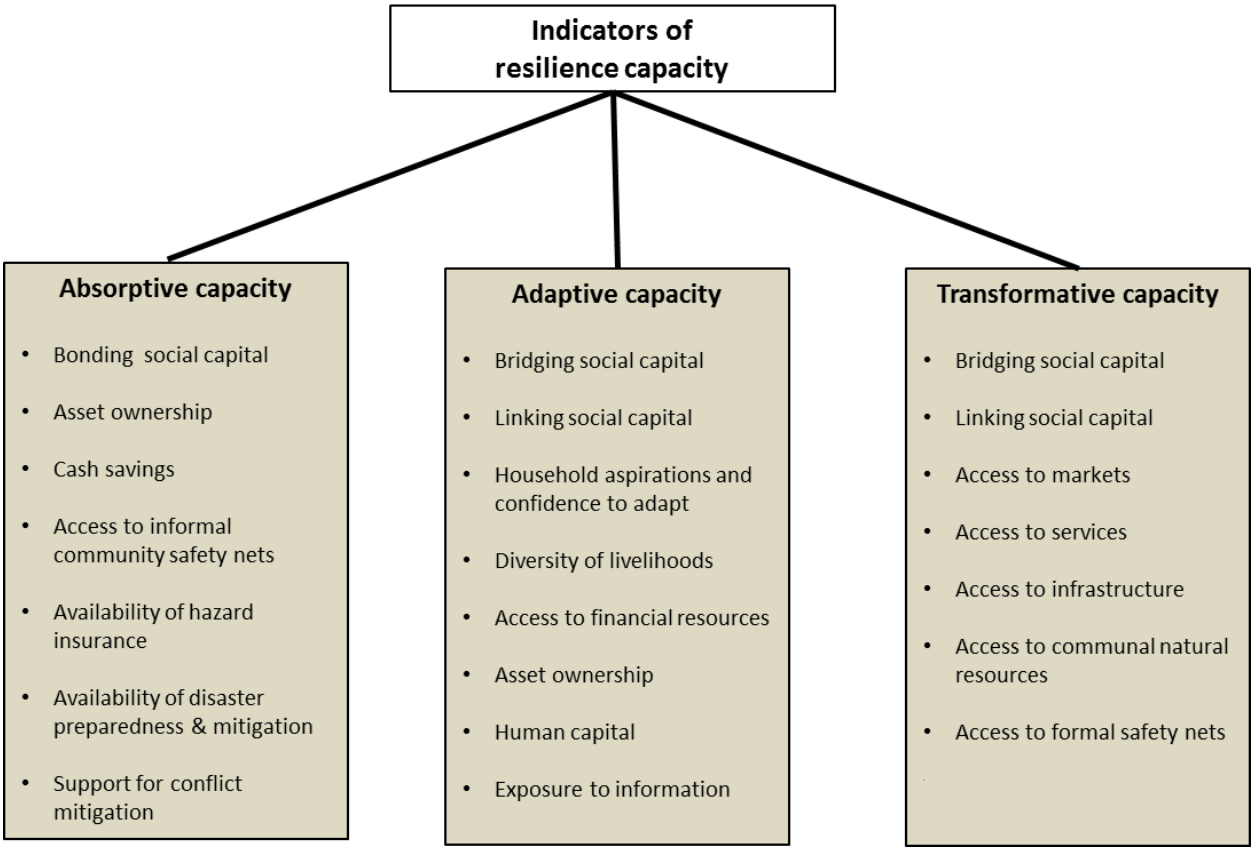
As noted in Chapter 1, household resilience capacities can be classified into three categories: a*bsorptive capacity, adaptive capacity*, and t*ransformative capacity*. Given their complexity, measuring these concepts requires combining a variety of indicators of the underlying concepts into an overall indicator. Figure 5.1 lays out the indicators of the three capacities that are used to measure them in this report. As can be seen, some indicators are used to measure more than one capacity. Thus, instead of treating each capacity separately in this chapter, we start by focusing in on these broad categories:

- Social capital;
- Aspirations and confidence to adapt;
- Economic sources of resilience capacity;
- Access to markets, infrastructure, services, and communal natural resources;
- Human capital and access to information; and
- Safety nets and disaster risk reduction.

Following, the indicators are combined into indexes of the three capacities and into an overall index of resilience capacity using principal components analysis (PCA). Both the indicators and indexes of resilience capacity are used to understand the conditions, attributes, and skills that enable households in the program areas, livelihood groups, and *Resilience in the Sahel Enhanced* (RISE) interventions groups to achieve resilience in the face of shocks.[28]

[28] The results on differences in resilience capacity between the RISE impact evaluation (IE) intervention groups are summarized and discussed in Chapter 7.

Figure 5.1. Indicators employed to measure resilience capacity



5.1.1 Social Capital

Social capital can be described as the quantity and quality of social resources (e.g., networks, membership in groups, social relations, and access to wider institutions in society) upon which people draw in pursuit of livelihoods.[29] While it may encapsulate political institutions, social capital is broader than political capital because it includes informal social processes at individual, household, and community levels. Social capital has often been described as the "glue" that binds people in society together. It is based on strong perceptions of local embeddedness, self-regulating moral codes, and the norms, reciprocity, and trust that exist between individuals and groups at the community level.[30] Close interaction between people through tight-knit communities, the ability to rely on others in times of crisis, and open communication between stakeholder groups are all generally seen as signs of well-developed social capital.

There are three types of social capital that enhance resilience—bonding social capital, bridging social capital, and linking social capital. Households and communities with higher levels of

[29] Frankenberger et al. (2013), Frankenberger and Garrett (1998).
[30] Chaskin (2008).

bonding, bridging, and linking social capital are inherently more resilient than those with only one type or none. They are described as follows: [31]

- ***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.

- ***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.

- ***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.

This section starts by presenting data from the RISE baseline quantitative survey on the sources and types of social support households received in the previous year. Next, it presents measures of bonding, bridging and linking social capital that will be used in the measurement of resilience capacity in Section 5.1.7 below.

Formal, Informal, and Capacity-Building Social Support

Table 5.1 reports data on formal, informal, and capacity-building social support received by households in the previous year. Informal support, that is support from relatives, neighbors or friends, was received by 56.1 percent of households, mainly in the form of loans, gifts (Quaadhan), and remittances. Formal social support was received by far less, 27 percent. The key sources of formal support are the government and non-governmental organizations (NGOs), and the main types of support received were food rations and food-for-work (FFW)/cash-for-work (CFW), and cash transfers. Among those receiving formal support, over two-thirds received food rations. Thirteen percent received FFW or CFW, and 12 percent received cash transfers.

[31] Aldrich (2012); Wetterberg (2004); Elliott, Haney, and Sams-Abiodun (2010); Woolcock and Narayan (2000).

Table 5.1. Formal and informal sources of social support received in the last year

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Received formal support	**27.0**	**19.2[a]**	**37.4[a]**	**17.7**	**29.8**	**22.1**	**21.1**	**33.1**
Sources of formal support[d/]								
Government	37.0	26.0[a]	44.6[a]	24.1	36.3	44.3	43.6	32.7
NGOs	68.2	65.5	70.1	71.1	69.3	62.6	66.6	69.3
Religious organization	3.8	7.5[a]	1.3[a]	4.1	3.3	5.9	3.7	3.9
Other	2.6	4.2	1.5	6.1	2.4	2.4	2.1	2.9
Types of formal support received[d/]								
Food ration	67.6	54.0	77.0	61.0	68.6[a]	65.7[a]	54.9[a]	76.0[a]
Food-for-work/cash-for-work	12.9	8.0	16.2	8.1[ab]	12.8[a]	14.5[b]	21.9	6.9
Housing materials	1.4	2.1	1.0	3.3	1.4	0.7	1.5	1.3
Installed water points	2.8	2.2	3.2	0.0[a]	3.2[a,b]	1.7[b]	4.9	1.3
Install latrine	5.7	12.2	1.2	2.0[a,b]	6.1[a]	5.3[b]	9.9	3.0
School for children	5.1	4.4	5.5	8.6	4.3	7.0	6.8	3.9
Cash transfer	11.7	18.6[a]	7.0[a]	32.4	10.7	9.0	12.0	11.5
Other	16.0	22.9[a]	11.2[a]	18.3	14.7	20.4	19.8	13.5
Received informal support	**56.1**	**56.1**	**56.1**	**57.1**	**55.9**	**56.4**	**53.9**	**58.3**
Types of informal support received[d/]								
Zakat[c/]	14.7	6.1[a]	26.3[a]	7.4[a]	15.6[a]	14.9	12.1	17.2
Remittances	26.9	25.1	29.3	25.6	25.1	32.8	22.7[a]	31.0[a]
Gifts (Quaadhan)	45.2	58.5[a]	27.1[a]	64.2	39.9	53.4	55.4[a]	35.3[a]
Loans	45.6	40.4	52.5	37.0	47.6	42.8	48.2	43.0
Xoolo goony[c/]	7.1	7.9	6.1	8.9	7.7	4.6	6.9	7.3
Sadaga[c/]	14.3	8.5[a]	22.1[a]	8.0	15.1	14.4	13.6	15.0
Other	5.2	4.8	5.7	2.3[ab]	5.8[a]	4.6[b]	4.2	6.2
Received capacity-building support	**27.3**	**24.8**	**30.5**	**22.9**	**29.0**	**23.7**	**20.7**	**34.1**
Sources of capacity-building support[d/]								
Government	35.0	34.4	35.5	20.0[a,b]	35.1[a]	40.0[b]	41.2	31.0
NGO	68.6	63.2	74.7	78.3	69.4	62.3	58.5[a]	75.2[a]
Private sector	7.4	13.4[a]	0.7[a]	7.8	6.8	9.5	10.5	5.4
Types of capacity-building support received[d/]								
Vocational training	5.3	6.8[a]	3.3[a]	2.9[a]	4.8[b]	7.8[a,b]	4.7	6.0
Business development training	2.2	2.5	1.7	2.1	2.0	2.8	1.6	2.8
Early warning training	1.6	2.0	0.9	1.7	1.4	2.1	1.3	1.8
Natural resource management	4.9	5.9[a]	3.5[a]	4.8	5.1	4.1	3.9	5.9
Seed packets/starter packets	15.4	10.0[a]	22.7[a]	10.3[a]	17.9[a,b]	10.0[b]	11.7	19.4
Adult education	10.2	9.4	11.2	9.9	11.0	7.9	5.7[a]	14.8[a]
Mobile phone for marketing	1.2	1.1	1.4	0.4	1.4	1.0	0.6	1.9

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] Local terms for types of tithing to support the poor.

[d/]Calculated only for those households receiving any of the particular type of support (formal, informal, or capacity-building).

Capacity-building support is a form of social support that is an investment in the long-term economic well-being of households. In the year prior to the survey, 27.3 percent of households across the RISE area received this type of support, mainly from NGOs and the government. The most common type of capacity-building support received involved the transfer of seed/starter packets to farmers and adult education.

A greater percentage of households in Niger received formal and capacity-building support (the latter mainly from formal sources) than households in Burkina Faso. By contrast, informal support had roughly the same incidence across households in the two program areas. Similarly, households whose predominant livelihood is agriculture were the most likely to receive formal and capacity-building support, while informal support was roughly even across the livelihood groups. The data in Table 5.1 show some strong differences in the types of support received across the program areas and livelihood groups.

Indexes of Bonding, Bridging, and Linking Social Capital

Having good overall measures of the strength of social capital is important for understanding its distribution across populations and how it changes over time, but also for measuring resilience. For these purposes, the RISE IE baseline data are used to construct indexes of bonding, bridging, and linking social capital, as detailed in Appendix 1.

The index of bonding social capital measures whether a household can rely on other members of their community when in need, and feels that if another community member needed them they could help out. The index of bridging social capital measures the same, but in reference to households residing *outside* of their community. The index of linking social capital is based on indicators of people's ability to form vertical linkages with sources of power and authority outside of their community. These indicators are: (1) having received information from extension agents or government officials; and (2) the quality of services provided in a households' community (roads, educational facilities, health services, veterinary services, and agricultural services). Higher quality services is an indication that community members have been able to draw on their relations with people in power to improve their lives.

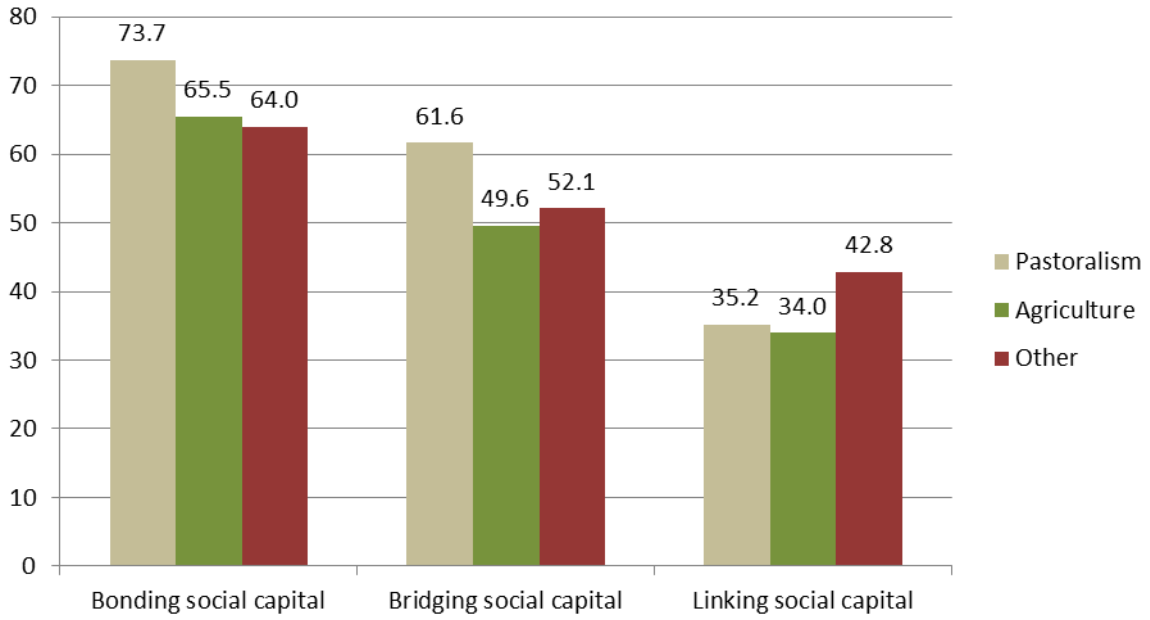
The means of the indexes by project country, predominant livelihood, and RISE intervention group are reported in Table 5.2. Bonding social capital is 14 percent higher in the Burkina Faso program area than the Niger area. There is no significant difference in bridging and linking social capital. While differences across the livelihood groups are also not very strong, a pattern of greater bonding and bridging social capital among pastoralists, and greater linking social capital among households falling into the "other" group, is apparent, as illustrated in Figure 5.2. This latter finding may be related to the fact that households in the "other" group likely have a greater tendency to gain their livelihoods outside of their own homes and villages.

Table 5.2. Indexes of bonding, bridging, and linking social capital

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Bonding social capital	65.9	69.5[a]	61.0[a]	73.7[a,b]	65.5[a]	64.0[b]	64.2	67.7
Bridging social capital	51.3	50.9	51.7	61.6[a,b]	49.6[a]	52.1[b]	50.7	51.9
Linking social capital	36.1	36.3	35.7	35.2	34.0[a]	42.8[a]	32.5	39.8

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Figure 5.2. Indexes of social capital, by predominant livelihood



Note that the qualitative information on social cohesion and communal support associated with bonding social capital was discussed in Chapter 4, Section 4.3 on "Community responses to shocks." In all villages surveyed, focus group discussions (FGDs) cited the key importance of intra-communal support for managing shocks.

Qualitative interviews also revealed the importance of linking social capital in some villages. In one village in the Northern Central Region of Burkina Faso, having a good direct connection with local authorities or central government was reported as useful for obtaining public aid. FGD participants in villages in the Sahel and Eastern Regions stated that they have no direct connections with political or administrative authorities.

In half of the qualitative survey villages in Niger, FGDs attributed receiving aid, services, or infrastructure improvements to community connections with people in public offices through either individual social networks or the geographical origins of decision makers. For example,

FGD participants in two villages in the Maradi Region reported that their villages received resources and services (e.g., a large mosque, electricity, participation in development initiatives) through their community leaders' connections.

5.1.2 Aspirations and Confidence to Adapt[32]

Psychosocial capabilities are thought to be important for fostering resilience in the face of shocks. Recent research in Eastern Africa (Ethiopia) has pointed to low self-esteem, low aspirations, and a fatalistic view among the poor as linked with their inability to take action to improve their material well-being.[33] These would be particularly disabling in the face of shocks, which require quick adaptation in order to successfully cope.

Table 5.3 presents means of an index of "aspirations and confidence to adapt," along with those for index subcomponents, by project country, predominant livelihood and RISE intervention group. The three index components are: absence of fatalism, belief in individual power to enact change, and exposure to alternatives to the status quo. These concepts were chosen because all are believed to be positively associated with having aspirations and confidence to adapt to change.[34] The methods for calculating the subindexes and the overall index are detailed in Appendix 1.

Table 5.3. Aspirations and confidence to adapt

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Index of aspirations and confidence to adapt	**34.1**	**36.0[a]**	**31.1[a]**	**34.4**	**33.4**	**36.1**	**34.6**	**33.5**
Index components								
Absence of fatalism	28.9	31.2[a]	25.4[a]	27.4	28.2	32.0	29.6	28.3
Belief in individual power to enact change	51.8	53.7[a]	49.0[a]	52.6	51.8	51.8	51.3	52.4
Exposure to alternatives to the status quo	5.6	5.9	5.0	6.5	5.1[a]	6.7[a]	6.2[a]	4.9[a]

[a] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

According to the index, aspirations and confidence to adapt is slightly higher in the Burkina Faso area than the Niger area. The difference is due to somewhat less fatalism and somewhat stronger belief in individual power to enact change in the Burkina Faso area. There is very little difference in this aspect of resilience across the livelihood groups. The only one that is statistically significant is greater exposure to alternatives to the status quo among the "other" livelihood group than among the agriculture group. This makes sense as a fair percentage of households in the "other" group gain the greatest part of their food and income from migration

[32] The definitions of these concepts appear in Annex A1.3.
[33] Bernard et al. (2012).
[34] An alternative terminology used in personality psychology for this aspect of resilience is "locus of control," defined as "The extent to which people believe they have power over events in their lives" (Fournier, 2009).

(remittances) and artisanal mining, the latter which can take family members away from their home village.

A male FGD in a village in the Eastern Region of Burkina Faso stated that it is important to be proactive in taking initiative of one's own livelihood. In a village in Niger, households stated that people's attitudes and aspirations have a significant impact on their ability to adapt to shocks and stresses. As one male focus group in a village in Maradi stated, "The world is for those who wake up early" ('*Ta Gusa Ka Gusa ba da Mutun*').

5.1.3 Economic Sources of Resilience Capacity

Economic sources of resilience capacity include diversity of livelihood sources, ownership of assets, and access to financial resources, which include credit and savings.

Livelihood Diversity

> *In addition to agriculture and livestock, our strength to bounce back from shocks is to diversify our activities by engaging in small economic activities such as petty trading and shoemaking, while also relying on the support of our children who are in Ouagadougou who include one police officer and a nurse.*
>
> -KII Northern Central Region, Burkina Faso

Diversity of livelihood sources is important for resilience since it allows flexibility, thereby reducing households' vulnerability in the face of shocks. Here diversity is measured as the total number of livelihood activities each household is engaged in, with the list of activities along with the percentage of households engaged in each listed in Table 5.4. As can be seen the dominant activities are crop production and sales and livestock production and sales. Out of a total of 18 possible activities, the number engaged in by the average household is 2.6, which indicates that households typically expand out of the these dominant livelihood activities. The average number of livelihood activities is slightly higher for households in the Burkina Faso program area than the Niger program area, 2.8 versus 2.4, and tends to be slightly lower among households falling into the pastoralism predominant livelihood group.

Based on the FGDs, rain-fed agriculture is the predominant livelihood activity that the majority of the households engage in across the RISE program area. The main crops grown are millet, sorghum, and cowpeas. Recently, crop diversification into vegetable gardens has also been a common intervention promoted in the area.

Livestock rearing is also a common activity throughout the program area with some differences across regions. Men primarily rear large livestock except in the Puele communities where women also own cattle and sell milk. Rearing and selling small ruminants is often the domain of women in Niger, and is becoming more common for women in the Burkina Faso program areas as well.

Households in the RISE program areas in both Burkina Faso and Niger recognize that being able to diversify into economic activities that are not climate sensitive improves their capacity to manage shocks. In Burkina Faso it is gold mining, and in Niger it is seasonal migration.

Table 5.4. Livelihood sources and livelihood diversity

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Agricultural sources								
Crop production and sales	94.1	92.9	95.7	86.7[a]	100[a,b]	79.3[b]	93.3	94.9
Livestock production and sales	65.6	87.2[a]	36.5[a]	97.6[a]	67.6[a]	46.4[a]	63.4	67.9
Agricultural laborer	3.5	1.8[a]	5.7[a]	0.4[a,b]	3.9[a]	3.4[b]	3.3	3.7
Production/sales of seedlings, seeds, and fodder	0.7	0.3	1.3	0.4	0.7	1.0	1.2	0.2
Production/sales of firewood, coal, and lumber	2.1	1.5	2.9	1.5	2.1	2.2	2.1	2.1
Sales of wild products	1.3	1.3	1.4	0.7	1.3	1.7	1.6	1.1
Employed in a commercial agricultural enterprise	0.4	0.5	0.2	0.4	0.2	0.8	0.4	0.3
Private agricultural service provider	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.1
Non-agricultural sources								
Petty commerce	24.6	25.4	23.5	16.0[a]	23.2[a]	32.5[a]	20.2[a]	29.2[a]
Non-agricultural service provider	3.0	3.4	2.4	2.0[a]	2.0[b]	6.3[a,b]	2.4	3.6
Technical/professional	6.9	7.4	6.1	2.2[a]	4.9[a]	14.5[a]	6.7	7.0
Artisanal mining	14.4	23.5[a]	2.3[a]	10.4[a]	13.8	17.9[a]	18.7[a]	10.0[a]
Non-agricultural worker	1.1	1.2	1.0	0.0[a,b]	1.1[a]	1.7[b]	1.3	0.9
Household help	0.2	0.4	0.1	0.0[a]	0.3[a]	0.1	0.3	0.2
Artisan	2.8	3.8[a]	1.4[a]	3.2	2.1[a]	4.7[a]	4.2[a]	1.3[a]
Transportation/docker	1.2	0.8	1.6	1.3	0.8[a]	2.2[a]	1.1	1.2
External, non-agricultural sources								
Migration (remittances)	24.2	9.8[a]	43.7[a]	8.5[a,b]	24.1[a]	31.1[b]	22.4	26.2
Gifts/inheritance	5.5	8.3[a]	1.7[a]	8.1[a]	3.6[a,b]	10.1[b]	6.1	4.9
Livelihood diversity[c/]	**2.6**	**2.8[a]**	**2.4[a]**	**2.4[a]**	**2.6**	**2.7[a]**	**2.6**	**2.6**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] Measured as the number of livelihood sources.

Improvements in agricultural practices as a result of RISE interventions were also cited as critical in increasing people's access to food and savings. Adoption of vegetable gardening has had a positive impact on households in all program areas where shortfalls exist in rain-fed production. In a village in the Eastern Region in Burkina Faso, the male FGD participants stated

that vegetable gardening was great because it took advantage of wet lands in the non-agricultural season when labor was more readily available. The RISE projects were cited as being instrumental in improving knowledge and providing training and inputs to increase production. In villages in Maradi in Niger, FGD participants stated that harvests have increased fourfold as a result of RISE interventions. Households that have adopted moringa in villages in Niger also have reaped income and nutritional benefits.

> *The households which fare better when confronted with shocks are those which allow the land to remain uncultivated through the practice of fallow lands. This method which allows the soil to be replenished requires large surface areas whereas, those who are less affluent have very little land.*
>
> -Female FGD in Northern Central Region, Burkina Faso.

In other villages in the program area of Niger, male FGD participants stated that there is a shift from depending solely on rain fed crops to cultivating manually irrigated vegetable gardening. Households who have transformed their livelihoods in that direction are unanimously considered as more resilient. Households that have enough land to practice following are also better adapted to changing climate conditions. However poorer households do not have enough access to land to follow such practices.

Land scarcity is a common problem across all the visited regions. This is due mainly to growing demographic pressure, competition between agricultural and grazing land, and lack of water management infrastructure (irrigation) which could allow cultivation of areas close to wetlands. Land is also being exploited by the mining sector (Burkina Faso). Deforestation for charcoal production is also leading to land degradation.

Land is shared in Niger, though men control a greater portion of land. The village chief assigns land allotments to men, who then allot a small portion to the woman to cultivate. When land is inherited, men receive twice the amount of land that women receive. Within the same family, just one-tenth of the total farmland is granted to women. Distribution of the harvest follows the same criteria.

In the Tillabery Region, there are no more unclaimed communal lands. Even men do not have enough land to share with women, and the village chief is now transferring part of his land to others. Because of the land shortage, women in one village do not get any portion of land inheritance, and women are only allowed to cultivate very marginal land (e.g., the edges of rice fields).

Burkina Faso. Millet and sorghum are the main staple foods primarily grown by men. Some maize is also grown in the Northern Central Region and in the Sahel Region. In lowlands in the Eastern Region, rice is grown as well. Women grow okra, green beans, and sesame. Sesame is also grown as a cash crop in some regions. Normally seeds are saved after harvest and

replanted. Some new short season varieties are being provided in the Sahel Region at subsidized prices by the agricultural extension service.

Vegetables are also grown in all three regions of the RISE program area. Diversifying into vegetable gardening is viewed by one local chief as one way to prevent men from migrating on a seasonal basis (per a key informant interview [KII] in a village in the Sahel Region). In one village in the Eastern Region, vegetable production has become quite profitable (KII in Eastern Region). It is an excellent crop to grow in the off season. Most of the produce are sold and not consumed. Men are primarily involved in the commercialization of vegetables. Pits are dug in the lowlands in the rainy season to provide water for irrigating the vegetables. These shallow wells are also used to supply drinking water to people and animals.

Livestock rearing is the main way that household accumulate wealth and savings. Caring for, grazing and selling large animals such as cattle are mainly a men's activity. Caring for small ruminants is a women's activity. In one village in the Eastern Region, cattle herders and farmers are beginning to clash over access to land (Male FGD in a village in the Eastern Region).

In one village in the Eastern Region, beekeeping has been introduced through RISE programs as a way to diversify livelihoods. This might be a viable alternative to traditional livestock rearing.

In the Burkina Faso program area, the key activity for diversifying livelihood activities beyond agriculture is artisanal gold mining. This activity exists in all villages surveyed except one. Young men and boys are the main gold miners, although women (widows and divorcees) are also working in the mines in all three regions. Men carve from deep underneath the stones, and then control the extraction process, while women sometimes participate in crushing stones. The women mainly obtain their share by scavenging in the areas where the extraction and packaging are done (Male FGD in a village in the Eastern Region).

Although gold mining can be quite lucrative in comparison to other economic activities, it is also very hazardous. Miners often have to handle poisoning compounds, descend into thin cavities for dozens of meters below ground level, and endure fatigue through consuming cheap drugs (amphetamines). In addition to the negative health impacts, young boys and men are foregoing their schooling to gain this immediate remuneration. Children often participate in mining activities, carrying on tasks similar to those of women but with the comparative "advantage" of being free from other responsibilities and therefore being available all year round. Many mothers rely on their children's contribution to their

> *For us, between our two livelihood activities, agriculture is the more sensitive livelihood option compared to livestock rearing simply because shocks have more of an impact on agricultural productivity than on pasturelands. Here, agriculture also includes rain-fed agriculture as well as rice paddy agriculture. Therefore climate change impacts agriculture and this is felt by many households.*
>
> -Male FGD in the Zinder Region, Niger.

available budget to ensure food for the family every day (KII Sahel Region). In some villages, households will engage in gold mining in the off season after the agricultural season (Female FGD in Northern Central Region).

In almost all of the villages surveyed, interviewees expressed mixed feelings regarding gold mining. Many families recognize that gold mining can help make up for agricultural shortfalls and ensure that steady income is coming into the households. But they also recognize that it is increasingly connected to crime and violence, with increasing school dropouts and a shortage of labor for agricultural tasks. Prostitution is on the rise, and young men are becoming richer than their parents and starting to treat them with less respect (Male FGD in a village in the Northern Central Region). Gold mining is also leading to a breakdown of social cohesion.

Other income-generating activities that women engage in include selling food products that have added value (beer, biscuits, cowpea balls, and cooked rice). Men will also engage in off-farm employment such as providing technical services (carpentry) or getting employment in government services.

The most resilient households identified by FGDs in the villages surveyed are those that diversify livelihood activities through growing staple crops, cash crops (sesame and peanuts), rearing livestock, gold mining, and engaging in off farm activities such as commerce or a skilled based employment activities. A resilient household would have family members engaged in several of these activities.

Niger. Combining crop production and livestock rearing are the main livelihood activities carried out across the surveyed villages in the RISE Niger program areas. Millet, sorghum, and cowpeas are common rain-fed crops. Maize and rice are cultivated in Tillabery. Irrigated rice is also cultivated in the Zinder Region. Women's have less access to agricultural land than men.

Vegetable gardening is also important in all villages surveyed. Men are more engaged in the marketing of vegetables than women. The competition for vegetable sales is going up because more households are engaging in this activity as way to compensate for poor rain-fed harvests.

Men own the larger livestock and women are in charge of the small ruminants. Livestock rearing is often carried out by women in Puele villages, even though they do not have primary responsibility for selling livestock. Through RISE project activities, women are becoming more engaged in livestock fattening programs.

Seasonal migration to urban areas during dry season is also a common strategy for adult males. This can create hardships for the family members left behind.

Poorer households are turning to charcoal production and firewood sales. This is leading to further land degradation.

The most resilient households in the villages surveyed in the qualitative study in Niger are those that diversify livelihoods by growing both rain-fed and irrigated crops, relying on improved seeds, rearing animals, relying on remittances, and accumulating savings. Community resilience was strengthened through women's group savings and cereal banks.

Ownership of Assets

Assets—both productive assets and consumer durables—can be used by households to increase income and to buffer themselves against shocks. They are thus important components of households' resilience to shocks. Table 5.5 reports on indexes of consumer durables ownership, ownership of farming implements, land, and animals, as well as a summary index of asset ownership.[35] The summary index (see bottom row) indicates that, overall, asset ownership is slightly higher among households in the Burkina Faso program area than those residing in the Niger area. This difference is due to greater ownership of consumer durables and farming implements as well as much greater ownership of animals. There is no difference in ownership of land between these two areas. Households in the pastoralism livelihood group tend to have somewhat greater asset ownership than the other groups, mainly due to a greater number of animals owned.

Table 5.5. Ownership of assets

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Index of consumer durables owned (out of 32)	7.8	9.1[a]	6.0[a]	8.2[a]	7.5[a,b]	8.6[b]	8.0	7.6
Index of farming implements owned (out of 20)	4.4	4.9[a]	3.8[a]	4.7[a]	4.6[b]	3.8[a,b]	4.4	4.4
Land owned (ha)	3.8	3.8	3.7	3.6	4.0[a]	3.1[a]	4.3[a]	3.2[a]
Animals owned (TLUs)[c/]	3.9	5.8[a]	1.5[a]	13.1[a]	3.2[a]	2.4[a]	4.7	3.1
Index of asset ownership	**64.8**	**66.5[a]**	**62.6[a]**	**66.8[a]**	**65.0[a]**	**63.4[a]**	**65.3**	**64.4**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] The unit of measure employed is Tropical Livestock Units (TLU), calculated as a weighted average of the number of five types of animals owned, where the weights for each animal are based on their typical size relative to a camel. The weights are as follows: camel = 1; cow = 0.7; sheep/goats = 0.1; donkeys, mules, and horses = 0.67; and poultry = 0.01 (Jahnke et al., 1988).

[35] Consumer durables ownership is measured as the number of different types of consumption assets owned out of a total of 11. Ownership of agricultural productive assets is measured as the number of different types of productive implements owned out of a total of 22. Animal ownership is measured in Tropical Livestock Units (TLUs) (see note to Table 5.5). Land owned is measured as the total hectares of land on which households engaged in farming activities in the last 12 months. The overall asset index is constructed from the four measures using PCA.

Access to and Usage of Credit Support

Financial assets, in particular, credit and savings, can also be used by households to increase income and to buffer themselves against shocks. Table 5.6 reports on access to and usage of credit support in the RISE area. Overall, near 70 percent of households live in villages in which credit is available from at least one source. The most common source by far is friends and relatives. Among more formal sources, the most common are shops/merchants, community groups, and microfinance institutions.

Table 5.6. Access to and usage of credit support

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Access to credit support								
Percent of households with access to credit	67.1	74.3	57.4	64.6	66.6	69.3	58.9	75.6
Types of people/institutions								
Bank	7.0	8.0	5.4	5.9	3.1[a]	18.9[a]	2.7	10.6
NGO/project	15.9	13.9	19.5	8.1	15.1	21.2	13.5	17.9
Community group	37.2	28.9	51.7	29.2	39.8	32.8	21.5[a]	50.1[a]
Friends/Relatives	79.7	78.0	82.5	77.1	78.3	84.7	81.0	78.5
Shops/merchants	39.0	38.4	40.1	33.6	39.7	39.0	43.1	35.6
Microfinance institution	33.0	45.7[a]	10.8[a]	42.6	27.9[a]	44.3[a]	29.8	35.6
Other	3.2	5.0	0.0	3.8	3.6	1.9	2.7	3.6
Usage of credit support								
Percent of households taking out loan in the last year	51.4	42.8[a]	62.9[a]	41.6[a,b]	52.2[a]	52.7[b]	50.6	52.1
Source of loans								
Money lender	12.2	4.4[a]	19.0[a]	9.2	12.7	11.6	16.7[a]	8.1[a]
Friend/neighbor	39.4	40.6	38.4	43.1	40.6	34.9	35.3	43.3
Family member	15.1	11.1[a]	18.5[a]	8.8[a]	17.1[a,b]	10.9[b]	17.9	12.5
Microfinance institution	5.9	11.1[a]	1.3[a]	3.9	5.1	8.8	5.4	6.2
Local businessperson	12.7	17.1[a]	8.8[a]	21.5[a]	11.2[a]	14.4	17.3[a]	8.4[a]
Community organization	4.5	2.6	6.3	3.8	4.8	3.9	1.2[a]	7.6[a]
Other	10.2	13.1	7.7	9.8	8.5[a]	15.4[a]	6.1[a]	14.0[a]
Reasons given for not taking out a loan when needed one								
Couldn't find a loan that met my needs[c/]	19.1	12.5[a]	37.6[a]	13.5	19.9	19.7	21.1	16.9
Afraid I couldn't pay back	61.8	66.3[a]	49.2[a]	61.5	61.9	61.5	56.1[a]	68.1[a]
No loan providers in my area	18.3	20.2	12.9	25.0	17.8	16.2	21.8	14.4
Other	0.9	1.0	0.4	0.0[a]	0.5	2.7[a]	1.1	0.6

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] I.e., is appropriate in terms of size, terms, sharia-compliant, etc.

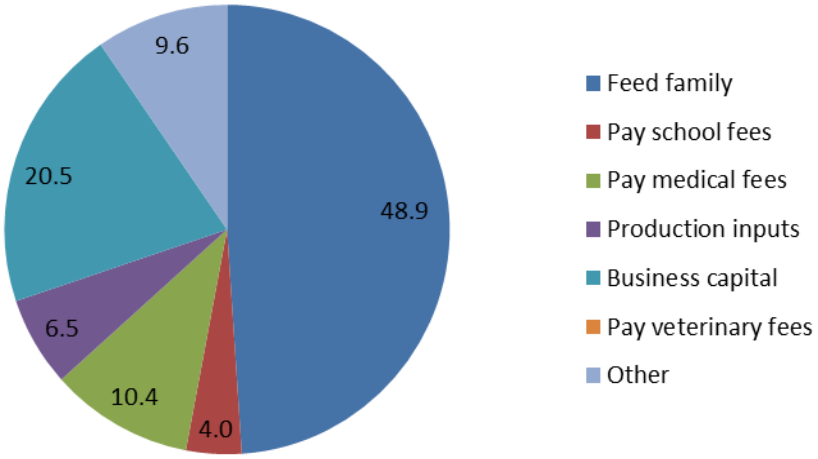
With respect to the *use* of credit services, over half of all households in the RISE area took out a loan in the year prior to the baseline survey. Consistent with the above information on the availability of credit, more than half of the loans came from either a friend, neighbor, or family member. Other sources were money lenders, and local business persons. Attesting to the precarious financial situation of many households in the RISE area, among households who did not take out a loan when one was needed, the most common reason given was "Afraid I couldn't pay back."

In general, credit is more widely available in the Burkina Faso program area than the Niger program area, with the defining difference being the greater presence of microfinance institutions in the Burkina Faso program area. Nevertheless, more households in the Niger program area actually took out loans in the year prior to the baseline survey, 62.9 percent versus 42.8 in Burkina Faso. Figure 5.3 shows the reasons given for taking out loans. The greater prevalence of loan-taking in Niger may be linked to the fact that far more loans were taken out for meeting a basic necessity of daily living: food. Note that while nearly half of loans were also taken out for this purpose in Burkina Faso, just over 20 percent were taken out for the purposes of investing in business capital, a longer-term investment with the possibility of generating future income.

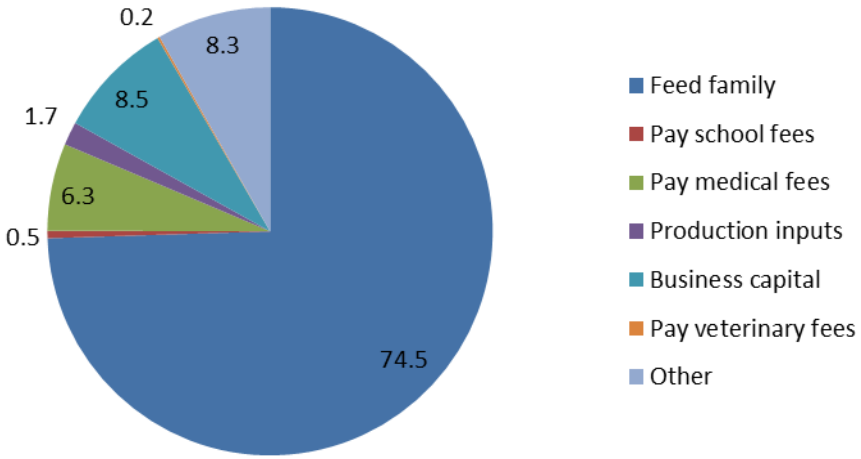
With regard to differences by predominant livelihood, none are apparent for access to credit. However, households whose predominant livelihood is pastoralism were considerably less likely to take out a loan in the year prior to the survey.

Figure 5.3. Reason for taking out loan, by program area

Burkina Faso



Niger



Access to and Usage of Savings Support

Just under half of households in the RISE program area live in villages where respondents to the community survey deemed savings support is available to households (Table 5.7). The most common source of such support is community groups, followed by friends/relatives and microfinance institutions.

Table 5.7. Access to and usage of savings support

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Access to savings support								
Percent of households with access to savings	47.9	44.8	52.0	43.1	46.1	55.3	39.4	56.7
Type of people/institutions								
Bank	9.9	13.2	6.0	8.9	4.5[a]	23.7[a]	4.0	14.1
NGO/project	18.9	13.5	25.3	16.9	16.9	24.6	12.1	23.9
Community group	51.1	31.3[a]	74.1[a]	38.8	56.0	42.7	36.1	62.0
Friends/Relatives	45.1	41.4	49.5	39.3	44.3	49.1	35.3	52.3
Shops/merchants	23.1	26.7	19.0	17.2	21.5	29.2	15.9	28.4
Microfinance institution	44.9	70.1[a]	15.6[a]	64.3[a]	40.8[a]	49.1	60.7	33.4
Other	2.8	5.1	0.0	1.4	2.3	4.2	0.0	4.8
Usage of savings support								
Percent of households with cash savings	36.6	53.6[a]	13.6[a]	43.4	34.2	40.9	33.7	39.6
Place where savings are held								
In cash at home	72.5	79.1[a]	27.2[a]	79.5[a]	75.8[b]	61.9[a,b]	79.8	66.1
With a microfinance institution	7.1	8.0[a]	0.5[a]	5.8[a]	3.9[b]	15.3[a,b]	7.2	7.0
With bank	6.0	6.7[a]	0.9[a]	7.5	2.4[a]	14.2[a]	6.5	5.6
With a savings group	12.5	4.0[a]	71.4[a]	3.8[a]	16.0[a,b]	7.0[b]	5.5[a]	18.7[a]
Other	1.9	2.2[a]	0.0[a]	3.4	1.8	1.6	1.1	2.6

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] I.e., is appropriate in terms of size, terms, sharia-compliant, etc.

Roughly one-third of households currently held cash savings at the time of the RISE baseline survey. The large majority of households held their savings at their home rather than with a formal institution.

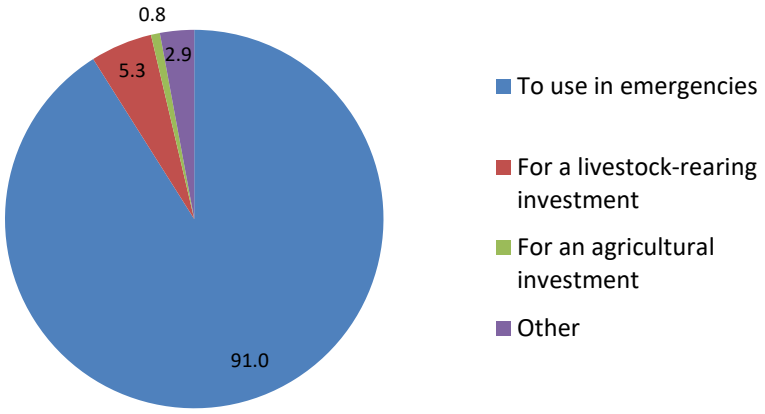
While there is little difference across the program areas with regard to access to savings support overall, the sources of such support do differ greatly. Community groups are a much more important source in Niger than in Burkina Faso. Conversely, microfinance institutions (MFIs) are a far more important source in Burkina Faso, where 70 percent of households reside in a community with an MFI. Nevertheless, very few Burkina Faso households that took out loans in the year prior to the baseline survey took them out through an MFI; only 8 percent.

Notably, households were much more likely to hold savings in Burkina Faso at the time of the baseline, 53.5 percent versus 13.6 percent in Niger. Another interesting difference across the program areas is that nearly 80 percent of Burkina Faso households who held savings, held them in cash at home while the large majority of Niger households with savings held them with a community savings group.

No significant difference was found in either access to savings support or holding of savings across the predominant livelihood groups. However, households in the "other" group were more likely to have access to and use a bank for savings support, and those in the pastoralism group are more likely to have access to an MFI, but less likely to use an MFI than those in the "other" group. Another difference of note is that households in the agriculture group tended to hold their savings through a savings group more often than the other livelihood groups.

Attesting to the shock prone environment in which these households live, the most common reason by far given for holding savings is "To use in emergencies" (see Figure 5.4). Based on qualitative interviews, female FGD participants in a village in the RISE program area in Maradi stated that participation in savings groups has been a great benefit for women managing shocks and stresses (Female FGD in Maradi).

Figure 5.4. Reason for holding savings



5.1.4 Access to Markets, Infrastructure, Services, and Communal Natural Resources

Access to markets, infrastructure, services, and communal natural resources are important elements of households' resilience to shocks. Being features of "transformative capacity" (see Figure 5.1), these factors enable more lasting and sustainable resilience.

Access to Markets

The top panel of Table 5.8 reports on households' access to markets for livestock, agricultural products, and agricultural inputs as well as an overall index of access to markets that takes into account all three. The data employed for the measures presented are from the village survey, but applied to each sample household participating in the household survey.

Table 5.8. Access to markets, infrastructure, services, and communal natural resources

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
				(Percent of households)				
Markets								
Livestock	53.0	57.3	47.4	60.6	50.0[a]	59.4[a]	46.6	59.4
Agricultural products	60.2	60.9	59.3	58.1	59.2	64.3	58.3	62.1
Agricultural inputs	43.4	49.2	35.8	48.6	39.0[a]	54.9[a]	43.5	43.2
Index	**1.6**	**1.7**	**1.4**	**1.7**	**1.5**	**1.8**	**1.5**	**1.6**
Infrastructure								
Piped water for drinking	18.1	16.6	20.1	10.3[a]	13.8[b]	34.1[a,b]	13.6	22.8
Electricity[c/]	5.4	5.6	5.2	2.5	3.9	10.9	5.1	5.7
Cell phone[c/]	76.5	77.8	74.8	84.0[a]	74.3[a]	79.9	73.1	80.0
Public telephone within 5 km	13.0	13.5	12.3	11.5	11.4	18.2	11.8	14.2
Paved road	19.9	10.0[a]	32.7[a]	5.9[a,b]	20.0[a]	25.0[b]	11.4[a]	28.6[a]
Index	**1.2**	**1.1**	**1.4**	**1.0[a]**	**1.2[b]**	**1.5[a,b]**	**1.1[a]**	**1.4[a]**
Basic services								
Primary school (<5 km)	98.6	100	96.8	100	98.3	98.8	100	97.1
Health center (<5 km)	73.2	68.5	79.1	65.2	72.2[a]	79.2[a]	69.3	77.1
Veterinary services (<5 km)	26.5	23.7	30.3	22.9[a]	22.1[b]	41.2[a,b]	30.2	22.8
Agricultural extension	60.9	54.9	68.5	50.8	64.5	54.1	56.2	65.7
Credit institutions	48.2	55.5	38.8	46.6	47.9	49.9	42.4	54.2
Savings institutions	42.8	39.4	47.2	40.2	41.4	48.1	37.3	48.5
Security services[d/]	57.7	54.6	61.7	58.2	53.2[a]	70.9[a]	47.2[a]	68.6[a]
Index	**4.1**	**4.0**	**4.2**	**3.9[a]**	**4.0[b]**	**4.4[a,b]**	**3.8**	**4.4**
Communal natural resources								
Grazing areas	63.0	41.2[a]	92.2[a]	50.3[a]	62.9	68.3[a]	59.5	66.7
Water sources for livestock	63.0	66.5	58.4	55.2	66.8[a]	54.5[a]	59.5	66.7
Firewood	74.2	80.7	65.5	76.3	75.9	68.4	63.1[a]	86.1[a]
Index	**2.0**	**1.9**	**2.2**	**1.8[a]**	**2.1[a]**	**1.9**	**1.8[a]**	**2.2[a]**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons across columns.

[c/] Use by greater than 50 percent of households in village of residence.

[d/] Security services can reach the village of residence within 1 hour.

Across the entire RISE program area, 53 percent of households have access to livestock markets, 60.2 percent to markets for agricultural products, and 43 percent to markets for agricultural inputs. According to the index of market access, there is little difference in market access across the two program areas. However, households falling into the "other" predominant livelihood group tend to live in villages that have greater access to markets than the other groups, perhaps because of the many households in this group that gain their livelihood from petty commerce, which often takes place in organized markets.

> *When women go to market, they essentially sell vegetables from their small field box, such as okra. The principal selling activity for women was the sale of milk. They have access to the market but much less compared to us men. In return, when they go to the market, they buy condiments for sauce, cereals, etc. [...] Men have more access to the market and when they go, they sell sheep, oxen, goats, etc., and they are paid back with grain.*
>
> -Male FGD Sahel Region, Burkina Faso

Access to markets was also explored through qualitative interviews in the RISE program areas in Burkina Faso and Niger.

Burkina Faso. Overall, men and women participate in markets but with gender-based differences. Men participate in market activities more than women, both as buyers and sellers, including in villages that have a market (e.g., a village in the Eastern Region). Participation in markets depends on personal freedom (in two regions) and time availability (in one region). Men conduct both small and larger business, trading imported food (rice); selling meat and vegetables; selling and buying livestock; or offering craft products, industrial goods, or services (e.g., mechanical repair). Men can own stable shops (boutiques), while women normally have mobile stands. Women's income at the market derives mostly from selling meals and drink (e.g., cookies, snacks, beer).

The amount of money managed by men and women is very different, as goods produced are of different value and quantity. Men normally sell and buy livestock (i.e., oxen, sheep, goats); cereals; and meat; while women sell their small amounts of vegetables, milk, and legumes, and buy condiments and cereals. Moreover, men prohibit women to sell the cereals harvested for the family in the men's field, although the crops were tended jointly by men and women.

Women need permission to go to the market, even if it is within short distances (less than 5 km), but FGD participants perceived that women are gaining increasing freedom to go to a market, even where physical access is challenging (e.g., includes a river crossing). Women's participation in markets is considered justified if women go to the market to sell, whereas men take care of buying essential food and goods. In a village in the Eastern Region where women have easier physical access to the market, women seem to participate more in market activities,

which according to male FGD participants, challenges gendered division of roles where only men sell cattle.

In all of the surveyed villages in Burkina Faso, there is much more market activity in the dry season after the harvest is completed and people have more economic resources and time.

RISE Projects and Markets in Burkina Faso. In a village in the Northern Central Region, women received inputs of seeds and are selling a portion of their cowpea harvest (interventions supported by the Victory Against Malnutrition Project [VIM]). In a village in the Eastern Region, the development project *Fonds d'Investissement pour les Collectivités Décentralisées* (FICOD) has worked on commercialization of vegetable production, and in a village in the Eastern Region, a development project is supporting a value chain for honey.

Niger. In Niger, men are not always more active than women in markets, as seen in two surveyed villages in the Tillabery Region. In one village, both male and female FGD participants considered participation by men and women equal; and in another village, male and female FGDs stated that women participate more than men, especially in the rainy season.

Products sold by women are similar almost everywhere, except for one village in the Maradi Region where cow milk is also sold. In one village in the Tillabery Region, rice is sold raw or cooked. According to women in one village, income generated by what women sell (e.g., vegetables, homemade cookies, street food) is enough only to buy food for the family. Men also sell similar products in most sampled villages—mostly livestock, cereals, and vegetable products—and engage in some petty trade.

In half of the villages surveyed in the RISE program area in Niger, women's mobility is considered a threat to household integrity. In some villages, women are strictly required to ask permission to their husband to go to the market, although women experience fewer restrictions in other surveyed villages in the RISE program area. According to men in one village in the Zinder Region, women gain freedom in mobility as they grow older, become wiser and less attractive, and attract less attention from men. According to a local saying, "the market within the house is for the woman, while the one outside is for the man."

RISE Projects and Markets in Niger. In half of the surveyed villages in the RISE program area, both men and women recognized RISE interventions as having boosted production and increased market access through interventions such as providing credit to women. Increased market participation has contributed to increased income. Even in an isolated and severely drought-impacted village in the Maradi Region, beneficiaries of the RISE projects have strengthened their resilience through increasing market participation. Households in this village started to produce and sell surplus moringa leaves. However, RISE interventions do not seem to have changed gender power dynamics or increased gender equality as far as market participation is concerned.

Access to Infrastructure

The most common type of infrastructure in Table 5.8 is cell phone service, which is widely available. However, only about one-fifth of households live in villages that can be accessed by a paved road, and roughly the same percentage have access to piped water for drinking. Access to electricity is rare: only 5 percent of households live in villages in which electricity is available. According to the overall index of access to infrastructure, there is no difference in such access across the program areas, although households in the Niger area have greater access to paved roads. Pastoralist-focused households tend to live in areas with lower access to infrastructure than the other livelihood groups, most particularly to paved roads and piped water for drinking.

Access to Basic Services

Almost all households have access to a primary school, and nearly three-quarters to a health center (Table 5.8). Around 60 percent have access to agricultural extension and to security services. Only half of households have access to credit institutions and 43 percent to savings institutions, however. The service that is most rare in the RISE program area is veterinary services, available to only 27 percent of households. There is no difference in access between the program areas, and little difference between the livelihood groups in overall access, but households in the "other" group tend to have greater access to security services, veterinary services, and a health center than the other groups.

Access to Communal Natural Resources

Both communal grazing areas and communal water sources for livestock in Table 5.8 are available to 63 percent of households, while access to communal sources of firewood are available to 74 percent. A large difference in access to communal grazing areas can be seen across the program areas, with over 90 percent of households in the Niger program area having such access while only 41 percent do in the Burkina Faso program area. Pastoralism-focused households have somewhat lower access to communal grazing areas than the other groups probably because they migrate with their animals, and agriculture-focused households tend to have greater access to communal water sources for their livestock because they are more sedentary.

5.1.5 Human Capital and Access to Information

Human capital, measured here using literacy, education levels, and trainings received, endows people with the ability to use information and other resources to cope with shocks and stressors. Access to information allows people to put such human capital to use.

Table 5.9 reports on the indicators of human capital, showing that only about one-third of households have an adult member who is literate and 29 percent an adult member with a

primary or higher education. Very few households have a member who has received specialized training of any kind.[36] An index of human capital combining the information on all three of these aspects reveals little difference across the program areas, but that it does differ significantly across the livelihood groups. In particular, pastoralism-focused households tend to have the lowest human capital while households in the "other" group tend to have the most.

Table 5.9. Human capital

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Percent of households with a literate adult	33.3	33.0	33.8	24.8[a]	31.9[a]	41.2[a]	28.4[a]	38.4[a]
Percent of households with an adult having primary or higher education	29.3	25.5	34.4	18.4[a]	26.9[a]	40.9[a]	23.7[a]	35.1[a]
Number of different types of trainings received by adult household members	0.24	0.26	0.21	0.20	0.24	0.23	0.16[a]	0.31[a]
Index of human capital	**27.4**	**26.1**	**29.1**	**20.1[a]**	**26.1[a]**	**34.4[a]**	**23.1[a]**	**31.9[a]**

[a] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons across columns.

Exposure to information is measured using survey respondents' answers to the question of whether at some time in the last year they received seven different types of information that are relevant in the RISE program area. The most commonly-received type of information (Table 5.10) was on child nutrition and health (received by 65.3 percent of households), followed by livestock disease threats or epidemics (63.3 percent). The least commonly-received type of information was on "water availability and prices of local boreholes, shallow wells, etc.," received by only 26 percent of households. According to an overall index access to information in general does not differ across the RISE program areas nor the livelihood groups. In spite of the lack of differences for the overall index, households in the Niger area have received more information on weather (long-term and rainfall) and water availability and households in the Burkina Faso area have received more information on livestock diseases. Pastoralists have received the least information on rainfall, but the most information on animal health/husbandry and livestock diseases.

Based on the focus group interviews, training on agro-ecological techniques has been highly valued by households in the RISE program areas in both countries. Agro-ecological techniques utilized in the RISE projects aim to increase soil quality, water retention capacity, and ultimately productivity. These interventions are aimed to improve management of natural resources for regeneration of degraded land and for conservation agriculture. The specific techniques promoted include punctual and systematic reutilization of manure and cinder as fertilizer,

[36] The specific types of training about which survey respondents were asked are: vocational (job) or skill training; business development training; natural resource management training; adult education (literacy, numeracy, or financial training); and training in how to use a cell phone to get market information like prices.

composting, mulching, zaï holes, stone rows, half-moons, *haie vive* (composite hedgerow), and reforestation.

Table 5.10. Exposure to information

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Percent of households that received types of information (last year)								
Long-term changes in weather patterns	52.2	45.1[a]	61.8[a]	41.0[a]	54.8[a]	49.0	49.4	55.2
Rainfall/weather prospects	41.8	31.5[a]	55.6[a]	21.8[a]	45.9[a]	37.4[a]	32.9[a]	51.1[a]
Water availability and prices of local boreholes, shallow wells, etc.	26.4	22.4[a]	31.8[a]	27.4	25.7	28.0	23.2	29.8
Methods for animal health/husbandry	54.4	58.8	48.4	65.1[a]	55.2[a]	47.4[a]	50.0	59.0
Livestock disease threats or epidemics	63.3	70.5[a]	53.5[a]	74.3[a,b]	62.8[a]	60.2[b]	60.2	66.5
Innovations in cultivation	42.6	45.9	38.2	38.6	44.6	38.2	38.0	47.5
Child nutrition and health information	65.3	68.5	61.1	68.5	66.5	60.5	61.9	69.0
Index of access to information	**3.5**	**3.4**	**3.5**	**3.4**	**3.6**	**3.2**	**3.2[a]**	**3.8[a]**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Training provided to women for setting up savings groups has been transformational, and has allowed women to have access to minimum amounts of personal income that can be used in emergencies and used to make productive investments.

Training on the importance of exclusive breastfeeding up to 6 months and the demonstration of actual recipes for preparing the supplementary infant food prepared with fortified flour and with local ingredients was also highly valued by female FGDs in all regions surveyed.

Based on the positive feedback from a male FGD in the Maradi Region of Niger, the different training activities in combination with emergency food distribution, the setup of a community cereal bank, with distribution of improved seeds, and the organization of hygiene education and family planning, have transformed the community.

5.1.6 Safety Nets and Disaster Risk Reduction

Safety Nets

Safety nets, both formal and informal, as well as specific support for households related to disaster risk reduction are important sources of resilience capacity for coping in the aftermath of shocks.

Table 5.11 lays out the state of access to safety nets in the RISE program area, reporting the percent of households living in villages in which various forms are available. The most highly available formal safety net is food assistance. Housing and other non-food assistance, assistance in the case of livestock losses, and disaster assistance are only available to a minority of households. Informal safety nets at the village level tend to be more widely available than the formal safety nets other than food assistance, but certainly not universal. The most widely-available informal safety net is women's groups. Groups that are sources of safety nets that are available to about one-quarter of households are: credit or microfinance groups, savings groups, mutual help groups, and religious groups. Overall indexes of access to formal and informal safety nets show that such access differs little across the program areas and livelihood groups, although there are some differences for individual types of groups when it comes to informal safety nets.

Based on the FGDs, food distribution to vulnerable households in the aftermath of a shock is very common in many sites, due to governmental or international partner's interventions. This support is viewed as critical to avoid extreme suffering and famine. CFW was also appreciated in the program area as a response to the recurrent shocks.

Qualitative Interviews in Burkina Faso. In the program areas in Burkina Faso, most villages surveyed received some form of food aid up to 2014. This food aid was primarily targeted to mothers and children. In one village in the Northern Central Region, a male FGD indicated that most vulnerable families in the village were receiving support from a government program since 2008 because a high government official working for the program was from that area (i.e., linking social capital). Two types of assistance were provided. The first program involved the sale of millet and beans at a subsidized price to vulnerable households that were on a list produced by the village. The second program involved a loan of food commodities which was paid back with interest.

In other villages in the Sahel and Northern Central Region, the Red Cross and other RISE partners (VIM and Families Achieving Sustainable Outcomes [FASO]) provided assistance up to 2014. Food was provided to pregnant women and children and general food distribution was provided to villages cut off in the rainy season. A female FGD in a village in the Northern Central Region indicated that during food aid distribution events, local businesses also benefited because households would purchase other items from the market.

Table 5.11. Access to formal and informal safety nets

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Formal safety nets (percent of households)[c/]								
Food assistance	47.1	47.2	46.9	47.0	45.0	53.3	42.9	51.4
Housing and other non-food assistance	17.8	19.5	15.5	18.0	18.0	17.0	6.4[a]	29.8[a]
Assistance in the case of livestock losses	12.0	8.0	17.4	15.0	11.0	14.0	8.0	16.2
Assistance in the case of a disaster (from government or an NGO)	11.9	6.9	18.6	10.5	13.4	8.0	0.0[a]	24.4[a]
Index of availability of formal safety nets	**0.9**	**0.8**	**1.0**	**0.9**	**0.9**	**0.9**	**0.6[a]**	**1.2[a]**
Informal safety nets (community organisations)[c/]								
Credit or microfinance group	26.1	24.3	28.5	26.2	25.6	27.6	17.4	35.2
Savings group	24.5	14.0[a]	38.5[a]	16.7	25.8	23.6	14.2[a]	35.2[a]
Mutual help group	26.8	37.2[a]	13.0[a]	35.1	25.9	26.3	19.0	35.1
Civic (improving community) group	9.7	8.0	11.9	4.8[a]	9.8[a]	11.3	11.2	8.1
Charitable group	5.3	6.9	3.1	1.7	6.3	3.8	0.0[a]	10.8[a]
Religious group	28.0	37.7[a]	15.0[a]	45.2[a]	25.5[a]	28.7	23.9	32.4
Women's group	73.7	81.7[a]	62.9[a]	79.4	72.6	74.8	66.6	81.1
Index of availability of informal safety nets	**1.9**	**2.1**	**1.7**	**2.1**	**1.9**	**2.0**	**1.5[a]**	**2.4[a]**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

[c/] Percentages represent the percent of households living in villages where various safety nets are available.

In one village in the Northern Central Region, food aid distribution did have a negative impact on community solidarity (Female FGD). Because not all of the vulnerable people received food assistance, it was perceived that the food was distributed unfairly.

Qualitative Interviews in Niger. In almost all villages surveyed in the program areas in Niger, there were recurrent humanitarian interventions involving food distribution, which still seem to be critical to prevent negative impacts on nutrition and on livelihoods. Food aid was mentioned in half of the villages surveyed as an essential intervention for dealing with the shortage of food created in the aftermath of a drought shock. RISE partners provided supplementary food to mothers and children and a protection ration during the lean season. World Food Programme provided food in both Zinder and Maradi in the lean season. Food assistance was also provided to some villages in the Tillabery Region by the government agricultural services (KII in Tillabery).

Food was also shared among family members and cash was provided to some families from household members that migrated to Nigeria and sent back remittances (KII in Tillabery). Cash for work was also provided in the Zinder Region by some RISE projects during the lean season

to help households to cope with food shortfalls (Male FGD in a village in the Zinder Region). In some villages in the Maradi Region, RISE projects assisted in the creation of cereal banks to manage seasonal food shortages.

Disaster Risk Reduction

Access to disaster risk reduction support is measured using three indicators: (1) an index of disaster preparedness and mitigation; (2) a variable indicating whether or not hazard insurance is available; and (3) a variable indicating whether or not an institution providing conflict mitigation is available. Disaster preparedness and mitigation is very low in the RISE area (see Table 5.12). Only between 12 percent and 13 percent of households live in a village in which either a government, an NGO, or a community-led disaster planning or response program/group is available. Further, only 20 percent of households live in a village where an emergency plan for livestock offtake is in place if a drought hits. Hazard insurance is available to just over 40 percent of households, and nearly half live in a village with an institution that provides conflict mitigation.

The only apparent difference across the program areas is that households in the Niger area are much more likely to live in a village with a disaster planning group than households in the Burkina Faso area (26.7 versus just 1.4 percent). Pastoralism-focused households have lower access to these groups, but greater access to institutions providing conflict mitigation.

None of the villages participating in the qualitative survey in the Burkina Faso program area had an organized early warning system in place. However, in half of the villages (two in the Northern Central Region and one in the Eastern Region), FGD participants mentioned that shamans (fetiches) or chiefs who traditionally held control of land are consulted to interpret environmental signs, such as the movement of birds or ants, to predict when the rainy season will start or end. Farmers would then follow the predictions to start planting as the rainy season is confirmed to have started or begin harvest after the rains are confirmed finished.[37]

Most villages in the Niger area do not have access to information on shocks in advance. The exceptions to this are one village in the Zinder Region and one village in the Maradi Region. In both, RISE projects have started to set up community-based early warning systems. In the village located in the Maradi Region, thanks to a project called Sawki, the population can now recognize the larvas of caterpillars in cow excrement and thus intervene before the spread of the pest. In the Zinder Region, the villagers have a formal committee that regularly monitors a group of indicators and can ask for specific interventions.

[37] Villagers rely on traditional rituals to facilitate rainfall, including ceremonies and temporary installations of tall magic sculptures belonging to shamans, shaped as birds at the border of fields. The shaman's service, intended to enhance fertility and agricultural production, is paid for by the land owner.

Table 5.12. Disaster preparedness and mitigation, availability of hazard insurance, and conflict mitigation support in households' village of residence

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Disaster preparedness and mitigation (percent of households)								
Availability of a government disaster planning or response program	12.2	9.8	15.5	12.6	13.4	8.4	3.2[a]	21.6[a]
Availability of an NGO disaster planning or response program	13.0	8.9	18.6	17.6	12.9	11.5	4.8[a]	21.6[a]
Availability of a disaster planning group	12.2	1.4[a]	26.7[a]	2.2[a,b]	13.8[a]	11.4[b]	3.2[a]	21.6[a]
Emergency plan for livestock offtake if a drought hits	19.7	20.9	18.1	15.8	20.9	17.8	12.8	27.1
Index of disaster preparedness and mitigation	**0.6**	**0.4**	**0.8**	**0.5**	**0.6**	**0.5**	**0.2[a]**	**0.9[a]**
Availability of hazard insurance	41.3	37.8	45.9	40.2	42.7	37.3	31.6	51.4
Availability of an institution providing conflict mitigation	48.4	55.7	38.5	64.9[a]	45.9[a]	49.5	50.7	46.0

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons across columns.

5.1.7 Indexes of Household Resilience Capacity

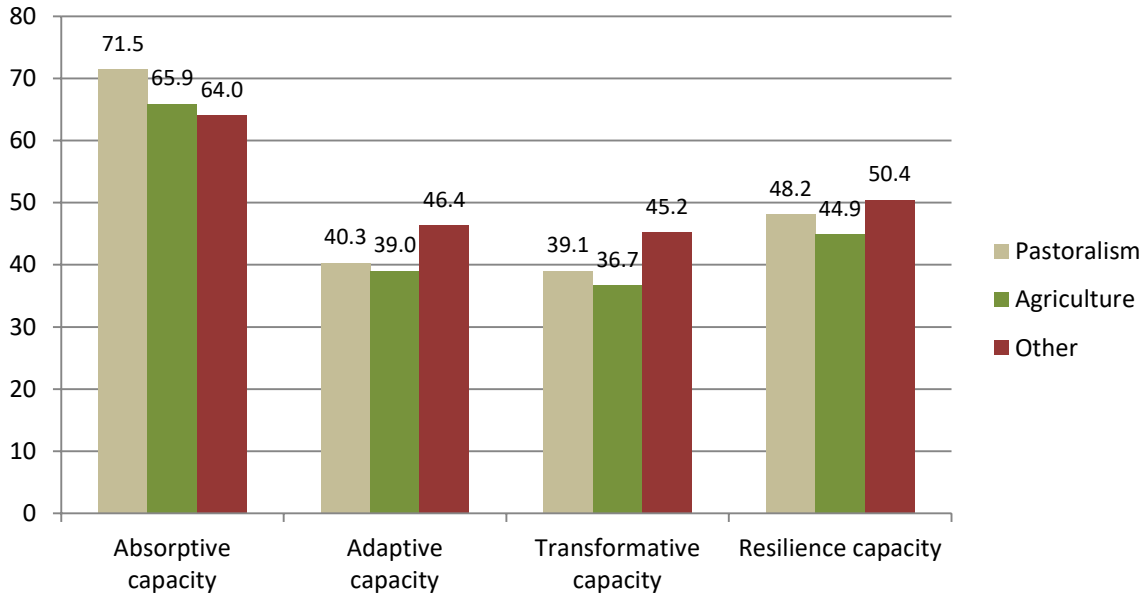
Table 5.13 reports means of the indexes of absorptive capacity, adaptive capacity, and transformative capacity. As seen for many of the measures making up these indexes, differences across the program areas and livelihood groups are not strong. For the former, the only statistically significant difference is that absorptive capacity is somewhat higher in Burkina Faso than Niger. The differences across the livelihood groups are illustrated in Figure 5.5. Pastoralism-focused households have somewhat greater absorptive capacity than the other groups, and households falling into the "other" group have moderately greater adaptive and transformative capacity. The overall index of resilience capacity indicates that this group has somewhat greater resilience than the other two groups. The underlying sources of this greater resilience are the group's stronger linking social capital, more diverse livelihoods, greater access to infrastructure and financial services, and greater human capital.

Table 5.13. Indexes of absorptive, adaptive and transformative capacity

Indicator	All	Program area		Predominant livelihood			RISE intervention group	
		Burkina Faso	Niger	Pastoralism	Agriculture	Other	Low exposure	High exposure
Absorptive capacity	66.0	69.0[a]	61.9[a]	71.5[ab]	65.9[a]	64.0[b]	64.3[a]	67.7[a]
Adaptive capacity	40.8	41.1	40.4	40.3[a]	39.0[b]	46.4[ab]	37.5[a]	44.3[a]
Transformative capacity	38.8	38.9	38.7	39.1	36.7[a]	45.2[a]	35.3	42.5
Household resilience capacity	**46.5**	**47.6**	**44.9**	**48.2**	**44.9[a]**	**50.4[a]**	**43.2[a]**	**49.8[a]**

[a,b] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Figure 5.5. Indexes of household resilience capacity, by predominant livelihood group



5.2 Community Resilience Capacity

Data collected as part of the baseline community (village) survey give insight into the strength of community resilience, as defined in Chapter 2, in the RISE program area. A defining feature of community resilience is community capacity for collective action as well as for collective problem solving and building consensus in order to negotiate coordinated response (Walker et al., 2010).

To measure community resilience, data on five types of collective action that members of a village can engage in are combined into an index. These are: (1) communal natural resource management; (2) disaster risk reduction; (3) social protection; (4) managing and maintaining public goods; and (5) conflict management. Appendix 1 details how indicators of these collective

actions are combined into an overall index. The baseline status of each, including differences across the program areas, is reported in Table 5.14.[38]

Table 5.14. Community resilience capacity

Indicator	All	Program area		RISE intervention group	
		Burkina Faso	Niger	Low exposure	High exposure
Indicators of community resilience capacity					
Natural resources management (index)	0.008	0.104	-0.123	-0.145	0.246
Presence of a disaster planning group (percent)	10.4	1.7[a]	22.3[a]	3.2[a]	21.6[a]
Social protection (index)	0.956	1.027[a]	0.859[a]	0.917[a]	1.017[a]
Managing and maintaining public goods (index)	-0.002	-0.076	0.100	0.029	-0.049
Presence of a conflict resolution committee (percent)	48.9	56.7	38.2	50.8	45.9
Community resilience capacity index	**43.3**	**45.0**	**40.8**	**40.0**	**48.3**

[a] Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

Natural resources management is measured using information on the existence of water user's groups, grazing land user's groups, groups regulating the collection of firewood, and the answer to the survey question of whether the village has defined "clear and widely accepted rules to ensure good management of natural resources." The index combining this information shows little difference across the program areas. Disaster risk reduction is measured based on the presence of a disaster planning group. Only 10 percent of villages have such a group, and there is a far higher presence in villages of the Niger program area than the Burkina Faso program area (22 percent versus 2 percent).

Social protection is measured using the presence of a number of different community groups that could potentially provide such protection (e.g., savings groups, charitable groups and women's groups) as well as household-reported information on informal social support within their village that is aggregated to the village level. An index combining this information indicates that social protection is somewhat greater in villages located in the Burkina Faso program area.

An index of managing and maintaining public goods is constructed based on information on the presence of a civic ("improving community") group and whether village roads or paths and schools are in good condition. Conflict mitigation is measured based on the presence of a conflict resolution committee in the village. Near half of all villages had such a committee at the time of the baseline survey. Both of these aspects of community resilience capacity, that related to public goods and that related to conflict resolution, show no significant difference across the program areas.

[38] Note that it is not possible to examine differences by livelihood group using the community-level data because membership in these groups is determined at the household level, not community level.

Overall, the index of community resilience capacity shows no significant difference across the Burkina Faso and Niger program areas.

Qualitative Interviews: Community Governance. FGD participants in the RISE program areas in both Burkina Faso and Niger in general spoke positively about local governance (i.e., village chief and community leaders). Community work is organized through the village chief and a committee, the Village Development Committee (*Comité Villagois de Developpément* – CVD). The CVD comprises a president, the religious authority (*imam*), and representatives from other relevant committees (e.g., education committee).

Burkina Faso. A notable case of committed leadership in support of people's livelihoods was found in one village in the Northern Central region. Despite criticism from villagers, the president of the CVD began implementing agro-ecology techniques (zai construction) and cultivating an unproductive area.[39] When the first sorghum plants started growing, the president persuaded other people and a group of youth to work together to transform the land from desert to arable land. Moreover, in the same village, the CVD regularly organizes transportation of state-subsidized food aid for identified households.

FGD participants in a village in the Sahel Region spoke positively about a village chief who bought a canoe with his own money so that the community would have transportation between the village and the rest of the municipality during the rainy season. Community members paid a fare to travel in the canoe, and after a few years, the chief bought a second canoe.

Opinions about leadership in one village in the Sahel Region were less positive. The chief had mobilized women to create a group to participate in Resilience and Economic Growth in the Sahel–Enhanced Resilience (REGIS-ER) and receive training, seeds, and technical support for collective field production. However, women reported that they were "pushed" to engage in the initiative so that the village would reach the minimum number of participants required by the project. Some women had no interest in participating but felt obliged to comply. This resulted in some women losing income through their primary economic activities (e.g., hair salon).

Niger. Many FGD participants in Niger reported that the community participates in a General Assembly when collective action is needed or when development partners propose interventions in the village. According to FGD participants, these assemblies allow for sharing of information, consensus building, and increased accountability. In one village in the Zinder Region, community leaders' efforts to organize meetings to coordinate responses to shocks are perceived as effective. Only one of the sampled sites, a village in the Tillabery Region, reported being negatively impacted by its chief, whose family is in conflict with the rest of the community.

[39] His brother called him aside and asked him to stop as he was being mocked by the community, which was also endangering his family's reputation.

In this village, the youth have formally organized themselves to support other community members, reflecting discontent with village governance.

Although most villages surveyed in the RISE program area in Niger have high levels of trust in the village chief and community leaders, this does not correspond to trust in other institutions, which are perceived as distant and inaccessible unless one has personal connections. Women in another village in the Zinder Region underscored that no public institutions would respond to their needs.

> *To undertake any activities both in the context of collective actions including 'gaya' to work the fields of the most vulnerable and their rice paddies, we always convene a General Assembly to not only give information to seek the support of the people but above all for better accountability.*
>
> -Male FGD in Maradi Region

Qualitative Interviews: Collective Action to Deal With Shocks. Development interventions, including RISE activities in the surveyed villages, do not seem to have disrupted existing community social cohesion[40] or collective action. In Niger, the RISE program seems to be increasing social cohesion.

A crucial gender difference was found regarding volunteer work for community collective action. While men offer labor to help others in the community for a limited time span, two cases were found in Burkina Faso and Niger in which women were expected to work on community activities throughout the year without pay.

Burkina Faso. Communities surveyed in Burkina Faso work together to manage some basic services (e.g., water pumps, school maintenance). Water pumps are managed by committees that use fees to pay for repairs. Villagers seem satisfied with the system, except in one village in the Sahel Region, where many household heads are seminomadic herders or migrate to seek paid work and thus do not want to pay the fee even though other family members stay in the village. In one village in the Sahel Region, the fathers provided maintenance to the school, and the mothers organized a school canteen. In a village in the Northern Central Region, where people are experiencing growing insecurity, villagers organized a search to find a young girl kidnapped by workers at the nearby artisanal gold mine (*orpailleurs*). In a village in the Eastern Region, people have coordinated with a neighboring municipality to monitor grazing land use by herders and their grazing livestock.

Niger. Based on FGDs, RISE interventions are fostering social cohesion and collective action which exists to varying extents in the villages surveyed in the RISE program areas. In two villages sampled in the Tillabery Region, virtually no external development or aid interventions

[40] The Organization of Economic Cooperation and Development defines social cohesion as follows: "A "cohesive" society works towards the well-being of all its members, creates a sense of belonging and fights against the marginalization within and between different groups of societies" (OECD, 2011).

have been conducted, and no tradition of recurrent community work seems to exist. In one Tillabery village, men reported in an FGD that women take the lead in organizing collective purchase of fertilizers, and in another, the women stated that villagers had taken no collective action to overcome flood impacts and had received negligible support from surrounding villages. Social cohesion and collective action, when they exist, along with outside support are perceived by male interviewees as contributing to resilience:

> *"Our community recovers successfully because it is organized; united, visionary, hardworking and has good production potential manageable against natural hazards (rainfall, predators, etc.). Our community recovered because it also receives financial and technical support from projects such as REGIS which provide the facilities and the framework for its economic and social development."*

In one village in the Zinder Region, although women are organized in groups, there are no collective actions led by women. In another village in the same region, men FGD participants pointed out that Pasam Tai, the project conducted by the RISE partner Catholic Relief Services (CRS), has "reinvigorated" existing groups in the village.

Collective action is often encouraged by the RISE projects, with or without project budget mobilization. Many partners use CFW measures to mobilize groups in the community, for training on agro-ecological techniques, and demonstrating their effectiveness, while others (e.g., CRS) aim at an almost zero-input approach, with the objective of reaching development goals by fostering community action. In one village in the Zinder Region, a CFW scheme has been implemented in collaboration with WFP and is viewed as being very beneficial to the community. The activity provides additional income during the lean season and reinforces knowledge about agro-ecology interventions for reducing soil erosion and combatting desertification.

Taking a different approach, CRS has implemented a water, sanitation, and hygiene (WASH) activity under the Pasam Tai project that aims to certify communities with 100 percent of households equipped with functioning latrines. CRS maintains that it is possible to improve sanitation and improve human waste management in communities by channeling project resources almost entirely toward sensitization, training, and facilitation. The goal of 100 percent household coverage was reached by harnessing collective action and identifying key people in the community to champion the initiative. The project's initiative uses volunteers and provides a collective prize for the community and advanced training and tools for the community-identified lead mason. This approach contrasts with the traditional approaches in which latrines have been built for free or at a subsidized price for the most vulnerable families. A key informant in the Zinder Region cited an example of a successful project in a neighboring village where hand-washing stations ("*tipi-tap*") are functioning outside every household latrine.

SUMMARY: Resilience Capacity

While resilience itself is an ability to manage or recover from shocks, resilience capacities are a set of conditions, attributes, or skills that enable households and communities to achieve resilience in the face of shocks. This chapter reviews the findings from the quantitative and qualitative data collected in the RISE baseline surveys on a wide range of characteristics that contribute to households' and communities' resilience capacities.

Social Capital. Social capital is the quantity and quality of social resources (e.g., networks, membership in groups, social relations, and access to wider institutions in society) upon which people draw in pursuit of livelihoods and is thought of as the "glue" that binds people in society together. Respondents to the quantitative survey reported receiving informal support, mainly in the form of loans, gifts and remittances from relative, neighbors, or friends far more often than formal sources of support such as food aid, cash transfers, and capacity-building support.

Data were examined on three types of social capital: bonding social capital, which are the links between community members; bridging social capital, which connects members of one community or group to other communities or groups; and linking social capital, which is founded on vertical linkages between households/communities and some form of higher authority or power. While bonding social capital is higher in the Burkina Faso program area than the Niger area, there is no significant difference in bridging and linking social capital. However, a pattern of greater bonding and bridging social capital among pastoralists, and greater linking social capital among households falling into the "other" group, who tend to gain their livelihoods outside of their own homes and villages, was found. Qualitative data reveal the primary importance of the social cohesion and communal support associated with bonding social capital for coping with shocks, of bridging social capital through remittances, and of linking social capital for receiving public aid and services.

Aspirations and Confidence to Adapt. Aspirations and confidence to adapt are psychosocial capabilities that are thought to give people greater resilience in the face of shocks. They are examined in this report using three indicators—absence of fatalism, belief in individual power to enact change, and exposure to alternatives to the status quo—combined into an overall index. According to the index, this aspect of resilience capacity is slightly higher in the Burkina Faso area than the Niger area due to somewhat lower fatalism and stronger belief in individual power to enact change in the Burkina Faso area; there is very little difference across the livelihood groups, except for more exposure to alternatives to the status quo in the "other" livelihood group compared to the agriculture livelihood group.

Economic Sources of Resilience Capacity. An important economic source of resilience capacity is diversity of livelihood sources which allows flexibility, thereby reducing households' vulnerability in the face of shocks. In general, livelihood diversity is quite low in the RISE program area, with the average household engaging in 2.6 out of a total of 18 activities. It is slightly higher for households in the Burkina Faso area and tends to be slightly lower among those falling into the pastoralist livelihood group. FGDs in both program areas reveal that people recognize that being able to diversify into economic activities that are not climate sensitive—especially gold mining in Burkina Faso and seasonal migration to urban areas in Niger—improves their capacity to manage shocks. Respondents in both areas also pointed to livestock rearing, which provides wealth and savings, and off-season and irrigated vegetable gardening as an important manner in which to diversify one's livelihood. In Burkina Faso, the most resilient households were identified by FGDs to be those that diversify livelihoods by growing staple crops, cash crops, rearing livestock, gold mining, and engaging in off-farm activities such as commerce or skilled-based employment. In the Niger area, the most resilient households were identified to be those who engage in both rain-fed and irrigated agriculture, rearing animals, relying on remittances, and accumulating savings.

Other economic sources of resilience capacity examined using the quantitative data were ownership of assets and access to financial resources (credit and savings). Asset ownership is slightly higher among households in the Burkina Faso program area and among the pastoralism-dominant livelihood group, the latter due to greater animal ownership. Access to credit, but not savings support, is more widely available in the Burkina Faso area. Few differences were found in access to financial resources across the livelihood groups.

Access to Markets, Infrastructure, Services, and Communal Natural Resources. All four of these resources are important elements of households' resilience to shocks. Being features of "transformative capacity," they enable more lasting and sustainable resilience.

Access to markets is not universal in the RISE program area: only 53 percent of households have access to a livestock market, 60 percent to a market for agricultural products, and 43percent to markets for agricultural inputs. There is little difference across the Burkina Faso and Niger program areas in access, but the "other" livelihood groups tends to have greater access, perhaps because of the reliance on petty commerce, which often takes place in organized markets, as a source of many households' livelihoods. According to the qualitative data, men in the Burkina Faso program area participate more in market activities than do women, while in the Niger program area participation is more equal. In both areas, women's freedom of mobility is an issue.

Access to infrastructure (e.g., cell phone service, paved roads, piped water, and electricity) and basic services (schools, health centers, and financial services) differs little across the RISE program areas, although households in the Niger area have greater access to paved roads. Pastoralist-focused households tend to live in areas with lower access to infrastructure, most particularly to paved road and piped water for drinking.

Almost all households have access to a primary school, and nearly three-quarters to a health center. Around 60 percent have access to agricultural extension and to security services. Only half of households have access to credit institutions and 43 percent to savings institutions, however. The service that is most rare in the RISE program area is veterinary services, available to only 27 percent of households.

Both communal grazing areas and communal water sources for livestock are available to 63 percent of households, while access to communal sources of firewood is available to 74 percent. A large difference in access to communal grazing areas can be seen across the program areas, with over 90 percent of households in the Niger program area having such access while only 41 percent do in the Burkina Faso program area. Pastoralism-focused households have somewhat lower access to communal grazing areas, and agriculture-focused households have greater access to communal water sources for their livestock.

Human Capital and Access to Information. Human capital, measured here using literacy, education levels, and trainings received, endows people with the ability to use information and other resources to cope with shocks and stressors. Access to information allows people to put such human capital to use. Human capital is equally very low across the two RISE program areas and is particularly low among pastoralism-focused households. Access to information shows no overall difference across the program areas or livelihood groups. According to FGDs, trainings on such subjects as agro-ecological techniques, setting up savings groups, and child feeding are highly valued, and some have transformed communities.

Safety Nets and Disaster Risk Reduction. Safety nets, both formal and informal, as well as specific support for households related to disaster risk reduction are important sources of resilience capacity for coping in the aftermath of shocks. According to the quantitative survey data the most highly available formal safety net is food assistance. Informal safety nets at the village level such as women's groups, credit or microfinance groups, savings groups, mutual help groups, and religious groups tend to be more widely available than the formal safety nets other than food assistance, but not universal. There is little difference in access to safety nets across the RISE program areas or livelihood groups. FGDs point to food distribution to vulnerable households in the aftermath of a shock as critical to avoiding extreme suffering and famine.

Disaster preparedness and mitigation is very low in the RISE program area. Availability of other elements of disaster risk reduction (hazard insurance and conflict mitigation support) is higher but far from universal. The only apparent difference across the program areas is that households in the Niger program area are much more likely to live in a village with a disaster planning group. Pastoralism-focused households have lower access to these groups, but greater access to institutions providing conflict mitigation. According to the qualitative data, formal early warning systems are not in place in the RISE program area except in places where the RISE project itself has started to set up systems. Households rely on local shamans to interpret environmental signs to predict when the rainy season will start or end.

Summary Indexes of Household Resilience Capacity: Absorptive Capacity, Adaptive Capacity, and Transformative Capacity. As seen for many of the measures described above that are used to construct these indexes, differences across the program areas and livelihood groups are not strong. For the former, absorptive capacity is somewhat higher in Burkina Faso than Niger. Pastoralism-focused households have somewhat greater absorptive capacity than the other groups, and households falling into the "other" group have moderately greater adaptive and transformative capacity. The overall index of resilience capacity indicates that this group has somewhat greater resilience than the other two groups. The underlying sources of this greater resilience are the group's stronger linking social capital, more diverse livelihoods, greater access to infrastructure and financial services, and greater human capital.

Community Resilience Capacity. A defining feature of community resilience is community capacity for collective action as well as for collective problem solving and building consensus in order to negotiate coordinated response. Community resilience is measured using data on five possible types of collective action: (1) communal natural resource management; (2) disaster risk reduction; (3) social protection; (4) managing and maintaining public goods; and (5) conflict management. The only difference across the RISE program areas in these five types of collective action is that there is a higher presence of disaster planning groups in the Niger area and social protection is somewhat greater in villages in the Burkina Faso area. Overall, an index of community resilience capacity shows no significant difference across the program areas.

FGD participants in both the Burkina Faso and Niger areas generally spoke positively about the leaders and governance institutions in their villages, with some exceptions linked to coerced participation and family conflicts with leaders. FGDs also raised numerous examples of collective action to deal with shocks, some supported by RISE project interventions. Note however, that some villages in Niger reported no tradition of recurrent, collective community actions in the face of shocks such as drought and flooding.

6. The Links Between Resilience Capacity, Ability to Recover From Shocks, and Household Food Security

Previous chapters of this report described the shock exposure of households in the year prior to the baseline survey, their ability to recover from the shocks experienced, and the baseline status of their food security and resilience capacities. Chapter 3 used regression analysis to explore the relationship between households' shock exposure and their food security, showing that shock exposure—especially drought shock exposure—indeed compromises their food security. This chapter expands on that analysis to explore how household and community resilience capacities affect their food security and resilience in the face of shocks. It also undertakes a specific analysis to understand whether household resilience capacity works to mitigate the negative impact of shocks on food security.

As discussed in Chapter 2, which lays out the regression methods in detail, it is important to keep in mind the exploratory, rather than causal, nature of this analysis given the data and methods employed. The goal is to determine whether the relationships seen between the variables are statistically significant and in the hypothesized direction (positive or negative).

6.1 Food Security and Resilience Capacity

The results examining the relationship between household food security and the overall index of resilience capacity are given in Table 6.1. They are presented for three measures of shock exposure: (1) overall shock exposure, including climate, conflict, economic, and other shocks (see Table 3.1); (2) drought-specific shock exposure, which includes exposure to drought itself and its downstream impacts; and (3) drought shock exposure as measured using satellite data from the African Flood and Drought Monitor (AFDM) on the number of months of agricultural drought. The results are presented for three measures of food security as well: the food security index, the household hunger index, and the dietary diversity score (see Chapter 3). In addition to resilience capacity and shock exposure, household demographic characteristics, education, livelihood group, and asset ownership are included as independent variables. For the first measure of shock exposure, the village of residence is also controlled for; for the second measure, village of residence and non-drought-related shocks; and for the third, non-drought-related shocks and country of residence.[41]

[41] The reader should keep in mind that some of the difference in the regression results between those for the perceptions-based measures and those for the months of agricultural drought will be driven by the fact that *village* of residence is controlled for in the regressions for the former while *country* of residence is controlled for in the latter (because the shock exposure measure is calculated at the province level).

Table 6.1. Regression analysis of the relationship between food security and household resilience capacity

	Overall shock exposure (Perceptions based)						Drought shock exposure (Perceptions based)						Drought shock exposure (Months of agricultural drought)a/					
	Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity	
Resilience capacity	**0.131**	***	**-0.319**	***	**0.030**	***	**0.129**	***	**-0.312**	***	**0.030**	***	**0.083**	***	**-0.168**	*	**0.015**	**
Shock exposure	-0.076	***	0.489	***	0.019		-0.159	***	0.968	***	0.027	*	-0.398	**	-1.621	*	-0.078	
Adult equivalents	-0.458	***	0.571		-0.027		-0.457	***	0.562		-0.026		-0.511	***	0.486		-0.037	
AE-squared	0.018	***	-0.030	*	0.003		0.019	***	-0.032	*	0.003		0.018	***	-0.027		0.002	
Percent females 0-16b/																		
Females 16-30	-0.008		-0.024		-0.002		-0.008		-0.024		-0.002		-0.012		-0.015		-0.003	
Females 30 plus	0.010		-0.049		0.001		0.008		-0.040		0.002		0.012		-0.052		0.005	
Males 0-16	0.002		-0.040		-0.006	**	0.002		-0.040		-0.006	**	-0.010		-0.067		-0.003	
Males 16-30	0.012		-0.053		-0.005		0.015	*	-0.065		-0.005		-0.018	*	-0.074		-0.001	
Males 30 plus	-0.003		0.031		-0.002		-0.003		0.028		-0.002		-0.003		0.025		-0.003	
Education: Noneb/																		
Primary	-0.112		0.498		0.095		-0.128		0.548		0.090		-0.443		1.831		0.281	**
Secondary	-0.319		-0.597		0.033		-0.377		-0.372		0.026		-0.214		-2.522		0.368	*
Female-adult-only household	-1.329	**	2.863		-0.106		-1.210	**	2.485		0.077		-2.672	***	6.141		-0.200	

Table 6.1. Regression analysis of the relationship between food security and household resilience capacity (continued)

	Overall shock exposure (Perceptions based)			Drought shock exposure (Perceptions based)			Drought shock exposure (Months of agricultural drought)a/		
	Food security	Hunger	Dietary diversity	Food security	Hunger	Dietary diversity	Food security	Hunger	Dietary diversity
Livelihood: Other[b/]									
Agriculture	-0.421	-1.047	-0.276 **	-0.354	-1.476	-0.285 **	-0.567	-2.079	-0.440 ***
Pastoralism	-0.702 *	4.101	-0.271	-0.550	3.126	-0.294	-0.630	4.618	-0.542 ***
Asset index	0.073 **	-0.290 *	0.040 ***	0.074 **	-0.293 *	0.040 ***	0.110 ***	-0.377 **	0.062 ***
Other shocks									
Insect invasion				0.707 *	-3.202	-0.046	0.981 **	-3.366	0.336 *
Economic stressor[c/]				-0.159	0.308	0.134	0.276	-1.208	0.158
Illness				0.370	-1.587	0.120	-0.296	-0.580	0.189
Death				-1.055 **	3.742	-0.209	-0.675	2.480	-0.093
Emigration				-0.944	3.795	-0.305	-0.165	-3.222	-0.478
Country: Niger							1.060 *	1.073	-1.878 ***
Number of observations	2,492	2,492	2,492	2,492	2,492	2,492	2,492	2,492	2,492
R-squared	0.369	0.201	0.380	0.376	0.207	0.382	0.136	0.038	0.234

Notes: Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels. Underlying *t*-statistics are robust to heteroskedasticity. The regression equations including the perceptions-based measures of shock exposure control for village of residence.

a/ Province-level AFDM measure.

b/ Reference category.

c/ Economic stressors include: Debt repayment, job loss by a household member, long-term unemployment, abrupt end of assistance from outside of the household, unavailability of productive inputs or a drop in demand for products sold.

The regression results suggest that resilience capacity indeed has a positive influence on household food security, confirming that greater resilience capacity is associated with better food security overall, reduced hunger, and increased dietary diversity. These results are robust to the type of shock experienced. While not as strongly statistically significant as the results for the perceptions-based measures of shock exposure, that for the months of agricultural drought, which is arguably the most objective measure of climate shock, provides confirmation that a households' resilience capacity supports its food security in the face of ("controlling for") drought.

Other results of interest from the regressions, some of which were already pointed to in the analysis of the relationship between food security and shock exposure (in Chapter 3), are that:

- Asset ownership, a proxy variable for economic status or income, also has a strongly statistically significant and positive relationship with food security. This suggests that resilience capacity's impact goes *above and beyond* households' economic status and confirms the independent identity of resilience capacity from general economic welfare—the latter which has been shown in many empirical analyses to strongly influence food security;

- All other characteristics controlled for in the regression being equal, the results indicate that

  - Female-adult-only households tend to have lower food security than other households;

  - Households whose predominant livelihood is agriculture tend to have lower dietary diversity than households in the "other" livelihood group; and

  - Households in the Niger program area tend to have lower dietary diversity than those in the Burkina Faso area.

The top panel of Table 6.2 reports on the results individually for absorptive capacity, adaptive capacity, and transformative capacity. That is, each is included individually, without the others, in a separate regression equation. Like the results for the overall index of resilience capacity, they indicate that all of these aspects of resilience capacity are positively associated with household food security, including dietary diversity, and negatively associated with hunger, that is, they reduce hunger. Because the indexes are all measured on the same scale (from 0 to 100), comparisons of their coefficients gives an indication of their relative strengths of impact. As found by a recent similar analysis undertaken for households in a drought-prone area of Ethiopia (Smith et al., 2015), transformative capacity appears to have a stronger influence than both absorptive and adaptive capacity. This makes sense because while absorptive capacity is about households coping with shocks in the short term and adaptive capacity about taking proactive decisions to deal with shocks, transformative capacity centers on creating an enabling environment for resilience that is widely applicable to all households in an area.

Table 6.2. Regression analysis of the relationship between food security and absorptive, adaptive, transformative, and community resilience capacities

	Overall shock exposure (Perceptions based)						Drought shock exposure (Perceptions based)						Drought shock exposure (Months of agricultural drought)a/					
	Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity		Food security		Hunger		Dietary diversity	
Household resilience capacity																		
Overall index	**0.131**	***	**-0.319**	***	**0.030**	***	**0.129**	***	**-0.312**	***	**0.030**	***	**0.083**	***	**-0.168**	*	**0.015**	**
Absorptive	0.077	***	-0.140	*	0.012	**	0.078	***	-0.145	*	0.012	**	0.106	***	-0.279	***	0.014	***
Adaptive	0.070	***	-0.219	***	0.023	***	0.067	***	-0.203	***	0.023	***	0.073	***	-0.142		0.015	***
Transformative	0.248	***	-0.601	***	0.049	***	0.251	***	-0.620	***	0.049	***	0.040	***	-0.063		0.007	
Community resilience capacity																		
Overall index	**-0.006**		**0.029**		**-0.006**	*	**-0.005**		**0.024**		**-0.006**	**	**0.111**		**-0.034**		**-0.003**	

Notes: Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels. Underlying *t*-statistics are robust to heteroskedasticity. The household resilience capacity regression equations including the perceptions-based measures of shock exposure control for village of residence. That including the number of months of agricultural drought controls for country of residence. The community resilience capacity regression equations including the perceptions-based measures control for province of residence. That including the number of months of agricultural drought controls for country of residence. The other independent variables controlled for are those listed in Table 6.1.

[a/] Province-level AFDM measure.

The bottom panel of Table 6.3 reports on the regression results for community resilience capacity. Here the only statistically significant association (at the 5 percent level) found is a negative one between community resilience capacity and dietary diversity when the perceptions-based drought shock exposure measure is employed. This counter-intuitive result is not substantiated when the months of agricultural drought measure is employed, but could be explained by the fact that downstream food price shocks (explicitly included in the perceptions-based measure) lead to changes in the types of foods households consume. The limitations of the data and statistical technique employed preclude any definitive conclusion that community resilience capacity does not influence household food security in a positive manner. Future analysis of the relationship between these two variables could employ alternative measures of community resilience and, further, empirical techniques that take into account the inter-relationship between household and community resilience.

6.2 Ability to Recover From Shocks and Resilience Capacity

The finding that household food security is positively associated with household resilience capacity is important and interesting. But knowing whether household resilience capacity actually helps households to recover from shocks, that is, bolsters their resilience to shocks, is key to both understanding the mechanisms that assist households in coping with shocks and validating the measure of resilience capacity being employed.

The regression results reported in Table 6.3 examine the relationship between household resilience capacity and their perceived ability to recover from shocks, an experiential measure of their resilience.[42] The measure of perceived ability to recover is described in Chapter 4.

[42] As for the food security regressions, the reader should keep in mind that some of the difference in the regression results between those for the perceptions-based measures and those for the months of agricultural drought will be driven by the fact that *village* of residence is controlled for in the regressions for the former while *country* of residence is controlled for in the latter (because the shock exposure measure is calculated at the province level).

Table 6.3. Regression analysis of the relationship between households' perceived ability to recover from shocks and resilience capacity

	Overall shock exposure (Perceptions based)		Drought shock exposure (Perceptions based)		Drought shock exposure (Months of agricultural drought)a/	
	(Dependent variable: Index of households perceived ability to recover from shocks)					
Household resilience capacity						
Overall index	**0.010**	*******	**0.009**	*******	**0.005**	******
The three capacities (separate regressions)						
Absorptive capacity	0.005	**	0.005	**	0.004	*
Adaptive capacity	0.007	***	0.006	***	0.006	***
Transformative capacity	0.016	***	0.014	***	0.002	
The three capacities (together in one regression)						
Absorptive capacity	0.003		0.003		0.003	
Adaptive capacity	0.005	**	0.004	*	0.004	*
Transformative capacity	0.004		0.003		0.003	
Community resilience capacity						
Overall index	**0.002**		**0.002**		**0.001**	

Notes: Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels. Underlying t-statistics are robust to heteroskedasticity. The notes for Table 6.2 regarding controls for village, province and country of residence as well as the other independent variables controlled for apply here.

a/ Province-level AFDM measure.

The results are presented first when indexes of the three types of resilience capacity are included individually in separate regressions. Doing so allows us to examine each individually, without concern that those with relatively strong correlations with the others and relatively high variation in the sample will statistically dominate the others. The results indicate that all three aspects of household resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity—bolster their resilience in the face of shocks, including drought shocks. Note, however, that when the AFDM measure of drought exposure is employed as the shock measure, only adaptive capacity, the ability to take pro-active decisions to respond to shocks, shows a statistically significant association at least at the 5 percent level. When the three types of resilience capacity are included together in the same regression, only adaptive capacity shows a statistically significant relationship with households' ability to recover. This does confirm the positive effect of adaptive capacity, but does not rule out positive roles for the other two capacities, especially since adaptive capacity has the strongest inter-correlations with the other capacities and relatively high sample variation.

Here again, the results suggest no statistically significant relationship between community resilience capacity and households' ability to recover from shocks.

6.3 Factors Supporting Households' Resilience Capacities That Contributed to Their Ability to Recover From Shocks

As seen above, all three dimensions of resilience capacity—absorptive capacity, adaptive capacity and transformative capacity—likely contributed in some way to helping households recover from the shocks they faced in the year prior to the baseline survey. The results in Table 6.4 look at which specific factors contributing to the three dimensions of resilience capacity (specifically, the index components listed in Figure 5.1) may have played a role.[43] The first column lists the indexes of resilience capacity in addition to the factors contributing to each. The red-colored boxes signify that, for a particular shock exposure measure, the regression coefficient of the resilience-capacity factor of interest is *positive* statistically significant at least at the 5 percent level. The purple-colored boxes signify that the regression coefficient is *negative* and statistically significant at least at the 5 percent level.

Note that one of the index components, asset ownership, is not included in the table. This is because assets contribute to households' ability to recover from shocks (and well-being outcomes in general) through other means than households' resilience capacities. It is thus not possible to single out their specific role through the pathway of bolstering households' resilience capacities.

[43] Again, the reader should keep in mind that some of the difference in the regression results between those for the perceptions-based measures and those for the months of agricultural drought will be driven by the fact that *village* of residence is controlled for in the regressions for the former while *country* of residence is controlled for in the latter (because the shock exposure measure is calculated at the province level).

Table 6.4. Regression analysis of the relationship between the resilience capacity index sub-components and households' ability to recover from shocks

Shock measure	Overall shock exposure (Perceptions based)			Drought shock exposure (Perceptions based)			Drought shock exposure (Months of agricultural drought)		
	All	Burkina Faso	Niger	All	Burkina Faso	Niger	All	Burkina Faso	Niger
Absorptive capacity									
Bonding social capital	0.003			0.003					
Holdings of savings			-0.271			-0.292			
Access to informal safety nets									
Hazard insurance									
Disaster preparedness and mitigation	0.111			0.117			0.121		
Conflict mitigation			0.285			0.314			
Adaptive capacity									
Bridging social capital	0.002			0.002			0.003		
Linking social capital		0.023			0.019				
Aspirations/confidence to adapt	0.004			0.004			0.005		
Livelihood diversity			-0.096			-0.102			
Access to financial resources									0.138
Human capital	0.002			0.002			0.003		
Exposure to information			-0.047			-0.043			
Transformative capacity									
Bridging social capital	0.002			0.002			0.003		
Linking social capital		0.023			0.019				
Access to ….markets									
….basic services									
….infrastructure		0.129	-0.205		0.019	-0.220		0.140	
….communal natural resources									
….formal safety nets						0.169	0.084		

Note: Numbers in boxes are regression coefficients, reported only for those that are statistically significant at least at the 5 percent level.

Red shading highlights positive coefficients while purple shading highlights negative coefficients.

Summary of regression results:

Absorptive capacity:

- Two aspects of households' absorptive capacity appear to have supported their ability to recover from the shocks: bonding social capacity and disaster preparedness and mitigation.[44]
- The evidence for the role of disaster preparedness and mitigation in assisting households to recover from exposure to *drought* is particularly strong.
- The data indicate that availability of a conflict mitigation group played a role in Niger.

Adaptive capacity:

- Bridging social capital, aspirations and confidence to adapt, and human capital are the components of adaptive capacity that appear to have supported their ability to recover.[45]
- Linking social capital may have also played a role in Burkina Faso, and access to financial resources in Niger.

Transformative capacity:

- Bridging social capital is the component of transformative capacity that appears to have supported households' ability to recover.[46]
- There is evidence that linking social capital and access to infrastructure boosted households' ability to recover in Burkina Faso.
- Access to formal safety nets may have helped households recover from exposure to drought, with the evidence on this factor being strongest for households in Niger.

Based on the Niger data only, negative regression coefficients were found for the following index sub-components: holdings of savings, livelihood diversity, exposure to information, and access to infrastructure. It is beyond the scope of this report to further investigate these counter-intuitive results. However they may be explained by the fact that households that are *least* able to recover from shocks are more likely to be those targeted by development activities with interventions that increase savings, infrastructure, and exposure to information

[44] These results hold even when all of the absorptive capacity index sub-components are entered together in the regression equation, rather than only individually.

[45] These results hold even when all of the adaptive capacity index sub-components are entered together in the regression equation, rather than only individually.

[46] These results hold even when all of the transformative capacity index sub-components are entered together in the regression equation, rather than only individually.

(especially that on shocks), and with interventions that diversify livelihoods. With regard to livelihood diversity in particular, it is possible that households in Niger that are unable to recover from shocks venture into a wider variety of livelihood activities as a coping strategy.

6.4 Does Greater Resilience Capacity Reduce the Negative Impact of Drought on Food Security?

Answering the question of whether greater resilience capacity reduces the negative impact of shocks on food security is another way to understand the role of resilience capacity in bolstering households' resilience to shocks and validate the measure of resilience capacity being employed. To answer the question, an interaction term between the shock exposure measure and the household resilience capacity index (shock exposure multiplied by resilience capacity) is included in the food security regression equations.

Focusing in on the overall index of food security, the results are in Table 6.4. Here we find that the coefficient of this interaction term is positive and strongly statistically significant (at the 1 percent level) when the AFDM drought exposure variable is employed. The result suggests that indeed the greater is a household's resilience capacity, the lesser is the negative influence of exposure to agricultural drought on its food security. The following is the implied empirical relationship between drought shock exposure (*drought_exp*), household resilience capacity (*RC*), and food security (*foodsec*):

where *D* represents the contribution to the equation of the estimated constant term and the remaining independent variables controlled for.

The estimated impact of *drought_exp* on food security is thus:

Table 6.5. Regression analysis: Does greater resilience capacity reduce the negative impact of shocks on food security?

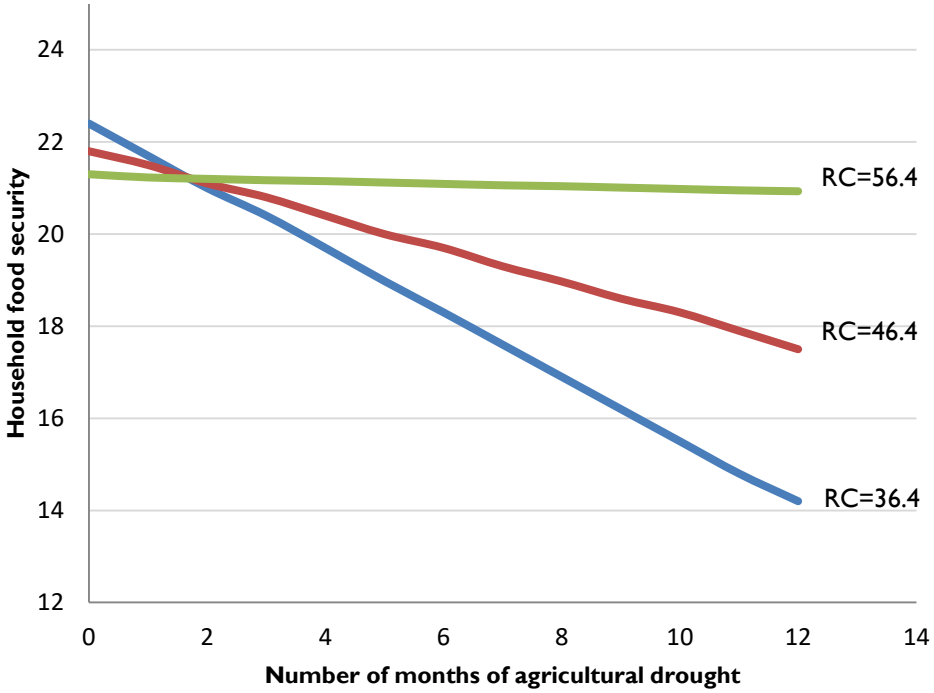
	Overall shock exposure (Perceptions based)		Drought shock exposure (Perceptions based)		Drought shock exposure (Months of agricultural drought)[a/]	
	(Dependent variable: Food security index)					
Household resilience capacity	0.149	***	0.141	***	-0.058	**
Shock exposure	0.046		-0.016		-1.894	***
Resilience capacity*shock exposure	**-0.003**	*	**-0.003**		**0.033**	***
Number of observations	2,492		2,492		2,492	
R-squared	0.370		0.377		0.163	

Notes: The dependent variable is the food security index. Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels. Underlying *t*-statistics are robust to heteroskedasticity. The notes for Table 6.2 regarding controls for village and country of residence as well as the other independent variables controlled for apply here.

[a/] Province-level AFDM measure.

The resilience capacity-mediated relationship between drought exposure and food insecurity implied by the above equation is illustrated in Figure 6.1. It shows the implied impact of drought exposure on food security at three values of the resilience capacity index: the mean (red line), the mean minus 10 points (blue line), and the mean plus 10 points (green line). The negative slope of the line is steeper the lower is the level of resilience capacity. Further, any given level of drought exposure (for example, 6 months) is associated with a higher level of food security the higher is resilience capacity.

Figure 6.1. Resilience capacity (RC)—moderated relationship between drought exposure (months of agricultural drought) and food security



Note: This figure shows the implied impact of drought exposure on food security, as implied by the regression results in Table 6.4, at three values of the resilience capacity index: the mean (red line), the mean minus ten points (blue line), and the mean plus ten points (green line). Resilience capacity is measured using the household resilience capacity index. The number of months of agricultural drought is from the Africa Flood and Drought Monitor (AFDM). Food security is measured using the *inverse* of the Household Food Insecurity Access Scale (HFIAS).

SUMMARY: The Links Between Resilience Capacity, Ability to Recover From Shocks, and Household Food Security

This chapter used regression analysis to explore the effect of resilience capacity on households' food security and their resilience to shocks. Shocks are controlled for using three measures: (1) overall shock exposure, including climate, conflict, economic shocks; (2) drought-specific shock exposure, which includes exposure to drought itself and its downstream impacts; and (3) drought shock exposure as measured using satellite data from the AFDM on the number of months of agricultural drought. The first two measures are perceptions-based measures calculated using the RISE baseline data.

The regression results confirm that greater household resilience capacity—including absorptive, adaptive and transformative capacity—is associated with better food security overall, reduced hunger, and increased dietary diversity. The results are robust to the measure of shock exposure. Community resilience capacity, on the other hand, was not found to have a statistically significant relationship with households' food security. As noted, the limitations of the data and statistical technique employed preclude any definitive conclusion regarding this relationship.

Does resilience capacity actually help households to recover from shocks, that is, bolster their resilience to shocks? This question is explored using households' perceived ability to recover from shocks, an experiential measure of resilience. As for food security, the results indicate that all three aspects of household resilience capacity bolster their resilience in the face of shocks, including drought shocks. The specific factors contributing to household resilience capacity (index sub-components) that are found to have likely supported their ability to recover are:

- Bonding social capital;
- Bridging social capital;
- Aspirations and confidence to adapt;
- Human capital;
- Access to formal safety nets; and
- Availability of disaster preparedness and mitigation support.

Additional factors that were found to be important in Burkina Faso were linking social capital and access to infrastructure; additional factors found to be important in Niger were access to financial resources and availability of a conflict mitigation group.

No statistically significant relationship between households' ability to recover and community resilience capacity was found.

A final analysis using the data on drought shock exposure from the AFDM indicates that greater household resilience capacity reduces the negative impact of agricultural drought on food security, which is further confirmation of its protective role in the face of climate shock, the most commonly experienced type of shock in the RISE program area.

7. Differences in Resilience and Resilience Capacity Across the RISE IE Intervention Groups

This chapter looks at whether there are any statistically significant differences in resilience (as measured by households' perceived ability to recover from shocks) and/or resilience capacity across the *Resilience in the Sahel Enhanced* (RISE) impact evaluation (IE) intervention groups. Recall that the high exposure group consists of households residing in villages slated to benefit from a set of Food for Peace (FFP) projects, the Resilience and Economic Growth in the Sahel–Enhanced Resilience (REGIS-ER) project or the Resilience and Economic Growth in the Sahel–Accelerated Growth (REGIS-AG) project. The low exposure group, which will serve as the control group in the final IE analysis, consists of households residing in villages not slated to receive support from these programs. It is important to take into account these differences in order to account for and use statistical techniques to overcome any problem of selection bias in estimates of the impact of the RISE project. The impact evaluation will take place after the endline data have been collected, which will be near the end of the program's activities.

Table 7.1 presents the differences for the experiential resilience indicators (see Chapter 4). The percent of households that recovered from the shocks experienced in the year prior to the baseline survey is 5.4 percentage-points higher for the high exposure group, a difference that is statistically significant at the 5 percent level. However, the severity-adjusted ability to recover index, which takes into account the degree of shock exposure, shows no difference.

Table 7.1. Differences in resilience (perceived ability to recover) across the RISE impact evaluation intervention groups

Indicator	Low exposure	High exposure	Difference (high low)
Percent of households that recovered from the shocks experienced in the year prior to the baseline survey	11.1	16.5	**5.4****
Severity-adjusted ability to recover index	1.88	1.99	0.11

Note: Asterisks (**) represent statistical significance at least at the 5 percent level.

Table 7.2 contains the differences for the indicators of resilience capacity (see Chapter 5). Here we find that resilience capacity, specifically absorptive and adaptive capacity, is somewhat higher among households residing in high exposure villages than low exposure villages, perhaps because of the processes for assigning program activities to areas with specific traits. The underlying indicators that are higher in the high exposure areas are:

- Access to infrastructure;
- Human capital;
- Access to information;

- Availability of formal safety nets;
- Availability of informal safety nets; and
- Disaster preparedness and mitigation.

It will be particularly important to take these differences into account, as well as differences in households' ability to recover from shocks at baseline, in the course of the RISE IE.

Table 7.2. Differences in resilience capacity across the RISE impact evaluation intervention groups

Indicator	Low exposure	High exposure	Difference (high low)
Social capital (indexes)			
Bonding	64.2	67.7	3.5
Bridging	50.7	51.9	1.2
Linking	32.5	39.8	7.3
Index of aspirations and confidence to adapt	34.6	33.5	-1.1
Economic sources of resilience capacity			
Livelihood diversity	2.6	2.6	0
Index of asset ownership	65.3	64.4	-0.9
Access to credit services	58.9	75.6	16.7
Access to savings services	39.4	56.7	17.3
Access to markets, services, infrastructure and communal natural resources			
Index of access to markets	1.5	1.6	0.1
Index of access to services	3.8	4.4	0.6
Index of access to infrastructure	1.1	1.4	0.3 **
Index of access to communal natural resources	1.8	2.2	0.4
Human capital and access to information			
Index of human capital	23.1	31.9	8.8 ***
Index of access to information	3.2	3.8	0.6 **
Safety nets			
Index of availability of formal safety nets	0.6	1.2	0.6 ***
Index of availability of informal safety nets	1.5	2.4	0.9 ***
Disaster risk reduction			
Index of disaster preparedness and mitigation	0.2	0.9	0.7 ***
Availability of hazard insurance	31.6	51.4	19.8
Availability of conflict mitigation support	50.7	46	-4.7
Indexes of resilience capacity			
Absorptive capacity	64.3	67.7	3.4 **
Adaptive capacity	37.5	44.3	6.8 **
Transformative capacity	35.3	42.5	7.2
Resilience capacity	43.2	49.8	6.6**

Note: Asterisks represent statistical significance at the 10(*), 5(**) and 1(***) percent levels.

8. Conclusion: Key Findings, Program Implications, and Next Steps

This report presents findings from the *Resilience in the Sahel Enhanced* (RISE) impact evaluation (IE) baseline survey resilience analysis. A number of tasks were undertaken in the report, and are listed as follows:

- The report presented the data on the degree of exposure to shocks of the population in the RISE area using data from both the baseline survey and from external sources as well as the baseline data on food security. It also explored the relationship between shock exposure and household food security.
- It reported on the degree of households' resilience to the shocks faced in the year prior to the baseline survey as reported by households on the degree to which they were able to recover from them.
- Baseline data on household and community resilience capacity were presented.
- A regression analysis addressed how household and community resilience capacity affect household food security in the face of shocks and their ability to recover from shocks.
- The report summarizes the differences found in resilience and resilience capacity across the RISE IE intervention groups, which is important information needed for conducting the final impact evaluation after the endline data are collected.

Key Findings. The quantitative and qualitative data corroborate prior information that the RISE program area is highly shock-prone. The most commonly experienced shocks are drought and its downstream impacts, including food price increases, animal disease, and conflict between herders and farmers and between villages. Other environmental shocks are floods and insect and bird invasions.

Qualitative interviews in the Burkina Faso area point to a stronger impact of drought on women than men as women are responsible for providing water. Drought means water fetching duties by women take more time, leaving less time for their other care activities. Niger focus group discussion (FGD) participants pointed to the fact that drought conditions often lead men to migrate in search of work, leaving women with a greater work burden.

Given the multiple shocks to which households are exposed, the large majority of households in the RISE program area, a full 76.4 percent, were food insecure at the time of the baseline survey. Regression analysis of the relationship between shock exposure and food security indicates that shock exposure has a soundly negative impact on food security. Thirteen percent suffered from hunger, the most severe form of food insecurity. The low quality of households'

diets is also an issue. Strong differences in the food security indicators across the Burkina Faso and Niger program areas and the livelihood groups are not apparent. The percent of households that are food insecure, however, is somewhat higher among households in the Burkina Faso program area and yet dietary quality tends to be higher than in the Niger program area.

The data indicate the majority of households that experienced a shock were not able to recover from it. Approximately one-fifth of households were able to recover from drought and food prices increases, the most commonly-experienced shocks, for example. Summary measures of households' resilience to shocks show no differences across the Burkina Faso and Niger program areas and limited differences between the livelihood groups.

The most common strategy used by households to cope with shocks, by far, is to sell livestock (employed by two-thirds of households), followed by reducing food consumption, and borrowing money from friends or relatives. Other commonly-employed strategies are: migration of some family members, drawing down on savings, receiving money or food from friends or relatives, and consuming seed stocks. Reducing food consumption and consuming seed stocks are particularly negative coping strategies. In addition, borrowing money from a money lender was utilized as a coping strategy by over 10 percent of households. Households in the Niger program area were more likely than those in the Burkina Faso area to use a number of coping strategies, consistent with the fact that they were more shock-exposed overall.

Livelihood diversification was seen as a way to prepare for and/or respond to shocks. Finally, sharing resources among extended family members and receiving money from children or relatives living elsewhere, especially those living in cities, was noted as important for coping with shocks. However, the increasing frequency and severity of shocks is eroding solidarity and hampering the ability of households to help each other in times of need.

In terms of the use of social capital to manage shocks, qualitative data reveal the primary importance of the social cohesion and communal support associated with bonding social capital for coping with shocks, of bridging social capital through remittances, and of linking social capital for receiving public aid and services.

In terms of livelihood diversification, respondents in both areas pointed to livestock rearing, which provides wealth and savings, and off-season and irrigated vegetable gardening as important manners in which to diversify one's livelihood. In Burkina Faso, the most resilient households were identified by FGDs to be those that diversify livelihoods by growing staple crops, cash crops, rearing livestock, gold mining and engaging in off-farm activities such as commerce or skilled-based employment. In the Niger program area, the most resilient households were identified to be those who engage in both rain-fed and irrigated agriculture, rearing animals, relying on remittances, and accumulating savings.

Asset ownership is slightly higher among households in the Burkina Faso program area and among the pastoralism-dominant livelihood group, the latter due to greater animal ownership. Access to credit, but not savings support, is more widely available in the Burkina Faso program area. Few differences were found in access to financial resources across the livelihood groups.

Access to markets is not universal in the RISE program area: only 53 percent of households have access to a livestock market, 60 percent to a market for agricultural products, and 43 percent to markets for agricultural inputs. According to the qualitative data, men in the Burkina Faso program area participate more in market activities than do women, while in the Niger program area participation is more equal. In both areas women's freedom of mobility is an issue.

Human capital is equally very low across the two RISE program areas, particularly among pastoralism-focused households. Access to information shows no overall difference across the program areas or livelihood groups. According to FGDs, trainings on such subjects as agro-ecological techniques, setting up savings groups, and child feeding are highly valued, and some have transformed communities.

The most highly available formal safety net is food assistance. Informal safety nets at the village level, such as women's groups, credit or microfinance groups, savings groups, mutual help groups and religious groups, tend to be more widely available than the formal safety nets other than food assistance, but not universal. There is little difference in access to safety nets across the RISE program areas or livelihood groups. FGDs point to food distribution to vulnerable households in the aftermath of a shock as critical to avoiding extreme suffering and famine.

Disaster preparedness and mitigation is very low in the RISE program area. Availability of other elements of disaster risk reduction (i.e., hazard insurance and conflict mitigation support) is higher but far from universal. The only apparent difference across the program areas is that households in the Niger area are much more likely to live in a village with a disaster planning group.

Pastoralism-focused households have somewhat greater absorptive capacity than the other groups, and households falling into the "other" group have moderately greater adaptive and transformative capacity. The overall index of resilience capacity indicates that this group has somewhat greater resilience than the other two groups. The underlying sources of this greater resilience are the group's stronger linking social capital, more diverse livelihoods, greater access to infrastructure and financial services, and greater human capital.

The regression results confirm that greater household resilience capacity—including absorptive, adaptive and transformative capacity—is associated with better food security overall, reduced hunger, and increased dietary diversity. The results are robust to the measure of shock exposure. Community resilience capacity, on the other hand, was not found to have a

statistically significant relationship with households' food security. Finally all three aspects of household resilience capacity bolster their resilience in the face of shocks, including drought shocks.

Program Implications. The results captured in this baseline report point to a number of areas where more attention should be given for programming, as summarized below.

- **Differences between Burkina Faso and Niger program areas**: When making adjustments to programs under RISE, differences found between outcomes in the two countries with RISE activities should be taken into account. The percent of households that are food insecure is somewhat higher among households in the Burkina Faso program area. Dietary quality, however, tends to be higher in the Niger program area.

- **Shock measures and trigger indicators for recurrent monitoring**: In addition to documenting shocks found in the quantitative data, such as drought and insect invasions, it is important to take into account shocks that were captured in the qualitative data but were not gathered in the quantitative survey, for example attacks by grain eating birds. In addition, the downstream effects of drought, such as food price increases, animal disease, and conflict between herders and farmers and between villages, will be critical to track over time through recurrent monitoring. Further, as shocks unfold it is important to track the changes in coping strategies that households employ to deal with changing conditions. Doing so will pick up on different patterns across geographical areas such as that found here that households in the Niger RISE program area turned to more coping strategies because they were experiencing more downstream shocks than Burkina Faso households. Trigger indicators that indicate that things are getting worse could include: reductions in food consumption, increased borrowing from money lenders, and consumption of seed stock. Although the Famine Early Warning Systems Network (FEWS NET) is collecting and analyzing data on conditions in the RISE program area, localized early warning systems could be improved in both program areas.

- **Gender differences in shock impacts**: The baseline data from Burkina Faso indicate that women may be more affected by recurrent droughts than men. Because droughts often create water shortages, women are taking more time to fetch water which has an effect on time allocated to other domestic work. This can create additional tension in the household leading to greater domestic violence. Improving access to water can mitigate these issues. The Niger data indicate that when men migrate for work to cope with shocks, the work burden of women left behind is increased. Further, women's opportunities to seek alternative income sources to make up for the resulting production shortfalls are affected by their restricted social mobility. This is another program area to give attention to.

- **Strengthening institutions to manage water and natural resources:** Although community institutions exist to maintain and manage water and natural resource use, more can be done to improve their functioning. For example, in the Sahel Region in Burkina Faso, the qualitative data indicate that water user groups may not be collecting enough from each household on an annual basis to keep the water points functioning with sufficient capacity. In addition, increased regulation of natural resources and inappropriate fines levied by municipal monitors ("pisteurs") is increasing intra-village conflict between herders and farmers.

- **Access to veterinary services:** One area where significant improvements in service delivery are needed is access to veterinary services. Currently, only 27 percent of households have access to veterinarians. This would be an important service to improve considering the fact that two-thirds of the households sell livestock to manage shocks. Livestock are also an important aspect of livelihood diversification.

- **Access to conflict mitigation groups:** Competition over limited resources due to drought is leading to more conflicts in the region. Currently, roughly 10 percent of the households are experiencing conflict as an important shock. The data analysis of this report showed that access to a conflict mitigation group did make a difference in recovery from shocks in Niger. To help avoid future conflicts arising in the RISE program areas, this factor should be given more attention.

- **Livelihood diversification:** In the qualitative interviews, livelihood diversification was identified by most focus groups as an important way to deal with shocks in both Burkina Faso and Niger. Diversification into livestock rearing was considered important as well as off-season and irrigated vegetable gardening. In villages in Burkina Faso, FGD participants stated that vegetable gardening was great because it took advantage of wet lands in the non-agricultural season when labor was more readily available. This has implications for the timing of training for vegetable gardening.

Livelihood diversification may not always be associated with better recovery. The regression analysis of which factors supporting households' resilience capacities helped them to recover from shocks showed that, for Niger, livelihood diversification has had a *negative* association with ability to recover. This result could be explained by the fact that poorer households who pursue multiple activities with relatively low remuneration would tend to have lower-than-usual recovery rates. A research area for further investigation is a comparison of the diversification strategies of those households that were able to recover from shocks with those who were not. Do the strategies of these groups differ?

Resilience capacity subcomponents and their implications for programming:

A number of subcomponents of the resilience capacities appear to be linked to a households' ability to recover from shocks. The following areas should be considered for increased focus in RISE programming.

- **Bonding, bridging, and linking social capital** were all found to be important in enabling households to recover from shocks. Households in both Burkina Faso and Niger RISE program areas indicate that sharing resources among extended family members and friends (bonding), receiving money from children and relatives living elsewhere (bridging), and receiving public aid and services (linking) were all important. Linking was more important in Burkina Faso than in Niger. In Burkina, having a connection to local authorities or the central government was found to be important for obtaining public aid. This would be an important area to investigate. The program should focus on strengthening social capital through the formation of women's groups, credit and microfinance groups, savings groups, and other mutual help groups. The program could then track how groups formed for one function actually take on other collective action functions and what factors encourage this change.

- **Availability of disaster preparedness and mitigation support:** The evidence for the role of disaster preparedness and mitigation in assisting households to recover from exposure to drought is particularly strong. Opportunities exist for expanding these types of interventions in Burkina Faso since more villages in Niger seem to have disaster plans in place.

- **Aspirations and confidence to adapt** also appear to have a positive influence on household's ability to recover. More work could be done by the RISE program to determine how it is supporting these psycho-social dimensions through its programming efforts.

- **Savings and access to financial services** was found to have a positive influence on the ability to recover in Niger. However, households in Burkina Faso are more likely to be in a village where microfinance institutions exist (70 percent). Access to microfinance institutions (MFIs) in Niger is worth exploring further. Savings was also cited in the qualitative interviews as an important means of managing shocks. Households in Burkina Faso were much more likely to hold cash savings at the time of the baseline (53.5 percent) as compared to households in Niger (13.6 percent). This could explain the negative association found between holding savings and the ability to recover in Niger in the regression analysis. In addition, 80 percent of the households in Burkina Faso held their savings in cash at home rather than in a community savings group like they do in Niger. Thus, access to savings support and holdings of savings is an important factor to take into account in future programming.

- **Access to infrastructure:** There is evidence that access to infrastructure boosted households' ability to recover in Burkina Faso. This indicates that infrastructure improvements have a positive impact on transformative capacity.

- **Access to markets** is not universal. Only 53 percent of the villages have access to a livestock market, 60 percent to an agriculture products market, and 43 percent to an agricultural inputs market. This could explain why access to markets did not have an effect on recovery. Much more could be done on strengthening market access. Given that cell phone use is extensive, market information could be easily shared in the region.

- **Human capital:** As would be expected, access to human capital has a positive relationship with recovery. Unfortunately, only one-third of the households have a literate adult in their family. Only one-fourth of pastoralist-focused households have a literate adult. This has serious implications for information transfer and livelihood diversification into off-farm income generating activities.

- **Access to formal safety nets:** Access to formal safety nets may have helped households recover from exposure to droughts. This is especially the case for households in Niger. This finding supports the notion that timely social protection is critical to recovery from shocks and needs to be part of overall resilience programming strategies.

Next Steps. In the next step in this evaluation of the RISE project, Feed the Future FEEDBACK will set up an interim monitoring system to capture real-time household and community responses to shocks and stresses as they occur over the next 3 years. Information related to shocks and stresses will be collected such as climate variables (rainfall), price levels, animal disease levels, and conflict. Trigger thresholds will be identified for determining when shocks and major stressor points have occurred in program areas to determine when follow-up survey activities will be carried out with panel households. Following a shock or major stressor, quantitative and qualitative data collection activities using short survey instruments and topical outlines will be carried out every 2 months over a 12-month period. The main focus of these interim monitoring activities is to assess household and community capacity to manage risk.

In addition to the interim monitoring carried out in 2016-2017, an interim will be carried out in 2017 and an endline will be conducted in 2019 for the RISE program. A second interim monitoring activity will be carried out in 2018.

In addition to these surveys, further analyses will be carried out using the existing baseline data to explore the livelihood strategies of the households that did recover from shocks, unpacking the consequences of engaging in negative coping strategies on future resilience, and assessing the relationship between the educational level of the household head or the household in general and household resilience to shocks. Further research questions will be identified following a resilience workshop carried out in Ouagadougou in June 2016.

Appendix 1. Calculation of Measures of Perceived Ability to Recover and Resilience Capacity

In this appendix the calculation of the indexes used to measure resilience capacity is explained. The question numbers from the household and community questionnaires used for each index are listed after the explanation of its calculation is given, with those from the household questionnaire preceded by "hh" and those from the community questionnaire preceded by "cm." Table A.1 contains descriptive statistics for each of the indexes.

Table A.1. Descriptive statistics for ability to recover and resilience capacity indicators

	Mean	Standard deviation	Minimum	Maximum
Index of perceived ability to recover from shocks	1.9	0.73	0.86	4.9
Index of bonding social capital	65.5	23.8	0	100
Index of bridging social capital	51.1	30.1	0	100
Index of linking social capital	35.2	23.5	0	100
Index of aspirations and confidence to adapt	34.1	12.9	0	100
Index of absorptive capacity	65.6	14.4	0	100
Index of adaptive capacity	40.0	19.2	0	100
Index of transformative capacity	38.0	22.0	0	100
Index of household resilience capacity	45.7	17.4	0	100
Index of community resilience	43.1	25.9	0	100

A1.1 Index of Perceived Ability to Recover From Shocks

The index is based on estimation of the ability of households to recover from the typical types of shocks that occur in the *Resilience in the Sahel Enhanced* (RISE) program area as based on data on the shocks households experienced in the year prior to the survey. Since each survey household did not experience the same types of shocks of the same severity, a "shock exposure corrected" index was created to measure ability to recover.

First, the measure of shock exposure was calculated taking into account the number of shocks (out of 26) experienced and their severity. Severity is measured using respondents' answers to the question, asked of each shock experienced, "How severe was the impact on your income and food consumption?" The possible responses are:

1. None;
2. Slight impact;
3. Moderate impact;
4. Strong impact; and
5. Worst ever happened.

The shock exposure measure is then a weighted average of the incidence of experience of each shock (a variable equal to one if it was experienced and zero otherwise), multiplied by the perceived severity of the shock.

Next, a base "perceived ability to recover" index was calculated based on responses to the following question: "To what extent were you and your household able to recover?", with possible responses:

1. Did not recover;
2. Recovered some, but worse off than before;
3. Recovered to same level as before;
4. Recovered and better off; and
5. Not affected.

The index is the mean value of respondents' responses to the question across all of the shocks experienced.

Finally, a shock-exposure-corrected index was calculated to create a measure of ability to recover that assumes households experienced the same shock exposure and thus is comparable across them. To do so, a linear regression of the base ability-to-recover (ATR) index on the shock exposure index was run, yielding the amount by which an increase of one in the shock exposure index can be expected to change the ability to recover index. The estimated empirical equation is:

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As expected, the higher the shock exposure, the lower is the ability to recover (the coefficient on shock exposure is negative). Next, the corrected recovery index was calculated as:

( ),

where 9.73 is the mean of the shock exposure index. As such, the ATR index value of a household with shock exposure below the mean would have a downward adjustment of its value and the opposite for a household with a shock exposure above the mean.

Survey Questions: hh301, hh303, hh305.

Sixteen percent (n=435) of the households in the sample did not experience any shock in the last year or had missing data, and thus an ability to recover index value could not be estimated for them in this way. The index value for these households was predicted using ordinary least squares (OLS) regression, with the following as predictors:

- Number of household adult equivalents;

- Age-sex composition of the household (percent of members in three age-sex groups);
- Whether the household is a "female adult only" household;
- Educational status of adult household members;
- Whether the household is asset poor;
- The livelihood group of the household; and
- Program area: Burkina Faso or Niger.

A1.2 Indexes of Bonding, Bridging, and Linking Social Capital

The **bonding social capital** index is based on eight yes/no questions:

- Two asking whether the household would be able to get help from relatives in their community;
- Two asking whether the household would be able to get help from non-relatives in their community;
- Two asking whether the household would be able to give help to relatives within the community; and
- Two asking whether the household would be able to give help to non-relatives within the community.

Survey Questions: hh1305, hh1307, hh1310, hh1312, hh1316, hh1318, hh1321, hh1323.

The **bridging social capital** index is also based on eight yes/no questions, but each is asked with regard to relatives or non-relatives living *outside* of their community.

Survey Questions: hh1306, hh1308, hh1311, hh1313, hh1317, hh1319, hh1322, hh1324.

The **linking social capital** index measures (1) the amount of information received from two types of government agents, rural development agents and government (political) officials; and (2) the households' access to services that are generally provided by the government and the quality of those services, including access routes (roads, trails), schools, health services, facilities for veterinary services, and agricultural extension services.

Information received was measured using the number of topics from which respondents' households received information (out of a possible 7) from either a rural development agent or a government official in the last year. Data from the community survey were used to measure access to and quality of services.

Quality of Roads/Trails. A household was considered to have access to a good quality road/trail if a road/trail is available in the community it resides in, and the road/trail can be used for travel throughout the year.

Quality of Schools. A 4-point quality scale was constructed as follows:

- No school (scale=0);
- There is a school, but there are not enough teachers and it is not in good physical condition (classified as poor or very poor) (scale=1);
- There is a school, there are not enough teachers, but it is in good physical condition (classified as "good" or "very good") or vice versa (scale=2); and
- There is a school and there are enough teachers and it is in good physical condition (classified as "good" or "very good") (scale=3).

Quality of Health Services. A 4-point quality scale was constructed as follows:

- No health center within 5 km (scale=0);
- There is a health center within 5 km, but its physical condition is classified as "poor" or "very poor" or there was a time in the last year when people needed health services but could not get them from the health center because of quality problems[47] (scale=1);
- There is a health center within 5 km and either the physical condition is not good or there are quality problems (but not both) (scale=2); and
- There is a health center within 5 km and its physical condition is good and there are no quality problems (scale=3).

Quality of Facility for Veterinary Services. A 4-point quality scale was constructed using the same criteria as for the quality of health services.[48]

[47] These problems could be: (1) No beds, health center was full; (2) No staff in the health center; (3) Health center was destroyed/burnt; (4) No drugs at the health center; (5) Quality of the health service is very poor.

[48] The quality problems could be: (1) No staff in the veterinary center; (2) Veterinary center too busy; (3) Veterinary center was destroy/burnt; (4) No equipment/drugs at the veterinary center; (5) Quality of the services is poor.

Quality of Agricultural Extension Services. A 3-point quality scale was constructed as follows:

- No agricultural extension services provided (scale=0).
- Agricultural extension services are provided, but there was a time in the last year when people needed services but could not get them because of quality problems[49] (scale=1); and
- Agricultural extension services are provided, and there were no quality problems cited in the last year (scale=2).

Survey Questions: hh1101, hh1102, cm314, cm320, cm323, cm324, cm330, cm331, cm334, cm335, cm336, cm337, cm338, cm339, cm343, cm344.

Principal components analysis (PCA) is used for calculating the bonding and bridging social capital indexes. Polychoric is used for linking social capital since some variables are ordinal. All indexes are placed on a 0-100 scale in order to enable cross-index comparisons. Because the social capital indexes are used further in calculating the resilience capacity indexes, missing values were predicted using OLS regression and the same independent variables as those used for predictions of the perceived ability to recover index (see Section A1.1).

A1.3 Index of Aspirations and Confidence to Adapt

This index is based on indicators of three underlying concepts:

- **Absence of Fatalism.** The absence of the sense of being powerless to enact change and that one has no control over life's events.
- **Sense of Individual Power.** A sense of having power to enact change as an individual rather than being subject to the decisions of more powerful people.
- **Exposure to Alternatives to the Status Quo.** The degree to which a person has been exposed to alternative ways of life than one's own.

The concepts are measured using the answers to both subjective and objective questions asked of household survey respondents that fall into three categories:

1. Yes/no questions regarding whether or not people agree with certain viewpoints or engage in certain behaviors;

[49] The problems could be: (1) Extension service center closed; (2) No extension workers; or (3) Quality of the services is poor.

2. Questions about the number of times in the previous month the respondent engaged in various behaviors; and

3. A series of statements about which respondents were asked to tell whether they "strongly agree," "disagree," "slightly disagree," "slightly agree," "agree" or "strongly agree." Responses to these statements can be put on a 6-point agreement scale.

Respondents' responses are used to calculate indexes, one for each of the three concepts.

The **absence of fatalism** index is based on four variables: two yes/no questions, one regarding the degree to which respondents agree that each person is responsible for his/her own success or failure in life and another regarding the degree to which a person can rely on luck rather than hard work to be successful. The second two correspond to the following 6-point agreement scale statements:

- My experience in my life has been that what is going to happen will happen.
- It is not always wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.

Survey Questions: hh1401, hh1402, hh1413, hh1415.

The **individual power** index is based on five variables: two yes/no questions, the first regarding whether a person is willing to move somewhere else to improve his/her life and the other on whether the respondent agrees that one should always follow the advice of elders, and the remaining three based on binary variables constructed from the 6-point agreement scale statements:

- I can mostly determine what will happen in my life.
- When I get what I want, it is usually because I worked hard for it.
- My life is determined by my own actions.

Survey Questions: hh1403, hh1404, hh416, hh1417, hh1418.

The **exposure to alternatives** index is based on three questions. Two are yes/no questions regarding communications with people outside of one's community and engagement in economic activities with members of other clans. The remaining question is based on the answer to the question "How many times in the past month have you stayed more than two days outside this village?"

Survey Questions: hh1405, hh1406, hh1409.

Polychoric PCA is used to calculate the indexes because all are based on either binary variables or a combination of binary and ordinal variables. All indexes are placed on a 0-100 scale in order to enable cross-index comparisons. The final overall index of aspirations and confidence to adapt is calculated using PCA.

A1.4 Index of Absorptive Capacity

The index of absorptive capacity is constructed from seven indicators, some of which are themselves indexes based on primary data collected in the household or community survey. The indicators and explanations of their calculation are as follows.

1. **Bonding Social Capital.** See Section A1.2 above.

2. **Asset Ownership.** Asset ownership is measured based on four categories of assets: consumer durables, agricultural productive assets, animals, and land. Consumer durables ownership is measured as the number of consumption assets owned out of a total of 32. Ownership of agricultural productive assets is measured as the number of productive implements owned out of 20. Animal ownership is measured in Tropical Livestock Units (TLUs), as defined in the notes to Table 5.5 of this report. Land is measured in terms of hectares farmed in the last 12 months. An overall asset index is constructed from the three measures using PCA.

Survey Questions: hh500, hh501, hh602, hh507.

3. **Whether household currently holds cash savings.**

Survey Question: hh1001.

4. **Access to Informal Community Safety Nets.** This indicator is the number of community organizations providing safety nets that are available in each household's community. The eight organizations are:

    - Credit or microfinance group;
    - Savings group;
    - Mutual help group (including burial societies);
    - Civic ("improving community") group;
    - Charitable group ("helping others");
    - Religious group; and
    - Women's group.

Survey Questions: cm401, cm359_3.

5. **Hazard Insurance.** A binary (dummy) variable equal to one if the household lives in a community with institutions where people can receive assistance due to losses of livestock.

Survey Question: cm368.

6. **Availability of Disaster Preparedness and Mitigation.** Binary (dummy) variable equal to 1 if the household lives in a community with (1) a government disaster planning and/or response program; (2) a non-governmental organization (NGO) disaster planning and/or response program; (3) a community disaster planning group; or (4) an emergency plan for livestock offtake if a drought hits.

Survey Questions: cm502, cm504 cm401, cm348.

7. **Support for conflict mitigation**. Dummy variable indicating whether or not the community of residence has an institution providing conflict mitigation.

Survey Question: cm803.

The indicators were combined into an index using polychoric factor analysis.

A1.5 Index of Adaptive Capacity

The index of adaptive capacity is constructed from eight indicators. Again, some of these are themselves indexes based on primary data collected in the household or community survey. The indicators and explanations of their calculation are as follows.

1. **Bridging Social Capital.** See Section A1.2 above.

2. **Linking Social Capital.** See Section A1.2 above.

3. **Household Aspirations and Confidence to Adapt.** Section A1.3 above.

4. **Diversity of Livelihoods.** Calculated as the number of livelihood activities engaged in over the last year. The question asked to identify these livelihoods is "What were the source of your household's food/income over the whole last 12 months?," with 21 possible options.

Survey Question: hh1201.

5. **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 type only, and two if there are institutions that provide both types of support.

Survey Questions: cm358, cm360.

6. **Asset Ownership.** See Section A1.4.

7. **Human Capital.** The variable is based on an index calculated from three variables. The first is whether or not any adults in the household can read or write, a binary variable. The second is whether any household adults have a primary or higher education, also a binary variable. The third is the number of trainings the respondent or any other household member has had, where the possibilities are: vocation (job) training, business development training, natural resource management training, adult education (literacy or numeracy or financial education), and training on how to use a cell phone to get market information like prices. Given that both binary and ordinal variables need to be combined, polychoric PCA is used to calculate the index.

Survey Questions: hh208, hh206, hh1326, hh1328, hh1332, hh1336, hh1338.

8. **Exposure to Information.** Number of topic respondent has received information on in the last year, out of seven topics.

Survey Question: hh1101.

The overall index of adaptive capacity is calculated using polychoric factor analysis.

A1.6 Index of Transformative Capacity

The index of transformative capacity is constructed from seven indicators, as follows.

1. **Bridging Social Capital.** See Section A1.2 above.

2. **Linking Social Capital.** See Section A1.2 above.

3. **Access to Markets.** The number of markets available within 20 kms of the household's community. The possible markets are:

   – Livestock market;

   – Market for selling agricultural products; and

   – Market for purchasing agricultural inputs.

Survey Questions: cm345, cm349, cm352.

4. **Access to Services.** A score that adds 1 point for each of the following conditions:

   – Household's community has a primary school or within 5 km;

   – Household's community has a health center within 5 km;

   – Household's community has a facility for veterinary services within 5 km;

   – Household's community has agricultural extension services "offered in this area";

   – Household's community has financial services (savings and credit institutions); and

   – Household's community has security services that can reach the community within 1 hour.

Survey Questions: cm320, cm321, cm330, cm331, cm335, cm336, cm341, cm343, cm358, cm359, cm360, cm361, cm357.

5. **Access to Infrastructure.** A score that adds 1 point for each of the following conditions:

   – Piped water is one of the main sources of drinking water in the household's community;

   – At least half of the households in the household's community have electricity;

   – The household's community either has cell phone service or a public telephone; and

   – The community can be reached with a paved road.

Survey Questions: cm304, cm305, cm307, cm310, cm311, cm313.

6. **Access to Communal Natural Resources.** A score that adds 1 point for each of the following conditions:

   – Household's community has communal grazing land;

   – Household's community has a communal water source for livestock; and

   – People in household's community get their firewood form communal land.

Survey Questions: cm208, cm211, cm214.

7. **Access to Formal Safety Nets.** This indicator is the number of formal safety nets available in each household's community. The possible formal safety nets are:

   – Institution in community where people can receive food assistance;

   – Institution in community where people can receive housing and other non-food items;

   – Institution in community where people can receive assistance due to losses of livestock; and

   – Availability of a disaster response program from government or an NGO.

Survey Questions: cm364, cm366, cm368, cm501-cm504.

The index of transformative capacity is calculated using polychoric factor analysis.

A1.7 Index of Household Resilience Capacity

The overall index of resilience capacity is calculated using PCA, with the indexes of absorptive capacity, adaptive capacity, and transformative capacity as inputs.

A1.8 Factor Loadings of Resilience Capacity Indexes

The factors loadings used to calculate each resilience capacity index are reported in Table A.2. The loadings represent the correlation between the sub-components of each index and the index itself, giving a sense of the relative statistical importance of each sub-component in forming the overall index. Bear in mind that PCA is a data reduction technique that is entirely based on the *correlation structure* of the included index sub-components, which can be thought of as how well they "fit" together. It is not a tool for assessing the relative importance of the index sub-components in influencing the outcome (e.g., adaptive capacity) one is measuring.

Table A.2 Factor Loadings of Resilience Capacity Indexes

Index sub component	Factor loading
Absorptive capacity	
Bonding social capital	0.2677
Asset ownership	0.2832
Access to informal safety nets	0.5738
Availability of hazard insurance	0.5689
Availability of a disaster planning and mitigation group	0.5247
Availability of conflict mitigation support	0.2861
Adaptive capacity	
Bridging social capital	0.2220
Linking social capital	0.4905
Aspirations and confidence to adapt	0.0544
Livelihood diversity	0.2218
Access to financial resources	0.5701
Asset ownership	0.2774
Human capital	0.3864
Exposure to information	0.2722
Transformative capacity	
Bridging social capital	0.1661
Linking social capital	0.7708
Access to markets	0.2454
Access to infrastructure	0.4542
Access to basic services	0.7422
Access to communal natural resources	0.1221
Access to formal safety nets	0.4257
Resilience capacity	
Absorptive capacity	0.3913
Adaptive capacity	0.6684
Transformative capacity	0.6326

A1.9 Index of Community Resilience Capacity

The index of community resilience is constructed from five indicators, as follows.

1. **Community Natural Resources Management.** Index constructed using information on the existence of water user's groups, grazing land user's groups, groups regulating the collection of firewood, and the answer to the survey question regarding whether the village has defined "clear and widely accepted rules to ensure good management of natural resources." The index is constructed using PCA.

Survey Questions: cm401, cm209, cm215, cm802.

2. **Presence of a disaster planning group in community.**

Survey Question: cm401.

3. **Social Protection Index.** This index is constructed from 13 variables.

   - A binary variable indicting whether there is a savings group in the community;
   - A binary variable indicating whether there is a mutual help group (including burial societies) in the community;
   - A binary variable indicating whether there is a charitable group (including burial societies) in the community;
   - A binary variable indicating whether there is a women's group in the community;
   - A binary variable indicating whether there is a youth group in the community;
   - The proportion of households in the community that have received any assistance from relatives, neighbors, or friends in the last year;
   - The proportion of households that have given any assistance to relatives, neighbors, or friends in the last year;
   - The proportion of households that respond "yes" to the question "If your household had a problem and needed money or food urgently, would you be able to get it from relatives living in this community?";
   - The proportion of households that respond "yes" to the question "If your household had a problem and needed money or food urgently, would you be able to get it from people in this community who are not your relatives?";
   - The proportion of households that respond "yes" to the question "If a relative in this community had a problem and needed money or food urgently, would you be able to give money or food?";
   - The proportion of households that respond "yes" to the question "If someone who is not your relative, but lives in this community had a problem and needed money or food urgently, would you be able to give money or food?";
   - The proportion of households that respond "yes" to the question "If someone in your household fell ill or was injured, and you needed help with

work, would you be able to get it from people in your community or from relatives?";

- The proportion of households that respond "yes" to the question "If your household had a problem and needed help with work, would you be able to get it from people in your community who are not your relatives?";
- The proportion of households that respond "yes" to the question "If a relative in this community had a problem and needed help with work, would you be able to help?"; and
- The proportion of households that respond "yes" to the question "If someone who is not your relative, but lives in this community had a problem and needed help with work, would you be able to help?."

The variables are combined into an index using polychoric factor analysis.

Survey Questions: cm359, cm401, hh1304a, hh1315a, hh1305, hh1307, hh1310, hh1312, hh1316, hh1318, hh1321, hh1323.

4. **Managing and maintaining public goods index.** An index made up the following:
   - Binary variable indicating the presence of a civic ("improving community") group in the community;
   - Binary variable equal to one if the community has a road in good quality condition; and
   - Binary variable equal to one if the community has a school in good quality condition.

Survey Questions: cm401, cm314, cm324.

5. **Presence of a Conflict Mitigation Committee in Community.** Binary variable indicating whether or not the community has a natural resources management-related conflict resolution committee.

Survey Question: cm803.

The overall index of community resilience was calculated using polychoric factor analysis.

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