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**Midline Survey  
Resilience Analysis  
November 2018**

**Resilience in the Sahel Enhanced (RISE)  
Program Impact Evaluation**

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Tim Frankenberger, President

**TANGO International**

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# ACRONYMS

AFDM	Africa Flood and Drought Monitor
ATR	Ability To Recover
CESAO	<i>Centre d'Etudes Economiques et Sociales de l'Afrique de l'Ouest</i> or Center for Economic and Social Studies of West Africa
CRS	Catholic Relief Services CRS
DID	difference-in-difference
EDM	<i>Ecole de Maris</i> or Husbands' School
FAO	Food and Agriculture Organization of the United Nations
FASO	Families Achieving Sustainable Outcomes
FEWS NET	Famine Early Warning Systems Network
FFP	Office of Food for Peace
FGD	Focus Group Discussion
GIS	Geographical Information System
HFIAS	Household Food Insecurity Access Scale
IE	Impact Evaluation
KI	Key informant
KII	Key informant interview
KMO	Kaiser–Meyer–Olkin test
LAHIA	Livelihoods, Agriculture and Health Interventions in Africa
NDVI	Normalized Difference Vegetation Index
OLS	Ordinary Least Squares
PASAM TAI	<i>Programme d'Appui à la Sécurité Alimentaire des Ménages-Tanadin Abincin Iyali</i> or Household Food Security Support Program-Tanadin Abincin Iyali
PPS	Probability Proportional to Size
PRIME	Pastoralists' Areas Resilience Improvement through Market Expansion
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
SAFE	Supporting Adolescent Girls' Future through Second Chance Education
SAREL	Sahel Resilience Learning Project
SE	Shock exposure
SPI	Standardized Precipitation Index
TANGO	Technical Assistance to Non-Governmental Organizations, International
TMG	The Mitchell Group, Inc.

US	United States
USAID	United States Agency for International Development
ViM	<i>Victoire sur la Malnutrition</i> or Victory Against Malnutrition Project
WASH	Water, sanitation, and hygiene
WHO	World Health Organization

## KEY MESSAGES

- This midline report shows that, consistent with a short-lived, but strong drought and generalized increased shock exposure, the RISE program area saw a reduction in food security since the baseline;
- No improvement has been seen in households' ability to recover from shocks or their overall resilience capacity;
- The Burkina Faso area saw a small decline in its resilience capacity since baseline, driven by a reduction in households' adaptive capacity. The Niger area saw no change overall, with improvements in some capacities and deteriorations in others;
- Nevertheless, this report finds that all three types of resilience capacity—absorptive, adaptive and transformative—likely helped households recover from the most widely-reported shock, drought;
- The report's analysis provides suggestive evidence that the RISE program's interventions to date *have* enhanced households' resilience to shocks though
  - Protecting asset ownership
  - Diversifying livelihoods
  - Enhancing households' holdings of savings
  - Increasing aspirations and confidence to adapt, and
  - Increasing access to markets.
- The interventions, then, likely served to mitigate the declines seen since the baseline in households' food security and ability to recover from shocks.

# EXECUTIVE SUMMARY

This report documents the resilience analysis of the midline data set 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 program is being implemented in targeted zones of Burkina Faso and Niger in West Africa.

The objectives of this report are to (1) document trends since the baseline in the four key variables important to resilience analysis—shocks, household coping strategies, household resilience, and household resilience capacities; and (2) explore how households' resilience capacities and the RISE program to date have affected households' resilience. The baseline data were collected in April/May 2015, and the midline data roughly two years later, in April/May 2017. The number of households included in the final data sets for analysis was 2,492 for both surveys. The surveys are cross-sectional with an embedded village panel (100 villages). The village panel nature of the data collection allowed construction of a household panel data set containing 360 households for whom measures can be compared individually over the two years.

## *Trends in shock exposure*

Shock exposure increased between the baseline and midline surveys in the RISE program area, including exposure to drought, flooding, insect invasions, animal disease outbreaks, food price inflation, and illness. With respect specifically to climate shocks, immediately following the baseline survey, during the 2015 rainy season, both the Burkina Faso and Niger program areas experienced a major drought. For Burkina Faso, the drought's severity was comparable to that experienced during the 2008 Sahel-wide drought. For Niger it was far more severe, dropping into "extreme drought" territory and marking the greatest period of rainfall deficit of this century. The drought and following flooding were likely still affecting households at the time of the midline survey and may be the source of the food price inflation and declining food security seen since the baseline. While there was no major covariate climate shock in the 2016 rainy season, the large majority of RISE villages experienced drought and/or flooding at some point, in varying severity.

## *Trends in household coping strategies*

The most commonly reported strategies for coping with shocks at both baseline and midline were selling livestock, migration, drawing on savings, and borrowing money or receiving gifts of food or money from friends and relatives. The qualitative data concur that mutual sharing (bonding social capital) is vitally important for coping with shocks in the RISE area. Other coping strategies reported in the qualitative data are migration, cultivation of counter-season crops, and sales of assets. The use of food security –related coping strategies (e.g., consuming

seed stock, reducing the number of meals eaten in a day, and limiting portion sizes at meals) increased in the Niger area since the baseline, an indication of rising difficulty accessing food. Trends data also suggest increased reliance on friends and relatives in addition to possible coping strategies exhaustion in the Niger area. The qualitative data from both program areas concur that although sharing has continued during the drought and flooding, households' ability to share resources has been waning.

### *Trends in food security and resilience to shocks*

Consistent with the increase in shock exposure observed, food security has declined in the RISE program area since the baseline. The percent of households that are food insecure has risen from an already high 76.2 to 80.7. The food insecurity prevalence remained steady in the Burkina Faso area; the overall increase is due to a substantial increase in the Niger area (from 67.6 to 84.3 percent). The qualitative data point to rainfall variability, and drought in particular, as main factors driving food insecurity.

Household resilience is the ability to manage or recover from shocks and stresses. It is measured in this report using two indicators. The first, an "experiential" indicator, is based on households' own reports of their ability to recover from the shocks they experienced in the prior year. The second, more objective, indicator is based on measured changes in households' food security for the 360 panel households.

Data on households' perceived ability to recover point to the same pattern found for food security: the ability to recover has declined for Niger households as a group and remained constant for Burkina Faso households. Among Niger households the reduction in ability to recover is particularly marked for both drought and food price increases. Data on the change in food security between the baseline and midline documents great variability. While the average change is negative, roughly half of households experienced an increase their food security and the other half a decrease. These differences across households can be attributed to the severity of their exposure to shocks as well as their underlying resilience capacities.

### *Trends in household resilience capacity*

Resilience capacities are a set of conditions that enable households to achieve resilience in the face of shocks. They are the underlying determinants of resilience, as classified into three dimensions:

**Absorptive capacity:** the ability to minimize exposure to shocks and stresses where possible and to recover quickly when exposed;

**Adaptive capacity:** the ability to make proactive and informed choices about alternative livelihood strategies based on changing conditions; and

***Transformative capacity:*** the presence of wider, system-level factors that enable more lasting resilience, such as governance mechanisms, policies/regulations, infrastructure, community networks, and formal safety nets.

An overall index of resilience combining indicators of all three of these capacities, and the three capacities themselves, show very little change in the RISE area as a whole since the baseline. However, there have been some notable shifts within the program areas.

The Burkina Faso area saw a small decline in its resilience capacity since baseline, as marked by a drop in the overall index of resilience capacity from 57.0 to 53.1. This decline was driven by a reduction in adaptive capacity, itself rooted in drops in the following individual indicators: linking social capital, livelihood diversity, asset ownership (farming implements and land), and exposure to information. Other important capacities that have seen a decline in Burkina Faso are: holdings of savings, access to firewood on communal lands, and access to hazard insurance.

For the Niger area, the finding of no change in the overall index of resilience capacity masks some significant changes, both positive and negative. Five capacities have improved: bonding social capital, aspirations and confidence to adapt, livelihood diversity, asset ownership (consumer durables), and access to markets. Four have declined: access to infrastructure (specifically, paved roads), access to communal natural resources (firewood), exposure to information, and access to hazard insurance.

While the qualitative data collected at midline do not give insight into trends in resilience capacities, they point to four as being particularly important for households' ability to recover from shocks—livelihood diversity, human capital, access to financial resources, and safety nets. From both the baseline and midline qualitative data, bonding social capital is also viewed as a critical capacity for household resilience.

### ***Which resilience capacities helped households recover from shocks?***

Regression analysis using both cross-sectional (N=2,492) and panel data (N=360) provides suggestive evidence that households' resilience capacities do indeed serve to enhance their resilience to shocks. More specifically, all three types of resilience capacity—absorptive, adaptive and transformative—likely helped reduce the negative impact on households' food security of the most widely-reported shock experienced, drought. The evidence is particularly strong for absorptive capacity. Specific absorptive capacities that may have helped households recover from the shocks they experienced in the period between the baseline and midline surveys are:

- Bonding social capital;
- Holdings of savings;
- Availability of hazard insurance;
- Disaster preparedness and mitigation; and
- Asset ownership;

Evidence was also found for two adaptive capacities:

- Bridging social capital; and
- Access to financial resources.

Given that asset ownership and holdings of savings were found to help boost households' resilience in the face of shocks, it is concerning that they are on a declining trend in the Burkina Faso area. Also of concern is that the availability of hazard insurance shows a steeply declining trend in the entire RISE area. On the positive side, bonding social capital shows a positive trend in the Niger area.

### ***How has exposure to RISE interventions affected households' resilience?***

Analysis of the RISE baseline and midline data using three alternative techniques—cross-sectional OLS regression, panel growth regression, and difference-in-difference analysis—finds that the RISE program's interventions to date *have* likely enhanced households' resilience to shocks, as measured by the change in food security between the baseline and endline, a period of substantial and increasing shock exposure. They did so by boosting households' adaptive and absorptive capacities. Suggestive evidence is found that the interventions increased resilience through:

- Protecting asset ownership;
- Diversifying livelihoods;
- Enhancing households' holdings of savings;
- Increasing aspirations and confidence to adapt;
- Increasing access to markets.

From above, we saw that some of the capacities listed above are on the decline in the Burkina Faso area: adaptive capacity overall and, specifically, asset ownership, livelihood diversity and holdings of savings. The RISE program may have helped to moderate these declines. Others show an increasing trend—aspirations for both areas, and in Niger, asset ownership, livelihood diversity, and access to markets. The RISE program's activities may be partially responsible for these positive signs of resilience-building progress.

### ***Gender dynamics***

Qualitative data collected in the Niger area point to some positive changes regarding gender roles and equality that can be linked to RISE program activities. Focus group discussions report an increasing acceptance on the part of men and the community in general of women's agency and economic self-empowerment as well as women's participation in household decision making. Men are becoming more flexible regarding their own gendered identities and gaining a better appreciation and support for women's health. Women's greater economic independence, as facilitated by RISE and other programs, is fostering reduced gender-based violence and domestic abuse.

### *Program implications*

Following from the above findings, a number of recommendations are made regarding (1) RISE programming to protect and enhance households' resilience; and (2) future research to support that programming. It is recommended that further support be providing for declining absorptive capacities that have been shown here to support households' resilience, including bonding social capital, holdings of savings, access to hazard insurance, disaster preparedness and mitigation, and asset ownership. In addition to assets, increased support to many adaptive capacities is called for: diversified livelihoods, access to financial services, aspirations, and exposure to information. Most transformative capacities have either been stagnant or declining in the RISE area; the program should continue to support these capacities, especially market access, access to basic services, and infrastructure, such as paved roads. Much of the recommended research can take place as part of a Recurrent Monitoring Survey that is now in the field. Other information can be gathered by examining the current allocation of program interventions.

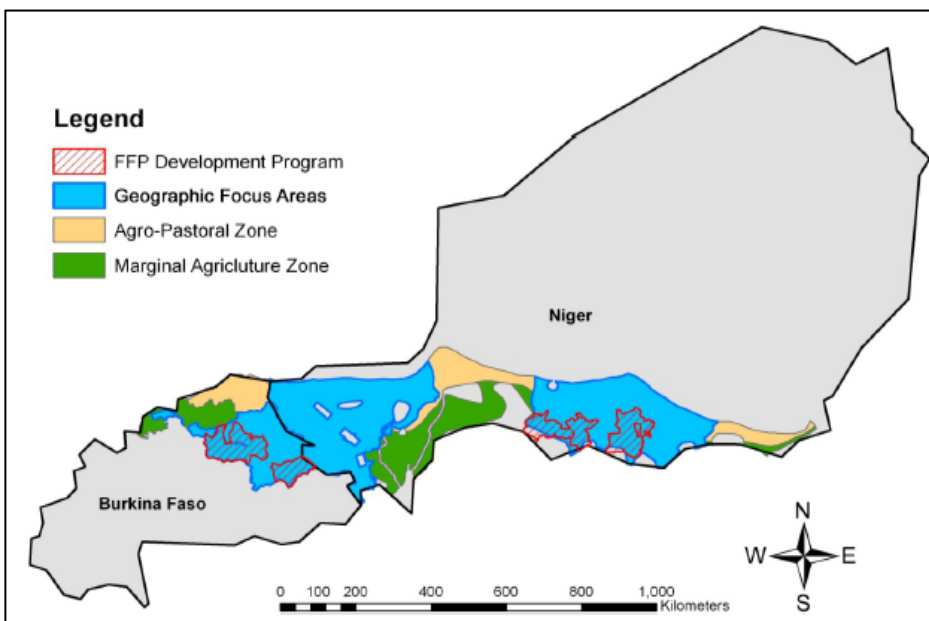


# I. INTRODUCTION

This report documents the resilience analysis of the midline data set collected as part of the impact evaluation (IE) of the *Resilience in the Sahel Enhanced* (RISE) initiative. The overarching goal of RISE is to increase the resilience to shocks of chronically vulnerable populations in agro-pastoral and marginal agriculture livelihood zones of the Sahel. The Sahel is the focus of RISE because it has a mix of deeply-rooted chronic poverty, food insecurity, recurrent climate shocks, conflict, and violent extremism that drives vulnerable communities into recurrent crises. With regard to climate shocks, the region experienced three droughts over the course of a decade, in 2008, 2010, and 2012. Further, as seen in this report, major rainfall deficits can occur in localized areas even in the absence of a major covariate shock that draws international attention.

The RISE program strategically layers, sequences and coordinates humanitarian and development efforts to end the Sahel's vicious cycle of crises and help vulnerable communities stay firmly on the path to development despite such events (USAID, 2015). The 5-year program, an initiative of the United States Agency for International Development (USAID), is being implemented from 2014 to 2019 in targeted zones of Burkina Faso and Niger. The zones include areas in the Eastern, Northern Central, and Sahel regions of Burkina Faso, and the Zinder, Maradi, and Tillabery zones in Niger (see Figure 1). The population of these combined areas is 11 million.

**Figure 1: Map of the RISE area**



Source: TMG/SAREL (2018).

RISE began with five FFP-funded development activities and activities focused on resilience, value chain, and learning (USAID 2018). Core RISE activities include:

- “Families Achieving Sustainable Outcomes” (FASO) implemented by a CRS-led consortium
- “Livelihoods, Agriculture and Health Interventions in Action” (LAHIA) implemented by a Save the Children International-led consortium
- “Program for Support to Household Food Security” (Programme d’Appui à la Sécurité Alimentaire des Ménages-Tanadin Abincin Iyali, PASAM-TAI) implemented by a CRS-led consortium
- “Resilience and Economic Growth in the Sahel – Accelerated Growth” (REGIS-AG) implemented by a Cultivating New Frontiers in Agriculture-led consortium
- “Resilience and Economic Growth in the Sahel–Enhanced Resilience” (REGIS-ER) implemented by an NCBA/CLUSA-led consortium
- “Sahel Resilience Learning” (SAREL) implemented by The Mitchell Group.
- “Sawki” implemented by a Mercy Corps-led consortium
- “Victoire sur la Malnutrition” (ViM) implemented by an ACDI/VOCA-led consortium.

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 (defined in Box 1); (2) households’ resilience capacities (factors that enhance resilience, see also Box 1); and (3) household resilience outcomes such as food security. Using both qualitative and quantitative data, this resilience analysis compares the baseline (2015) and midline (2017) status of all three of the above and undertakes exploratory analysis to understand how households’ resilience capacities and RISE interventions to date have affected households’ ability to recover from shocks. The analysis is based on data collected from cross-sectional, representative samples of 2,500 households residing in 100 RISE program-area villages.

A main midline report complementing this resilience analysis was written under the auspices of SAREL, which provides monitoring, evaluation, collaboration, and learning support to the RISE initiative (TMG/SAREL 2018). The report provides background information about levels and trends in households’ economic well-being and livelihoods, community governance, health and nutrition, and women’s empowerment. It also provides additional details about the RISE program and the baseline and midline data collection.

**Box 1: What are resilience and resilience capacity?**

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.” 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, resilience capacities can be classified into three categories:

- **Absorptive capacity** is the ability to minimize exposure to shocks and stresses (*ex ante*) where possible and to recover quickly when exposed (*ex post*).
- **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.

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

The Sahel is 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.<sup>1</sup> 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

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<sup>1</sup> 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).

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.

The second driver of the area's resilience deficit 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" is often to work in gold mines, while in Niger it is to seek employment in urban areas or even to beg.

Among the RISE program area's most vulnerable are its children under 5. According to the midline data, the prevalence of chronic undernutrition (stunting) in the area is 46.8 percent. That of acute undernutrition (wasting) is 15.9 percent (see TMG/SAREL 2018), far higher than the 10 percent deemed by the World Health Organization (WHO) to signify serious concern (WHO, 2000).<sup>2</sup> Such high malnutrition is caused by the area's excessive levels of food insecurity, as described in Chapter 4 of this report, poor child feeding practices, and unsanitary conditions.<sup>3</sup>

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<sup>2</sup> 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 (United Nations Children's Fund, WHO, & World Bank, 2015).

<sup>3</sup> According to the SAREL midline report (TMG/SAREL 2018), only 5.7 percent of children 6-23 months in the program area receive a minimum acceptable diet, and 39.8 percent of children 0-6 months are exclusively breastfed. With respect to sanitation, although 68.9 percent of households use an improved drinking water sources, only 19.4 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
  - Improved natural resources management;
  - Disaster risk management;
  - Strengthened conflict management systems; and
  - Strengthened government and regional capacity and coordination.
3. Improved health and nutritional status through
  - Increased access to potable water;
  - Improved health and nutrition practices, particularly for mothers and children;
  - Improved family planning; and
  - Better sanitation practices.

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

The RISE initiative includes three sets of projects: ongoing FFP projects underway since 2012,<sup>4</sup> 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.

### 1.3 Objectives of this Report and Research Questions

The objectives of this report are to (1) document trends since the baseline in the four key variables important to resilience analysis—shocks, household coping strategies, household resilience, and household resilience capacities; and (2) explore how households’ resilience capacities and the RISE program to date have affected households’ resilience.

The research questions related to **trends** are:

1. **Shock exposure and coping strategies.** How have the degree of shock exposure and types of shocks experienced changed since the baseline? How have households’ coping strategies changed? Do these changes differ by program area, pastoralist status, and RISE intervention arm (high exposure versus low exposure)?
2. **Food security and resilience.** How have food security and households’ resilience to shocks changed since baseline? Do these changes differ by program area, pastoralist status, and intervention arm?
3. **Resilience capacity.** How have households’ resilience capacities changed since the baseline (absorptive, adaptive, and transformative capacities, and individual capacities influencing them)? How do these changes differ by program area, pastoralist status, and intervention arm?

The research questions related to **resilience drivers** are:

Have households’ resilience capacities helped them recover from shocks?

4. Do households’ resilience capacities reduce the negative impact of shocks on their food security?
5. Do households’ resilience capacities have a positive effect on their ability to recover from shocks?
6. Which specific resilience capacities bolster households’ resilience to shocks?

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<sup>4</sup> 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).

Have RISE interventions to date improved households' resilience to shocks?<sup>5</sup>

7. Has exposure to RISE interventions had a positive effect on their ability to recover from shocks?
8. Has exposure to RISE interventions had a positive effect on their resilience capacities? Which specific capacities?

## 1.4 Organization of the Report

Chapter 2 of this report presents the RISE IE midline survey data collection and analysis methodologies. Chapters 3, 4 and 5 present the data on trends in shock exposure and coping strategies, food security and resilience to shocks, and resilience capacity, respectively. Chapters 6 and 7 focus in on the two potential drivers of households' resilience. Finally, the concluding chapter presents key findings and program implications.

## 2. METHODOLOGY

This chapter lays out the methods used for collecting the RISE midline data, both quantitative and qualitative, and for conducting the midline resilience analysis. The resilience analysis relies on both baseline and midline data.

### 2.1 Quantitative Data Collection and Analysis

#### 2.1.1 Data Collection

The baseline quantitative data were collected from April 29 to May 30, 2015; midline data were collected roughly two years later, from April 6 to May 4, 2017. Both household and community (village) surveys were conducted by SAREL and the *Centre d'Etudes Economiques et Sociales de l'Afrique de l'Ouest* (CESAO), an African international association based in Burkina Faso that collaborates with SAREL in its monitoring, evaluation and learning activities.

The sampling design was planned with the need to collect data for the two RISE intervention groups—high exposure and low exposure—in order to evaluate the impact of RISE interventions. As noted in Chapter 1, the high exposure group consists of households residing

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<sup>5</sup> A question that would be an obvious corollary to #4 above regarding resilience capacities is: “Has exposure to RISE interventions reduced the negative impact of shocks on households' food security?” It is not possible to credibly investigate this question for the reasons given in Chapter 7.

in villages slated to benefit from a set of 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 program impact evaluation, consists of households residing in villages not slated to receive support from these programs.

Data collection for the baseline and midline surveys followed a two-stage, stratified sampling design with the intervention groups serving as the strata. In the first stage, 37 villages were randomly selected within the high exposure group and 63 villages within the low exposure group using Probability Proportional to Size (PPS) sampling.<sup>6</sup> The same 100 villages serve as the first-stage sampling units for the baseline and midline, forming a village panel. In the second stage, 25 households<sup>7</sup> were randomly selected within each village to reach the desired sample size of 2,500. A new set of randomly-selected households was sampled at midline using updated household listings. The baseline and midline surveys had a 99.7 percent response rate yielding final analysis samples of 2,492 households for both. 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 the SAREL midline report (TMG/SAREL 2018). The survey instruments are in Volume 2.

### 2.1.2 Data sets: Cross-section and panel

The fact that the baseline and midline cross-sectional data sets constitute a village panel greatly increases the chance that some of the same households randomly sampled within villages at baseline were also randomly sampled at midline. In the case of the RISE IE data sets, the village panel nature of the data collection makes it possible to construct an “incidental *household* panel” that can be used for specialized panel data analysis (see next section). The incidental panel is made up of 360 households residing in 85 of the 100 sample villages.

Given that panel households are more likely to reside in smaller villages population-wise, they are more likely to reside in Niger than the general population. They do not differ from the general population in terms of remoteness, demographic characteristics of households (household size, education, predominant livelihood group, etc.), and asset ownership, but had slightly lower resilience capacity at baseline.

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<sup>6</sup> The unbalanced allocation of villages across the high and low exposure groups will facilitate the impact evaluation to take place using the endline data, in particular the application of Propensity Score Matching.

<sup>7</sup> The actual number of households sampled was 28 in order to reach the target of 25 needed to achieve the desired sample size.



### 2.1.3 Data Analysis

The quantitative data analysis was conducted with the statistical software STATA using both descriptive and multivariate analysis techniques.

#### *Descriptive Analysis of Trends*

In the report, the baseline/midline household and community survey data are used to conduct descriptive analysis of indicators describing levels and trends in households' shock exposure, coping strategies, food security, resilience, and resilience capacities. Indicator values are reported as percentages and means.

- **Percentages.** For values provided in nominal scales (e.g., yes/no responses), percentages are 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.
- **Means.** For variables calculated in a continuous scale format (e.g., dietary diversity score), means are 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 by time period (baseline and midline), and tests for statistically significant differences in the indicators across the groups and periods are undertaken. Differences are considered significant if statistically significant at the five percent level. The population subgroups for which values of variables are reported are:

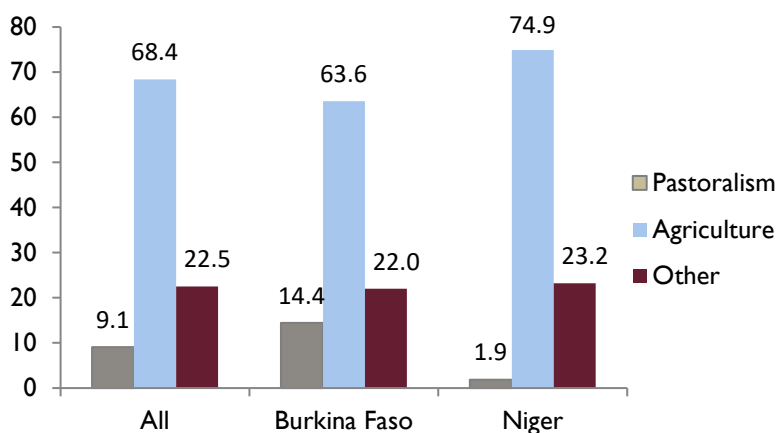
- RISE program area: Burkina Faso or Niger;
- Predominant livelihood: Pastoralism, agriculture, or “other”; and
- Intervention group: high exposure or low exposure.

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. The livelihoods of these households are dominated by retailing, remittances from migration, and artisanal mining, occupations that tend to be less climate-dependent than 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 a combination

of animal rearing, farming, and the more non-climate-dependent occupations, lying somewhere along the spectrum of agro-pastoralism.

Figure 2 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 in the Burkina Faso area.

**Figure 2: Percent of households falling into livelihood groups, by program area**



Source: RISE baseline data

The sample size for data collection 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 ( $n \leq 30$ ) 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 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. Note that the method for calculating the weights differs from that used at baseline. The new weights, provided by SAREL, include a correction for differences between the village sizes used for the original PPS sampling of villages (from census data) and the actual sizes obtained from household listings. These weights were retroactively applied to the baseline data for this midline analysis. Consequently, some baseline statistics reported here may differ slightly from those in the baseline report.

Some important variables of interest (e.g., resilience capacities) are composite measures based on multiple indicators. For many of these variables, factor analysis is used to construct an index. Factor analysis reduces 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 them from their correlation matrix. The variables are combined using weights that represent their relative correlations with the single variable produced. The method used for calculating factor analysis indexes and updating them so that they are comparable over time is given in Appendix I.

### **Multivariate Analysis of the Role of Households' Resilience Capacities**

In Chapter 6, multivariate regression analysis is first used to investigate Research Questions (4) through (6) addressing whether households' resilience capacities helped them recover from shocks:

4. Did households' resilience capacities reduce the negative impact of shocks on their food security?
5. Did their resilience capacities have a positive effect on their ability to recover from shocks?
6. Which specific resilience capacities bolstered households' resilience to shocks?

To investigate Question (4), Ordinary Least Squares (OLS)-Fixed effects regression analysis is applied to the midline cross-sectional data set (N=2,492). Household  $i$ 's food security (denoted  $Y_i$ ) is hypothesized to be influenced by its

- Resilience capacity ( $RC_i$ );
- Shock exposure ( $SE_i$ );
- Socio-demographic characteristics (vector  $X_i$ ); and
- Geographical location.

The empirical specification is:

$$Y_{i,ml} = \alpha + \beta_1 RC_{i,ml} + \beta_2 SE_{i,ml} + \beta_3 RC_{i,ml} * SE_{i,ml} + \beta_4 X_{i,ml} + \mu + \varepsilon_i, \quad (1)$$

where  $\alpha$  and the  $\beta$ s are coefficients to be estimated and  $\varepsilon_i$  is an error term. The term  $\mu$  represents the "fixed-effects," in this case controlling for the geographic region of residence of each household (village or country). Doing so allows taking into account unobserved, area-specific factors affecting food security, such as terrain, climate, or cultural values.

The household characteristics,  $X_i$ , included as independent variables are:

- Number of household adult equivalents (and its square);
- Percentage of members in six age-sex groups (female 0-16, female 16-30, female 30+, male 0-16, male 16-30 and male 30+);
- Education of adult household members, measured as dummy variables for no education, achievement of a primary education by at least one member, and achievement of a secondary education by at least one member;
- Whether the household is a female-adult-only household;

- Predominant livelihood group (dummy variables for agriculture, pastoralist, and “other”); and
- An asset index based on ownership of four categories of assets: consumer durables, agricultural productive assets, livestock, and land.

Resilience marks the ability of households to withstand and recover from shocks, to maintain their well-being even in the face of shocks. The interaction term between resilience capacity and shock exposure represents this ability; a coefficient on the interaction term, here  $\beta_3$ , that is statistically significant and positive indicates that the protective effect of resilience capacity is in action. Note that while simply running a regression with food security as the dependent variable without the interaction term does give us some information about the relationship between resilience capacity and food security, it does not tell us about households’ ability to manage and recover from shocks, that is, their resilience.

Two types of analyses are used to investigate Questions (5) and (6), which more directly ask whether households’ resilience capacities have a positive effect on their ability to recover from shocks. The first is OLS regression applied to the full midline, cross-sectional data set (N=2,492) with households’ perceived ability to recover as the dependent variable. Perceived ability to recover is a subjective measure of resilience calculated from households’ responses to questions regarding the degree to which they were able to recover from 25 different shocks in the last year (see Chapter 4, section 4.2) as the dependent variable.

The ability-to-recover (ATR) OLS empirical specification is:

$$ATR_{i,ml} = \alpha + \beta_1 RC_{i,ml} + \beta_2 SE_{i,ml} + \beta_3 X_{i,ml} + \mu + \varepsilon_i. \quad (2)$$

A positive and statistically significant  $\beta_1$  in Equation (2) is suggestive evidence that households’ resilience capacity bolsters their ability to recover from shocks.

The second method for investigating Questions (5) and (6) is to apply standard growth regression (e.g., Yamano et al. 2015; Hoddinott and Kinsey 2001) to the incidental household panel data set (N=360). Here the dependent variable is the change in food security from baseline to midline, and households’ starting (baseline) food security is controlled for. The specifications are:

$$Y_{i,ml} - Y_{i,bl} = \alpha + \beta_1 RC_{i,bl} + \beta_2 SE_{i,ml} + \beta_3 Y_{i,bl} + \beta_4 X_{i,ml} + \mu + \varepsilon_i, \quad (3)$$

$$Y_{i,ml} - Y_{i,bl} = \alpha + \beta_1 RC_{i,bl} + \beta_2 SE_{i,ml} + \beta_3 Y_{i,bl} + \beta_4 RC_{i,bl} * SE_{i,ml} + \beta_5 X_{i,ml} + \mu + \varepsilon_i. \quad (4)$$

## Multivariate and Difference-in-Difference Analysis of the Role of RISE interventions

In Chapter 7, multivariate regression and difference-in-difference analysis are used to investigate Research Questions (7) and (8) addressing whether RISE interventions to date have helped households recover from shocks:

7. Has exposure to RISE interventions had a positive effect on households' ability to recover from shocks?

8. Has exposure to RISE interventions had a positive effect on their resilience capacities? Which specific capacities?

Research question (7) is first explored using multivariate regression analysis with empirical specifications similar to those used to address research questions (5) and (6). The ability-to-recover OLS specification is:

$$ATR_{i,ml} = \alpha + \beta_1 T_i + \beta_2 SE_{i,ml} + \beta_3 X_{i,ml} + \mu + \varepsilon_i, \quad (5)$$

where T is a "treatment" group dummy variable equal to 1 for the high exposure group of households (the treatment group) and 0 for the low exposure group (the control group). Here a positive and statistically significant coefficient on the term  $\beta_1$  is suggestive evidence that RISE interventions have helped households recover from the shocks they face.

The food security growth regression specification is:

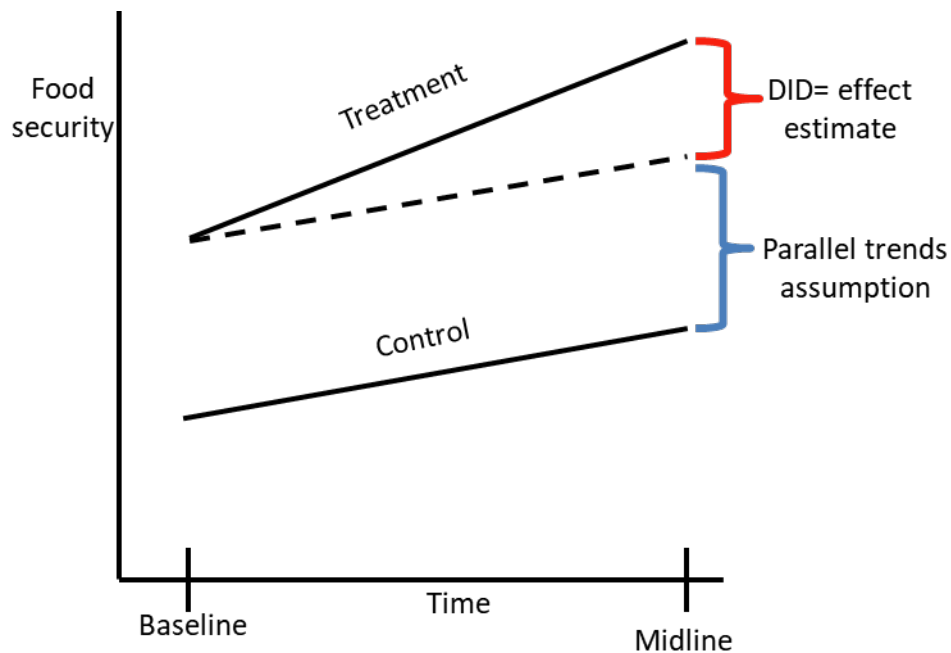
$$Y_{i,ml} - Y_{i,bl} = \alpha + \beta_1 T_i + \beta_2 SE_{i,ml} + \beta_3 Y_{i,bl} + \beta_4 X_{i,ml} + \mu + \varepsilon_i, \quad (6)$$

The similar empirical specification for Research Question (8) regarding resilience capacities is:

$$RC_{i,ml} - RC_{i,bl} = \alpha + \beta_1 T_i + \beta_2 SE_{i,ml} + \beta_3 RC_{i,bl} + \beta_4 X_{i,ml} + \mu + \varepsilon_i. \quad (7)$$

Next, the questions are explored using difference-in-difference (DID) analysis, whereby the change from baseline to midline in key indicators of interest—food security, ability to recover, and resilience capacities—for the treatment group is compared to that change for the control group. This comparison removes any differences between the groups that was present at baseline (and, therefore, obviously not a result of the program). Like growth regression, the method, then, does control for initial differences across the groups. Figure 3 illustrates difference-in-difference estimation for the example of food security. The effect estimate is given by the difference in the midline food security for the treatment group and that which is assumed would have occurred for the control group if it started at the same point as the treatment group.

**Figure 3: Difference-in-Difference Estimation: Illustration for food security**



An important assumption on which DID rests is the “parallel trends assumption”: that the *trend* in a variable is the same for the treatment and control groups. As will be explained in Chapter 7, this assumption is violated for our variables of interest, and we take this violation into account in interpreting the results.

### **A note on causality**

Given the nature of the data collected, the regression techniques used to analyze the data do not allow analysis of causal impacts of households’ resilience capacity and the RISE program on the outcomes of interest. Specifically for the case of RISE interventions, OLS, standard growth regression, and DID in the forms employed do not account for the possibility of selection bias due to targeting and to household self-selection, and are thus not rigorous project impact evaluation techniques.<sup>8</sup> We take care to understand the direction of any such bias by comparing the baseline food security, shock exposure, economic status, resilience capacities, and demographic characteristics of households across intervention groups before proceeding with the regression analysis.

Given the above, the results presented in this report should be considered exploratory and “suggestive.” The focus is on determining whether the relationships between the dependent and independent variables (as identified by the signs of regression coefficients) are in the expected, hypothesized directions and deemed to be statistically significant, while controlling

<sup>8</sup> Inferring causality more directly would involve the use of different techniques (for example, experimental or instrumental variables methods) and/or a careful triangulation of multiple sources of quasi-experimental and non-experimental data (Smith et al., 2013).

for other factors known to influence the dependent variables. While we cannot claim to provide accurate estimates of the magnitude of effect of the hypothesized factors, the data do allow us to reasonably identify whether or not they play a role.

## 2.2 Qualitative Data Collection and Analysis

The qualitative data collection focused on capturing contextual information at the local level about resilience dynamics and the impact of shocks in order to help interpret and explain 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. Specific research topics include:

- 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 also serve to give a voice to the people living in the RISE program area by reporting their own words on important topics such as how social capital functions in the wake of shocks, including ways in which unequal power relations and access to resources influence the ability of households to build and draw upon social capital.

Topical outlines for the data collection were developed by Technical Assistance to Non-Governmental Organizations International (TANGO) in conjunction with 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.

**Sample selection** Field work was conducted in Burkina Faso from August 19–31, 2017 and in Niger from August 17–31, 2017. The qualitative survey was carried out in a sample of 12 villages—six in Burkina Faso and six in Niger. The sample was drawn from the list of villages

sampled for the quantitative survey. In each country, four villages were chosen from among high exposure sites, and two from among low exposure sites.<sup>9</sup>

In the choice of sample villages the teams also considered logistical criteria (e.g., flood risk, security, holidays, road conditions), the need to cover the maximum variety of RISE partners' interventions, environmental diversity, livelihood differences, and access to markets.

**Data collection methods.** Focus group discussions (FGDs) were conducted with representative groups of women and men from the primary livelihood systems and wealth ranking categories in the community. Groups varied somewhat in size; the research teams tried to limit them to 8-10 individuals. Focus group facilitators used topical outlines translated into local languages to guide discussions focused on the nature of shocks and stresses experienced by the community and common responses to them. Particular emphasis was given to individual and household engagement with formal and informal institutions and factors influencing the community's capacity for collective action. To understand household's perceptions of resilience, the research teams conducted positive deviant interviews to identify the local resources and capacities used to manage shocks.

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

**Team Composition and Training.** The qualitative field teams were composed of four researchers (two men and two women) in each country with one international team leader. CESAO also provided one part-time survey coordinator who took part in some of the qualitative data collection work in Burkina Faso and was responsible for identifying and training interviewers, finalizing the tools, and setting up and overseeing field work in both countries (e.g., obtaining official permits, communicating with relevant national and local government structures, and handling survey expenditures).

One three-day training was conducted in each of the two capital towns. The main objective of the training was to ensure that all qualitative team members understood the study objectives, proper use of the survey tools, and team member roles and responsibilities in data collection.

The training introduced the teams to the concepts of resilience and resilience capacity (including absorptive, adaptive, and transformative capacity) at individual, household and

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<sup>9</sup> "High exposure" villages were defined in Niger as those with at least one of the main RISE projects and in Burkina Faso as those with two or more RISE projects. "Low exposure" villages were defined in Niger as having no RISE activities, and in Burkina Faso, as having one RISE project.



community levels, and introduced teams 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 two female and two male team members (with a male team leader); in Niger two females and two males made up the team (with a female team leader), and one female international team member that was part of both teams. In the Burkina Faso program area, FGDs and KIs were conducted in local languages (Mooré, Ffuldédé, and Gourmantché). A local translator was needed in only one village (Kulfuo). In Niger, language was not a problem for the team.

**Challenges to the data collection.** In Burkina Faso, two minor flooding events compelled the team to change its itinerary: one flash flood, which forced them to leave a village abruptly before completing a second positive deviant interview, and a second which caused a long travel delay. The team thus changed the itinerary to a closer village. In Niger, data collection had to be finished before the El Eid holiday, which began September 1<sup>st</sup> or 2<sup>nd</sup>, and due to security concerns stemming from public discord over the holiday commencement dates set by different authorities.

**Data analysis.** The qualitative information from the FGDs, KIs, 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 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.

### 3. TRENDS IN HOUSEHOLD SHOCK EXPOSURE AND COPING STRATEGIES

This chapter first describes the changes in shock exposure that have occurred between the baseline (April/May 2015) and midline (April/May 2017) surveys, including environmental shocks, conflict shocks, and economic shocks. The analysis relies on quantitative and qualitative data from the baseline and midline surveys as well as secondary information from the Africa Flood and Drought Monitor (AFDM). The chapter introduces key shock exposure measures that will be employed in the empirical analyses of Chapters 6 and 7. It then ends using both quantitative and qualitative data to examine households' coping strategies for dealing with shocks.

## 3.1 Shock Exposure

### 3.1.1 Shock Exposure Data from the RISE Quantitative and Qualitative Surveys

Table 1 reports the percent of households in the RISE program areas and predominant livelihood groups who experienced various shocks in the 12-months prior to the baseline and midline surveys. Also given are means of an overall shock exposure index and an index focusing specifically on drought, the most prevalent environmental shock. The overall index takes into account the number of shocks households experienced 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 (0 or 1) and its perceived severity as measured on the five-point scale. The drought shock exposure index simply reports on the perceived severity of drought, being equal to 0 if not experienced at all.

According to household reports, shock exposure has increased since the baseline, particularly environmental and economic shocks. The greatest increases are in excessive rains (experienced by 4.2 percent of households at baseline versus 14.4 percent at midline), drought (53.7 versus 67.5), sharp food price increases (almost 32.6 versus 69.4), and health expenses related to illness (20.2 versus nearly 29.8). These differences for individual shocks are apparent in both the overall and drought-specific shock exposure indexes, which rose 41 and 14 percent, respectively, since baseline.

**Table 1: Baseline-midline comparison of household shock exposure (self-reported), by program area and predominant livelihood group**

Indicator	All		Program area				Predominant livelihood						
	Baseline	Midline	Burkina Faso		Niger		Pastoralism		Agriculture		Other		
			Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	
<b>Environmental shocks (% of households)</b>													
Excessive rains	4.2 <sup>a</sup>	14.4 <sup>a</sup>	2.7 <sup>a</sup>	15.1 <sup>a</sup>	6.0 <sup>a</sup>	13.5 <sup>a</sup>	2.7 <sup>a</sup>	13.9 <sup>a</sup>	4.1 <sup>a</sup>	12.9 <sup>a</sup>	4.9 <sup>a</sup>	17.6 <sup>a</sup>	
Too little rain/drought	53.7 <sup>a</sup>	67.5 <sup>a</sup>	55.7 <sup>a</sup>	73.2 <sup>a</sup>	51.3	60.4	70.8	72.4	54.4	69.6	45.3 <sup>a</sup>	60.7 <sup>a</sup>	
Massive insect invasion	20.1	25.6	4.2 <sup>a</sup>	9.7 <sup>a</sup>	39.8	45.2	6.5 <sup>a</sup>	21.3 <sup>a</sup>	22.9	23.9	16.8 <sup>a</sup>	31.1 <sup>a</sup>	
Animal disease outbreak	25.6	30.0	25.4 <sup>a</sup>	39.0 <sup>a</sup>	25.8	18.9	36.3	35.7	27.4	31.3	16.3 <sup>a</sup>	24.8 <sup>a</sup>	
Bush fires	0.6	0.4	0.6	0.5	0.5	0.3	0.8	0.0	0.5	0.6	0.7	0.2	
<b>Conflict shocks (%)</b>													
Land conflicts	2.1	1.2	0.9	1.6	3.5 <sup>a</sup>	0.6 <sup>a</sup>	1.1	1.1	2.1	1.4	2.2 <sup>a</sup>	0.6 <sup>a</sup>	
Conflict between farmers & herders	2.7 <sup>a</sup>	1.1 <sup>a</sup>	2.9	1.7	2.3 <sup>a</sup>	0.2 <sup>a</sup>	4.9	2.5	2.8 <sup>a</sup>	1.0 <sup>a</sup>	1.3	0.5	
Conflict between entire villages	0.0	0.2	0.0	0.3	0.0	0.1	0.0	0.9	0.0	0.2	0.0	0.0	
Theft of assets/holdups	7.8 <sup>a</sup>	5.6 <sup>a</sup>	7.8	4.9	7.8	6.4	10.1	6.4	8.4 <sup>a</sup>	4.7 <sup>a</sup>	5.3	7.2	
<b>Economic shocks (%)</b>													
Sharp food price increases	32.6 <sup>a</sup>	69.4 <sup>a</sup>	24.1 <sup>a</sup>	53.3 <sup>a</sup>	43.1 <sup>a</sup>	89.4 <sup>a</sup>	42.1 <sup>a</sup>	76.3 <sup>a</sup>	34.0 <sup>a</sup>	65.9 <sup>a</sup>	24.8 <sup>a</sup>	74.5 <sup>a</sup>	
Unavailability of inputs	11.3	12.3	2.4 <sup>a</sup>	9.6 <sup>a</sup>	22.2	15.6	4.7	9.3	12.2	11.5	10.8	15.3	
Drop in demand for products	1.9	2.4	1.1	2.4	2.9	2.4	2.7	6.6	1.9	1.8	1.8	2.0	
Increase in price of inputs	8.1	10.9	5.1 <sup>a</sup>	11.7 <sup>a</sup>	11.7	9.9	7.7 <sup>a</sup>	18.8 <sup>a</sup>	9.1	8.5	5.2 <sup>a</sup>	13.0 <sup>a</sup>	
Drop in price of products	3.5	3.5	3.0 <sup>a</sup>	5.7 <sup>a</sup>	4.0 <sup>a</sup>	0.7 <sup>a</sup>	10.8	13.3	2.5	1.7	3.7	3.4	
Debt repayment	6.6	9.5	4.1	3.7	9.8	16.8	3.4	6.7	6.5	8.2	8.3 <sup>a</sup>	13.8 <sup>a</sup>	
Job loss by household member	0.5	0.5	0.3	0.6	0.8	0.4	0.0	0.7	0.5	0.5	0.6	0.5	
Long-term unemployment	1.2	1.2	0.7	1.7	1.8 <sup>a</sup>	0.6 <sup>a</sup>	0.3	2.0	1.2	0.5	1.5	2.5	
Abrupt end of assistance/regular support from outside the household	0.9	1.0	0.9	0.7	1.0	1.5	0.0	0.5	0.9	0.4	1.3	2.7	
Disease/exceptional health expense	20.2 <sup>a</sup>	29.8 <sup>a</sup>	17.5 <sup>a</sup>	34.7 <sup>a</sup>	23.5	23.8	19.8	27.3	21.4 <sup>a</sup>	30.9 <sup>a</sup>	16.6 <sup>a</sup>	28.5 <sup>a</sup>	
<b>Other shocks (%)</b>													
Death of household member	6.4	6.7	7.8	7.0	4.6	6.4	6.5	5.7	6.0	6.9	7.6	6.7	
Serious illness of member	10.6	12.4	10.7 <sup>a</sup>	16.3 <sup>a</sup>	10.4	7.6	7.7	5.5	9.4 <sup>a</sup>	13.0 <sup>a</sup>	15.1	13.8	
Emigration of household member	3.8	3.9	0.7	1.6	7.6	6.7	0.8	2.4	3.8	2.0	4.9	8.6	
Fire (house...)	1.4	0.9	0.7	0.9	2.4	1.0	0.6	1.8	1.0	1.2	2.9 <sup>a</sup>	0.1 <sup>a</sup>	
Forced repatriation	0.2	0.3	0.1	0.0	0.3	0.7	0.0	0.7	0.2	0.2	0.2	0.5	
Household dislocation	0.6	0.5	0.3	0.4	0.9	0.7	0.0	0.0	0.6	0.4	0.7	1.0	
Sudden increase in household size	0.6 <sup>a</sup>	3.4 <sup>a</sup>	0.4 <sup>a</sup>	3.9 <sup>a</sup>	0.8 <sup>a</sup>	2.8 <sup>a</sup>	0.3 <sup>a</sup>	2.8 <sup>a</sup>	0.6 <sup>a</sup>	3.3 <sup>a</sup>	0.5 <sup>a</sup>	3.7 <sup>a</sup>	
<b>Indexes (means)</b>													
Shock exposure index	7.9 <sup>a</sup>	11.1 <sup>a</sup>	6.3 <sup>a</sup>	10.3 <sup>a</sup>	9.8 <sup>a</sup>	12.1 <sup>a</sup>	8.52 <sup>a</sup>	12.0 <sup>a</sup>	8.07 <sup>a</sup>	10.6 <sup>a</sup>	6.95 <sup>a</sup>	11.9 <sup>a</sup>	
Drought shock exposure index	2.37 <sup>a</sup>	2.70 <sup>a</sup>	2.41 <sup>a</sup>	2.74 <sup>a</sup>	2.31	2.65	2.83	2.90	2.37 <sup>a</sup>	2.72 <sup>a</sup>	2.17 <sup>a</sup>	2.59 <sup>a</sup>	

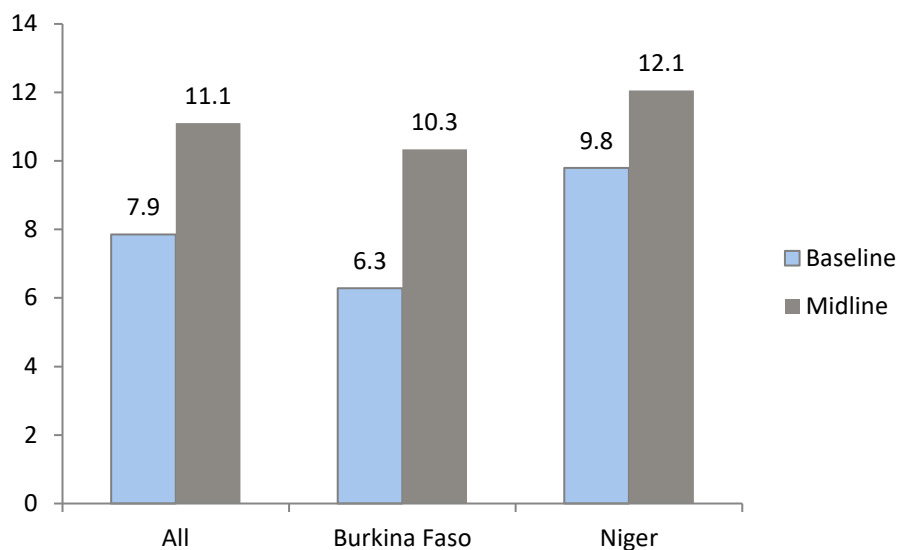
<sup>a</sup> Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

The baseline-midline differences in environmental shocks are particularly strong for the Burkina Faso program area, with substantial increases in the percent of households exposed to excessive rains, drought, insect invasions, and animal disease outbreaks. FEWS NET reports confirm that while the 2016 rainy season was above average overall, there were localized problems with poor distribution of rainfall, insect, and bird invasions, and below-average harvests (FEWS NET 2015a, 2016a, 2016b, 2016c, 2017a, 2017b). The Niger area registered an increase in the percent of households exposed to excess rains, but not to the other environmental shocks. FEWS NET reports for Niger also indicate above average rainfall for the 2016 season, pointing to “anomalies” specifically in the Maradi and Tillabery regions (FEWS NET 2015b, 2016a, 2016e, 2016f, 2017c, 2017d).

Beyond environmental shocks, both program areas experienced very large increases in exposure to food price increases, as confirmed by FEWS NET price bulletins (FEWS NET 2017e, 2017f).<sup>10</sup> However, the Burkina Faso area alone experienced significant increases in “serious illness” of members (from 11.7 to 16.3 percent of households) and an associated rise in health expenses.

Given these differences, while the overall shock exposure index remains higher for the Niger than Burkina Faso area, it increased more for the Burkina Faso area since the baseline (see Figure 4).

**Figure 4: Household shock exposure index, baseline versus midline for the program areas**



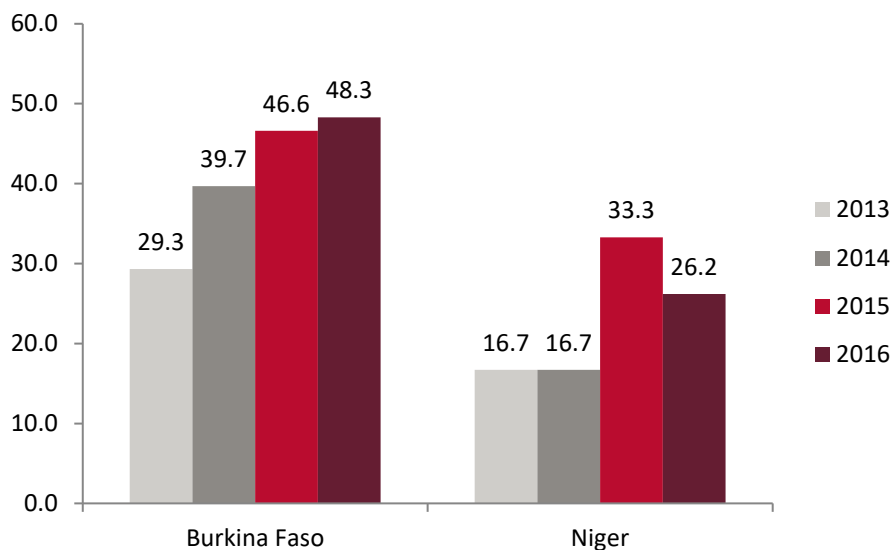
Source: RISE household survey data.

Data from the shock history module of the community survey agree with the pattern of program-area differences in drought exposure reported by households. They show an

<sup>10</sup> Note, however, that the opposite is indicated in FEWSNET *Outlook* reports.

increasing pattern in the percent of villages in the Burkina Faso area experiencing drought since 2013 (see Figure 5). In the Niger area, while drought is less widespread overall, it has also increased over the period according to this data source.

**Figure 5: Percent of villages experiencing drought in 2013, 2014, 2015, and 2016, by program area**



Source: RISE community survey data

In addition to listing the occurrences of drought over the last five years, community survey participants were asked whether or not their village has been experiencing changes in climate over the last 5-10 years and, if so, what kinds. Ninety of the 100 sample villages reported experiencing changes in climate (86 percent in the Burkina Faso area and 95 in the Niger area). Of those, Table 2 gives the percent of villages reporting drought-related changes “that have had the most impact on villagers’ welfare.” Rainfall irregularity is the most commonly-cited change in both areas. However other changes--increased drought, poorer rainfall distribution, and desertification--are all notably higher for the Burkina Faso area.

**Table 2: Percent of villages reporting various drought-related changes in climate over the last 5-10 years**

	Burkina Faso	Niger
Rainfall irregularity	32	33
Drought	27	21
Poor distribution of rains across time and space	15	9
Desertification	16	3

Qualitative data collected in FGDs and KIs in Burkina Faso and Niger largely support the quantitative data. In Burkina Faso, FGD participants in all villages reported droughts, flooding

events, animal disease, and crop pests. Two villages in the Est region also reported problems with insecurity/robbery, where armed groups attacked households and livestock guardians to steal their money, food, and other assets. In this case, the bandits were not perceived as a new or recent event but rather an issue they had been dealing with for years. Although five of the six villages reported flooding as a problem, only certain groups of households are typically affected, i.e., those closest to rivers or dams. Likewise, drought was perceived as having a more adverse effect on those who own land in the lowlands (bas-fond) than those who have land at higher elevations. As one female FGD participant noted, *“Those who cultivated the lowlands were the most affected because they lost everything.”* Although the quantitative data for Burkina Faso indicate that over half of respondents experienced sharp food price increases, FGDs in only two villages listed this type of shock.

In Niger, floods were the most commonly reported shock. Four of the six villages visited reported that flooding has increased in frequency and cumulative impact. Moreover, the rainy season has become more variable and shorter, leaving rain-fed crops vulnerable to a longer dry season. These changes are relatively new, as reflected in comments from the Maradi region (Box 2). Consistent with the household data, half of the villages visited in Niger reported exposure to drought.

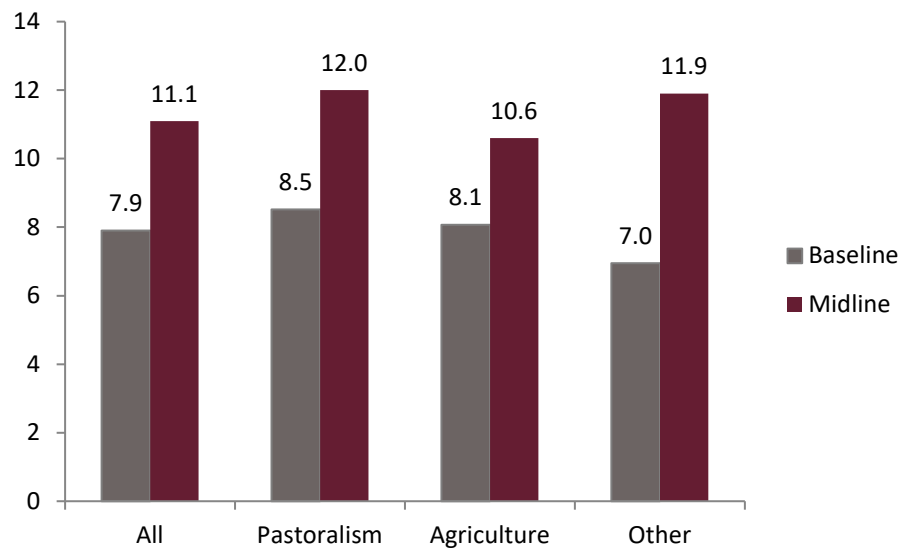
Returning to the quantitative results in Table I, among the three predominant livelihood groups—pastoralism, agriculture, and “other” (whose primary livelihood is neither pastoralism nor agriculture)—the “other” group started out with the lowest shock exposure and experienced the greatest increase since the baseline (Figure 6). Its overall shock exposure index rose from an index value of 7.0 to 11.9, an increase of over 70 percent. This group experienced the greatest increase in both environmental and economic shock exposure.

**Box 2: Quote from men's FGD in the Maradi region of Niger**

“...we have never experienced these kinds of shocks. Maybe the elders can tell if they recall anything like that.”

“Often, when we are in the middle of planting time ...the rain becomes scarce and seedlings become yellow and then die. Or often when seedlings are well formed and tall, pests come down and wreak havoc.”

**Figure 6: Household shock exposure index, baseline versus midline for the predominant livelihood groups**



Qualitative data from Burkina Faso highlight the variable severity of impacts of different types of shocks based on livelihood types. For example, a key informant in one village stated that pastoralists were the most affected by livestock disease from December 2016 to February 2017. In contrast, FGDs and one KII indicate that crop pests (e.g., armyworm) which affected the village in August 2017, and floods strongly impact farmers, not pastoralists. In Niger, counter-season agriculture has been negatively impacted by flooding in the Tillabery region and drought in the Maradi region, which has also reduced or stopped beneficial flooding. FGD participants attributed these changes to climate change, though attribution is confounded by recent road and dam construction in the two sites.

Despite the increase in environmental shock exposure in the RISE area and reported increase in violent extremist activities and rhetoric (TMG/SAREL 2018), there were no increases in reports of conflict shocks. In fact, all statistically significant differences between the baseline and midline conflict shock indicators are negative.

### 3.1.2 Climate Shock Exposure Data from the Africa Flood and Drought Monitor

The Africa Flood and Drought Monitor (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 are used, accessed using 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 50<sup>th</sup> percentile represents the norm). The SPI is used to detect meteorological drought, defined by rainfall deficiency. Meteorological drought can progress to agricultural drought, which can be detected using the NDVI. Agricultural drought is characterized by soil water deficiency and subsequent plant water stress and reduced crop production (UN-SPIDER, 2017).

Figure 7 and Figure 8 track the 1-month SPI and NDVI percentile, respectively, in the two-year period between the baseline and midline surveys 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. Note that both program areas have a single rainy season per year. We do not know the specific timing of the rainfall seasons for the RISE program areas. However, for reference we note that the rainy season in Burkina Faso is reported to run from May through October; Niger’s shorter season runs from June through September (FEWS NET, 2013).

According to the SPI data (Figure 7), rainfall levels fluctuated greatly around the norm at different points throughout the period, but dipped into far below average territory in the period following the baseline. This drought occurred during the 2015 rainy season,<sup>11</sup> affecting both program areas. For the Burkina Faso area, its severity was comparable to that experienced during the 2008 Sahel-wide drought (dipping just below an SPI of -1.0). For the Niger area it was far more severe, dropping into “extreme drought”<sup>12</sup> territory and being the most severe drought of this century (see long-term climate data from the AFDM in Appendix 3). Both areas experienced a sharp and comparable drop in vegetation coverage as a result of the drought (Figure 8). The year 2015 was also marked by extremes in rainfall in the opposite direction, with the SPI rising to over +2 for Burkina Faso, signifying an “extremely wet episode” associated with flooding (Guerreiro et al. 2008).

The highly erratic weather pattern in 2015 (despite normal cumulative rainfall) was most likely still affecting households at the time of the midline survey, with some households continuing to recover from its impacts. It may be the underlying reason for the food price increases reported

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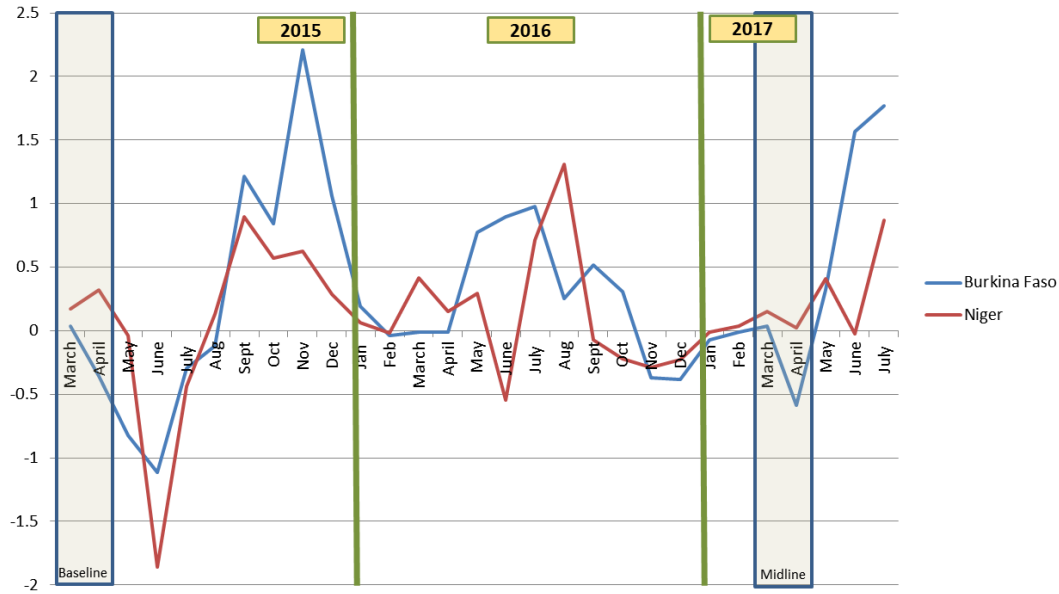
<sup>11</sup> Since rain only normally falls during the rainy season, we can assume that the notable dips seen in Figure 7 occurred during the rainy seasons of each project area.

<sup>12</sup> 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).



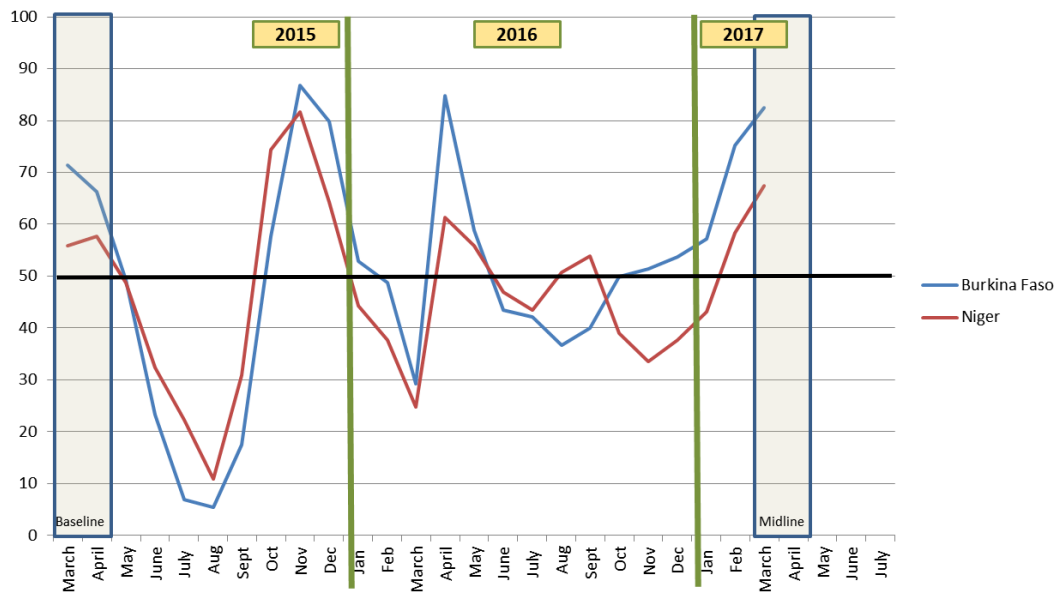
in the household survey and FEWSNET price bulletins as well as the overall decline in food security for the RISE population between the baseline and midline (see Chapter 4).

Figure 7: Rainfall deviation from the norm in RISE program areas, March 2015-July 2017



Source: Africa Flood and Drought Monitor

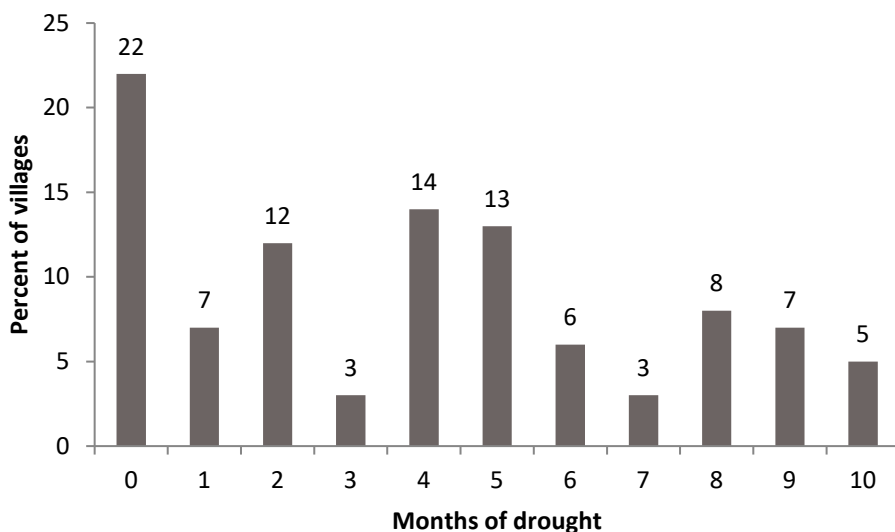
Figure 8: Vegetation deviation from the norm in RISE program areas, March 2015-July 2017



Source: Africa Flood and Drought Monitor

Turning to the 12 months immediately preceding the midline survey, consistent with FEWS NET reports (FEWS NET 2015a 2015b, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2017a, 2017b), there appears to have been no major covariate climate shock. However, consistent with *household* reports, the fluctuating rainfall and vegetation patterns indicate that many households likely experienced drought at some point, while others experienced flooding, and some both. With respect to drought in particular, recall from Table I that nearly 70 percent of households reported experiencing drought in their local area in the year prior to the midline survey. Figure 9 bears this out, giving the number of months of agricultural drought experienced by the 100 survey villages in the year prior to the midline survey. A full 78 percent of villages experienced at least one month of drought, and the majority four or more months.

**Figure 9: Number of months of agricultural drought experienced by survey villages in the year prior to the midline survey (percent of villages)**



Source: Africa Flood and Drought Monitor

### 3.1.3 Summary Measures of Drought Exposure from Household and Satellite Data

The upper panel of Table 3 presents summary measures of drought exposure from the AFDM satellite data for the RISE area as a whole and the program areas, including cumulative rainfall and vegetation deficits<sup>13</sup> and the number of months of meteorological and agricultural drought.<sup>14</sup> The measures are shown for the year prior to the baseline and midline surveys in order to discern any trend in climate shock exposure over the period. Means of the drought shock exposure index from the household quantitative survey are also given for comparison.

**Table 3: Baseline-midline comparison of indicators of drought exposure, by program area**

Indicator (means)	All		Program area			
	Baseline	Midline	Burkina Faso		Niger	
			Baseline	Midline	Baseline	Midline
<b>From African Flood and Drought Monitor data</b>						
Cumulative rainfall deficit	2.1	2.3	2.1 <sup>a</sup>	1.6 <sup>a</sup>	2.1 <sup>a</sup>	3.1 <sup>a</sup>
Cumulative vegetation deficit	114.9	104.5	122.2 <sup>a</sup>	74.0 <sup>a</sup>	105.7 <sup>a</sup>	142.1 <sup>a</sup>
Months of meteorological drought	0.71	0.72	0.75 <sup>a</sup>	0.37 <sup>a</sup>	0.67 <sup>a</sup>	1.16 <sup>a</sup>
Months of agricultural drought	4.1	3.6	4.0 <sup>a</sup>	2.8 <sup>a</sup>	4.2	4.8
<b>Index from household data (self-reported)</b>						
Drought shock exposure index	2.37 <sup>a</sup>	2.70 <sup>a</sup>	2.41 <sup>a</sup>	2.74 <sup>a</sup>	2.31	2.65

<sup>a</sup> Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

According to the AFDM data, the Burkina Faso area experienced a reduction in drought exposure over the two-year period, while the Niger area registered an increase. The cumulative rainfall deficit, for example, dropped by 24 percent for the Burkina Faso area but rose by 48 percent for the Niger area. According to the household data, by contrast, the Burkina Faso area experienced a small increase in drought exposure while the Niger area experience no significant change.

The pattern of trends discerned from the satellite data is based on the duration and depth of exposure to below-normal rainfall and subsequent vegetation deficits. Apparently the Burkina Faso villages experienced a decline in cumulative rainfall and vegetation deficit levels since the baseline while the Niger area experienced an increase. The trends discerned from the *household*

<sup>13</sup> 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.

<sup>14</sup> 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.

data, by contrast, are based on percentages of households experiencing drought and, for those, the severity of impact on households' food and income. Further examination of the data reveals that the upward direction of the trend is driven solely by increased percentages of households experiencing drought<sup>15</sup> (e.g., the increase for Burkina Faso was from 55.7 to 73.2 percent). Thus, we can conclude that in the Niger area while the spread of drought (percent experiencing it) remained constant, the severity of drought has increased since the baseline. For the Burkina Faso area the spread of drought has increased, but on average the severity has declined.

Because the drought exposure measures derived from the household and satellite data measure different phenomenon and give differing assessments of trends, both will be used in Chapters 6 and 7 to look at the effects of households' resilience capacities and the RISE program on their ability to cope with drought and other shocks.

## 3.2 Correlations Across Shocks

In complex risk environments such as in the Sahel, where climate shocks interact with economic and conflict shocks, it is important to understand how the various shocks being experienced by households co-occur. Table 4 is the correlation matrix of the incidence of the 26 shocks reported on in the household survey, as derived from the midline data. Only those that are statistically significant and greater than 0.05 are reported; those highlighted in purple are greater than 0.10.

Drought, the most commonly-reported environmental shock, is most strongly correlated with animal disease and the economic shocks, especially those related to the availability and prices of inputs. Stronger correlations are seen between the economic shocks and both insect invasions and animal disease. Of note is that the shock that has the highest correlation with sharp food price increases is insect invasions, which can devastate food crops. FGDs and one KII in Burkina Faso reported another observed relationship: the armyworm crop pest usually appears soon after drought begins and causes significant damage.

As would be expected, there are fairly strong inter-correlations among the economic shocks. The highest correlation, at 0.35, is between increases in the prices of inputs and input shortages. Finally, a notable positive correlation is found between animal disease and illness among household members.

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<sup>15</sup> For those households experiencing drought, the severity measure itself has declined slightly for Burkina Faso and remained steady for Niger.

**Table 4: Correlations between shock incidences for the RISE program area**

		Climate shocks				Conflict shocks				Economic shocks					Illness and loss		
		Excessive Rain	Drought	Insect invasion	Animal disease	Land	Farmers/herders	Cross-village	Theft	Food price increases	Input shortages	Input price increases	Debt	Health expense	Illness	Death	Emigratn
Climate	Excessive rain	1															
	Drought	-0.061	1														
	Insect invasion	0.073		1													
	Animal disease		0.057		1												
Conflict	Land conflicts					1											
	Conflicts: farmers/herders				0.053	0.055	1										
	Conflicts: between entire villages							1									
	Theft of assets/hold ups				0.082		0.055		1								
Economic	Sharp food price increases			0.286	0.053				0.083	1							
	Unavailability of inputs		0.090		0.132				0.167	0.125	1						
	Increases in prices of inputs		0.092		0.080		0.055		0.081	0.150	0.349	1					
	Debt repayment		0.069	0.195	0.135					0.160	0.091	0.114	1				
	Disease/exceptional health expense	0.059	0.071		0.189	0.073			0.152	0.088	0.106	0.089	0.059	1			
Illness/loss	Serious illness of member	0.057			0.130						0.08	0.129	0.098	0.216	1		
	Death of member												0.133	0.061	1		
	Emigration of a member			0.093	-0.052				0.055	0.056	0.054	0.077	0.079				1

Notes: Only correlations that are statistically significant and greater than 0.05 are reported. Purple-highlighted correlations are greater than 0.1.

## 3.3 Coping Strategies

### 3.3.1 Quantitative Data on Coping Strategies

Table 5 provides a baseline-midline comparison of the coping strategies households reported using in response to the shocks they faced in the previous year. The most commonly-employed coping strategy at midline, by far, was to sell livestock (reported by 75 percent of households). Other prevalent strategies were: borrowing money or receiving gifts of food or money from friends and relatives, migration, and drawing on savings.

Strong differences across the program areas in trends between the baseline and midline can be observed, trends that give insight into the relative degree of stress felt by households. Strategies that are most immediately associated with stress from shock exposure are those signaling that households have difficulty accessing food. From the bottom of Table 5 we can see that there have been substantial reductions in three of these strategies among Burkina Faso area households: consuming seed stock, reducing the number of meals eaten in a day, and limiting portion sizes at meal times. By contrast the percentage of Niger-area households employing these strategies has remained steady, and by midline the percentage was far higher than in Burkina Faso. These differential coping strategy trends related to food security are consistent with a greater increase in the severity of shock exposure in the Niger area.

Beyond food-related strategies, the only other noticeable change in coping for the Burkina Faso area over the two-year period is an increase in selling livestock, from 68 to 81 percent of households, signaling that some households may have experienced increased stress. For the Niger area, the incidences of a number of coping strategies declined significantly over the period: migration, selling household items or productive assets, and borrowing from money lenders. These types of shifts could indicate “coping strategies exhaustion,” such that options previously available begin to dry up as shock exposure increases or, on the other hand, that people did not need to use them because they had other options. Endline data will help clarify this matter.

There was a shift from reliance on food aid (which may have been higher at baseline because of the oncoming area-wide, covariate drought conditions) to reliance on friends and relatives for food and money. The latter suggests a deepening level of stress in this program area.

While all of the livelihood groups registered an increase in selling of livestock, the agriculture-dominant group exhibited the same pattern seen in the Niger area as a whole, that is, a decline in the use of multiple coping strategies, suggesting that households relying on agriculture as their primary livelihood might be experiencing coping strategies exhaustion more so than other livelihood groups.

**Table 5: Baseline-midline comparison of percent of households employing various shock coping strategies, by program area and predominant livelihood group**

Indicator	All		Program area				Predominant livelihood							
	Baseline	Midline	Burkina Faso		Niger		Pastoralism		Agriculture		Other			
			Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline		
<b>Management of livestock</b>														
Send livestock in search of pasture	6.8	4.9	9.9	7.6	3.8 <sup>a</sup>	1.6 <sup>a</sup>	24.5	16.9	4.9	3.8	5.8 <sup>a</sup>	2.5 <sup>a</sup>		
Sell livestock	64.6 <sup>a</sup>	74.6 <sup>a</sup>	68.0 <sup>a</sup>	81.2 <sup>a</sup>	61.2	66.9	77.6 <sup>a</sup>	93.9 <sup>a</sup>	68.2 <sup>a</sup>	78.7 <sup>a</sup>	48.0 <sup>a</sup>	57.5 <sup>a</sup>		
Slaughter livestock	4.5	2.6	2.8	3.3	6.1 <sup>a</sup>	1.8 <sup>a</sup>	3.9	4.3	4.7	3.1	4.0 <sup>a</sup>	0.9 <sup>a</sup>		
<b>Strategies to get more food or money</b>														
<b>Labor strategies</b>														
Take up new wage labor	2.8	3.4	1.9	4.2	3.7	2.5	0.7	4.6	3.4	2.2	1.9	5.6		
Send children to work for money	2.4	2.4	1.2	0.5	3.6	4.7	1.7	1.1	2.1	2.7	3.7	2.4		
<b>Migration</b>														
Migration of some family members	25.0 <sup>a</sup>	19.1 <sup>a</sup>	6.0	6.1	43.7 <sup>a</sup>	34.4 <sup>a</sup>	6.6	9.5	26.2 <sup>a</sup>	18.1 <sup>a</sup>	28.6	25.1		
Migration of the whole family	1.2 <sup>a</sup>	0.2 <sup>a</sup>	0.5	0.2	1.9 <sup>a</sup>	0.2 <sup>a</sup>	2.3	0.1	1.2 <sup>a</sup>	0.2 <sup>a</sup>	0.8	0.1		
Send someone to stay with relatives	1.7	3.7	1.0	1.3	2.2	6.6	1.4	2.4	1.6	3.9	2.0	3.9		
<b>Sell or lease out assets</b>														
Sell household items (e.g., radio, bed)	8.8	7.5	1.1	0.6	16.5	15.6	3.2	3.1	9.6	7.0	8.7	10.2		
Sell productive assets (e.g., plough)	2.5 <sup>a</sup>	1.0 <sup>a</sup>	0.6	0.4	4.4 <sup>a</sup>	1.8 <sup>a</sup>	1.6	0.5	2.7 <sup>a</sup>	0.7 <sup>a</sup>	2.2	2.1		
Lease out land	7.5 <sup>a</sup>	4.5 <sup>a</sup>	0.2	0.3	14.8 <sup>a</sup>	9.3 <sup>a</sup>	3.4	2.7	7.8 <sup>a</sup>	3.2 <sup>a</sup>	8.1	8.0		
<b>Borrow money or rely on savings</b>														
Borrow money from an NGO	2.7	1.3	1.9 <sup>a</sup>	0.5 <sup>a</sup>	3.4	2.2	4.4	1.8	2.4 <sup>a</sup>	1.0 <sup>a</sup>	3.0	1.8		
Borrow money from a bank	1.6 <sup>a</sup>	0.8 <sup>a</sup>	2.4	1.3	0.8 <sup>a</sup>	0.1 <sup>a</sup>	1.0	1.2	1.1	0.2	3.5 <sup>a</sup>	1.8 <sup>a</sup>		
Borrow from a money lender	11.4 <sup>a</sup>	7.5 <sup>a</sup>	6.8	10.1	15.9 <sup>a</sup>	4.3 <sup>a</sup>	7.9	10.8	12.5 <sup>a</sup>	7.4 <sup>a</sup>	9.1	6.4		
Draw down on savings	19.0	21.4	30.7	27.6	7.5	14.0	14.0	13.2	17.8	21.6	24.9	24.1		
<b>Rely on formal sources of assistance</b>														
Receive food aid from government	6.2 <sup>a</sup>	2.1 <sup>a</sup>	3.4	2.6	9.0 <sup>a</sup>	1.5 <sup>a</sup>	2.4	3.2	6.7 <sup>a</sup>	2.1 <sup>a</sup>	6.4	1.7		
Receive food aid from an NGO	8.3 <sup>a</sup>	3.0 <sup>a</sup>	5.4 <sup>a</sup>	2.0 <sup>a</sup>	11.2 <sup>a</sup>	4.1 <sup>a</sup>	4.4	1.7	8.4 <sup>a</sup>	2.8 <sup>a</sup>	9.6	3.9		
Participate in food/cash-for-work	3.9	3.1	2.8	1.6	5.0	4.9	3.0	2.4	3.6	3.4	5.1	2.8		
<b>Rely on assistance from friends/relatives</b>														
Receive money/food from family	23.1	25.1	29.1	23.6	17.2 <sup>a</sup>	26.8 <sup>a</sup>	28.9	20.2	20.2	24.9	29.8	27.3		
Receive remittances from relative	9.6	8.8	7.4	5.9	11.7	12.3	6.4	5.7	9.4	7.4	11.4	13.4		
Borrow money from friends/relatives	35.5 <sup>a</sup>	41.0 <sup>a</sup>	25.8	24.6	45.1 <sup>a</sup>	60.4 <sup>a</sup>	25.3	31.2	36.7 <sup>a</sup>	42.5 <sup>a</sup>	35.9	41.6		

(Continued)

**Table 5 (continued)**

Indicator	All		Program area				Predominant livelihood							
	Baseline	Midline	Burkina Faso		Niger		Pastoralism		Agriculture		Other			
			Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline		
<b>Strategies to reduce current expenditure</b>														
Reduce food consumption/change source														
Eat lean season food (Anza, etc.)	3.7	2.5	3.2	1.3	4.3	4.0	3.6	0.6	3.6	2.2	4.1	4.0		
Excavation of termite mounds	0.2	0.1	0.3	0.0	0.1	0.2	0.0	0.2	0.2	0.1	0.2	0.1		
Hunting, gathering	4.7	4.6	2.0	1.5	7.3	8.4	2.9	2.7	4.4	4.1	6.3	6.5		
Consume seed stock	19.0 <sup>a</sup>	12.9 <sup>a</sup>	15.2 <sup>a</sup>	4.4 <sup>a</sup>	22.8	22.9	18.9 <sup>a</sup>	8.1 <sup>a</sup>	17.5	13.3	23.7 <sup>a</sup>	13.9 <sup>a</sup>		
Reduce number of meals in a day	31.1	25.1	31.6 <sup>a</sup>	17.5 <sup>a</sup>	30.7	34.1	44.1 <sup>a</sup>	30.4 <sup>a</sup>	28.9	21.9	33.0	30.3		
Limit portion sizes at mealtimes	33.7	27.6	30.6 <sup>a</sup>	24.2 <sup>a</sup>	36.7	31.6	46.2	34.9	32.7	24.1	31.7	32.4		
Take children out of school	1.3	1.0	1.4	1.2	1.2	0.7	1.5	0.0	1.1	1.4	2.1 <sup>a</sup>	0.4 <sup>a</sup>		
Move to less expensive housing	0.3	0.1	0.3 <sup>a</sup>	0.0 <sup>a</sup>	0.4	0.2	0.4	0.0	0.1	0.1	0.8	0.2		

<sup>a</sup> Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.



### 3.3.2 Qualitative Data on Coping Strategies

According to FGDs, reliance on social capital, or mutual support, was the most common coping strategy in both countries. In Niger, FGD participants also listed migration, counter-season crop production, and selling of assets as common strategies; begging was only reported in one village in Niger. While not noted by qualitative survey respondents, artisanal mining is increasingly becoming a strategy for coping with shocks in the RISE program area.<sup>16</sup>

**Reliance on social capital:** One of the primary ways to cope with shocks and stresses reported by FGDs overall is to rely on social capital or mutual support. Generally, informal community-based support exists in both regions and ranges from cash or in-kind gifts to relatives or a household that has been recognized in need (e.g., lost the main income-earner), monetary loans to households that are temporarily short of cash (including relatives), to more collective initiatives where a group of people (e.g., women) decide to collectively self-finance their economic activities (e.g., tontine) or cultivate a communal plot. One male FGD participant in Burkina Faso said, “*Mutual support to an affected parent or neighbor is usually the first aid [that people receive] in the case of drought before other supports arrive.*” FGs described most mutual support as including cash or food gifts, loaning livestock (in some regions), and sharing labor, usually in agricultural fields of families who have been affected by an adverse event such as a temporary inability to work or the death of the household head.

#### Box 3: Quote from men’s FGD, the Sahel Region

“These [RISE] activities mobilize members of the different households, neighbors, and put them together.....for us this strengthens social cohesion.”

In Niger, FGs indicated that “community solidarity” was necessary due to a complete lack of support from the government and limited emergency support from non-state actors. Five of the six villages visited reported that they gave or received food from friends and family to cope with the shocks and stresses they experienced.

FGD participants in Burkina Faso and Niger also reported that people relied on the mutual support found in savings groups to cope with shocks. In Burkina Faso, savings group (*tontine*) members use money received from the *tontine* to buy food, make small trade, or cope in the event of difficulties. *Tontines* were established to offset the lack of cash that households and individuals have, not necessarily to deal with shocks: “...there is no arrangement between members when one is affected by the drought and their turn [to receive money] has not arrived yet” (FGD participant, Yakouta, Niger). However, FGD participants noted that the order in which members are eligible to receive cash from the group is sometimes altered to respond to a shock: “In case of sickness, for example, each woman contributes according to her means to give to the person affected by the disease” (FGD participant, Yakouta, Niger). In

<sup>16</sup> Comment on this report received from Saadatou Oumarou, USAID/Ouagadougou, October 2018.

Niger, nearly all villages visited reported sharing or giving support (i.e., reciprocal support) to friends and family, while two villages reported borrowing or loaning food/assets, or borrowing cash from a women's savings group.

**Box 4: Quote from Women's FGD on gender, Zinder Region**

"We receive some support for buying some animals, but because of shocks it does not last."

Another system of sharing resources is the livestock "loan" system in which poor households who have lost or do not own livestock can keep one of the offspring from the herd(s) they have been taking care of (known as *habanayé*). However, respondents indicated that continuous exposure to shocks constrains the success of *habanayé*. In the Sahel region of Burkina Faso, respondents indicated that livestock is too "valued" to be given away; people prefer to gift cash or food to people in need. To

maximize the income generated from selling the livestock received through *habanayé*, people must raise and fatten the livestock. However, in difficult times, people sell the animals soon after receiving them (Box 4). Beneficiaries know that the program does not allow them to sell the animals received under the *habanayé* intervention.

Thus, only a few examples of this coping strategy were hinted at during data collection.

Qualitative data indicate that although sharing has continued during the drought and floods in both countries, household ability to share has recently (in the last year) waned. FGD participants in Burkina Faso were ambivalent, stating both that "they are our brothers, we will help them as long as we can" (Male

FGD, Sidogo) and also "Before, it was easy to make donations, but now the gifts have diminished a lot except for relatives ... " (Male FGD, Kulfuo). Thus, people demonstrate a strong desire to help others during and after shocks but recognize the reality that sharing is not always possible (see also Box 5). Qualitative data suggest that in Niger, women perceive that increasing poverty and scarcity are eroding reciprocal help and solidarity over time. Male FGD participants also reported that village solidarity is being eroded but did not attribute the change to increasing frequency or severity of shocks. Rather, they perceived the shift away from reciprocity as resulting more from increased use of money in transactions (i.e., more reliance on cash and less on in-kind trading).

**Migration:** Migration is an important coping strategy reported by all six villages visited in Niger. Primarily men migrate to urban areas or other countries to work and send money home. Several villages suggested that migration is increasing, with new routes and destinations (e.g., Cote d'Ivoire, Ghana, and, more recently, Libya). In a high-exposure village in the Maradi region, migration has apparently increased due to a new dam in Nigeria, close to the border. Prior to the dam, most of the village reportedly practiced counter-season cultivation in the

**Box 5: KI quote from Centre-Nord region, Burkina Faso**

"Repetition of shocks will not kill this (sharing) mechanism, but it will diminish it because we cannot always help people, even if we have the will."

valley, which was possible because of seasonal flooding. Without the seasonal floods (due to the dam), it is no longer possible to grow counter-season crops. Thus, an important livelihood and source of income was eliminated, which has contributed to increased rates of migration from the village.

**Box 6: Quote from men’s FGD in Zinder region, Niger**

“We leave the elders in the village and seek ways to help them so they can keep up with their agricultural work in the village. This is what we have been doing all these years. If, for example, we migrate together in a group, we collect money among us for sending one of us back to bring some money to the families. This is how we manage to send something almost every week.”

Group migration is a tactic adopted to reduce individual risk. Besides offering the protection and safety of traveling in a group, migrating with other villagers reduces the effort and cost associated with remitting money to families in the home village: migrants take turns travelling back every week to bring money to families of the group member. Moreover, transportation costs can be shared among group members and can substantially help reduce costs (Box 6).

Remittances – from family members migrating seasonally to a foreign state as well as from those moving to urban settings – are of such fundamental importance for virtually all households that migration in its different forms and frequency is considered a permanent strategy for household resilience.

**Box 7: Quote from men’s FGD on resilience, Maradi Region**

“What has changed is the value of Naira, which makes things very difficult. Those who migrate and go to Nigeria for seeking some job do not even manage anymore to care for themselves.”

However, FGD participants in three regions reported many accounts of decreasingly profitable migration due to several factors. First, many migrant workers, contrary to expectations, found only low-paid intermittent work; they then depleted the resources they had brought with them, and could not pay for their living expenses and purchase their return trip. Second, unfavorable exchange rates have further reduced the profitability of migration. Seasonal migration (i.e., after harvest of rain-fed crops) to

Nigeria by young and adult males living close to the southern Niger border used to be a common strategy of ensuring some availability of household resources. Due to fluctuations in the Nigeria Naira exchange rate, with a net loss in parity with the CFA franc, this widespread strategy is becoming less and less fruitful.

Third, one male FGD participant in the Maradi region stated that people are having to sell land to buy food and then migrating to find paid work but are not profiting because of the factors described above. Upon return, these migrants have to rent fields for cultivating in the following season.

**Counter-season crops:** FGDs in four out of six villages in Niger noted that growing counter-season crops helped them cope with shocks. This is particularly important where access to water for irrigation is available. In a low-exposure village visited in Tillabery region, floods have resulted in the need to move to higher ground those areas that are dedicated to *marâchage* (i.e., counter-season crop cultivation). In Burkina Faso, counter-season crops were not mentioned by FGDs, but one KII attributed the success of positive deviants to their participation in rain-fed agriculture and counter-season gardening.

**Sale of key assets:** Sale of key assets such as livestock and land was reported by FGDs in four out of six villages in Niger. In cases of scarce harvest, FGD participants in Niger frequently mentioned selling some livestock (e.g., a few goats or sheep) to buy food. With RISE and other projects' credit and savings schemes, livestock fattening, and small ruminant activities, more women are becoming livestock owners in almost all villages. In the Maradi region, men have begun "borrowing" (and repaying) small ruminants from their wives and selling them in order to meet pressing household needs (e.g., food, health care). Unfavorable foreign exchange rates, though, have recently resulted in lower livestock prices close to the Nigerian border in the Zinder Region, where the Nigeria Naira is used more than the CFA franc.

The number of households affected by frequent shocks is increasing in Niger, and more heads of household are resorting to selling their lands. This appears to be a decreasingly sustainable strategy as the cost of land continues to increase. Priced out of the market, individuals who sell their land may subsequently find themselves renting – often their own – land at some point in the future.

The combined effects of RISE and other projects' focus on women has contributed to an increase in the ability of some women, including those who head their households,<sup>17</sup> to purchase not only livestock but also land.

**Box 8: Quote from a women's FGD on resilience, Maradi Region**

"During the last five years, livelihood options have decreased due to shock; natural resources did too, as trees were partially cut and sold to provide for households' needs."

The frequent and cumulative shocks that are weakening livelihoods are pushing some households in Niger to cut and sell trees as their last resort, after they have sold livestock and land assets, as reported in a low-exposure village in Maradi Region (see Box 8).

### 3.4 Summary

Shock exposure increased between the baseline and midline surveys in the RISE program area, including exposure to drought, flooding, insect invasions, animal disease outbreaks, food price inflation, and illness. With respect specifically to climate shocks, immediately following the baseline survey, during the 2015 rainy season, both the Burkina Faso and Niger program areas

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<sup>17</sup> Village chief, Tillabery Region

experienced a major drought. For Burkina Faso, the drought's severity was comparable to that experienced during the 2008 Sahel-wide drought. For Niger it was far more severe, dropping into "extreme drought" territory and marking the greatest period of rainfall deficit of this century. The drought and following flooding were likely still affecting households at the time of the midline survey and may be the source of the food price inflation and declining food security seen since the baseline. While there was no major covariate climate shock in the 2016 rainy season, the large majority of RISE villages experienced drought and/or flooding at some point, in varying severity.

The most commonly reported strategies for coping with shocks at both baseline and midline were selling livestock, migration, drawing on savings, and borrowing money or receiving gifts of food or money from friends and relatives. The qualitative data concur that mutual sharing (bonding social capital) was vitally important for coping with shocks. Other coping strategies reported in the qualitative data are migration, cultivation of counter-season crops, and sales of assets. The use of food security –related coping strategies (e.g., consuming seed stock, reducing the number of meals eaten in a day, and limiting portion sizes at meals) increased in the Niger area since the baseline, an indication of rising difficulty accessing food. Trends data also suggest increased reliance on friends and relatives in addition to possible coping strategies exhaustion in the area. The qualitative data from both program areas concur that although sharing has continued during the drought and flooding, households' ability to share resources has been waning.

## 4. TRENDS IN HOUSEHOLD FOOD SECURITY AND RESILIENCE TO SHOCKS

As seen in Chapter 3, a major drought occurred in the RISE program area immediately following the baseline survey. While no similar covariate climate shock struck the area in the year preceding the midline survey, the majority of households experienced some degree of climate shock (whether rainfall deficits or flooding) and economic shock, especially food price increases. These more localized shocks, together with the long-term effects of chronic vulnerability and extreme poverty, mean that the large majority of households experienced shock exposure that was detrimental to their livelihoods. For this reason, it is not surprising that this chapter documents an ongoing and high degree of food insecurity among RISE area households. After documenting baseline-midline trends in food security, the chapter looks at how resilient households were to the shocks they faced and whether their resilience has increased since the baseline, when RISE activities commenced.

The main indicator of food security relied on is the inverse of an experiential indicator of food insecurity, the Household Food Insecurity Access Scale (HFIAS) (Coates et al., 2007). This indicator is used to measure food security itself as well as *changes* in food security, a measure of

resilience (see below). The HFIAS is an index constructed from responses to nine questions regarding people’s experiences of food insecurity in the [previous](#) four weeks, ranging from worry about not having enough food to actual experiences of food deprivation associated with hunger.<sup>18</sup> The inverse of the score is taken for this analysis because a measure that increases with increasing food security is needed. The HFIAS can also be used to identify which households can be categorized as food secure, defined as experiencing none of the nine conditions, or just experiencing worry, but rarely. Two other food security indicators are reported on. The first is the household hunger scale (Ballard et al., 2011), which captures the most extreme form of food insecurity. The second is the dietary diversity score (Swindale and Bilinsky, 2006), an indicator of dietary quality measured as the total number of food groups, out of 12, from which household members consumed food in the previous day.<sup>19</sup>

## 4.1 Food Security

### 4.1.1 Quantitative Data

Table 6 documents the changes in food security that have taken place between the baseline and midline. The registered decline in the food security index for the entire RISE program area is due to a significant drop for the Niger area only. This decline was accompanied by a marked increase in the percent of households that are food *insecure*, which rose from 68 to 84 (see Figure 10). The hunger scale did not change in either of the areas over the period, and changes in dietary diversity have been minor.

With respect to the livelihood groups, the food security index declined for the agriculture and “other” livelihood groups, but not the pastoralism-focused group (see Figure 11). The household hunger scale and dietary diversity score remained constant or changed very little.

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<sup>18</sup> The nine experiences 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.

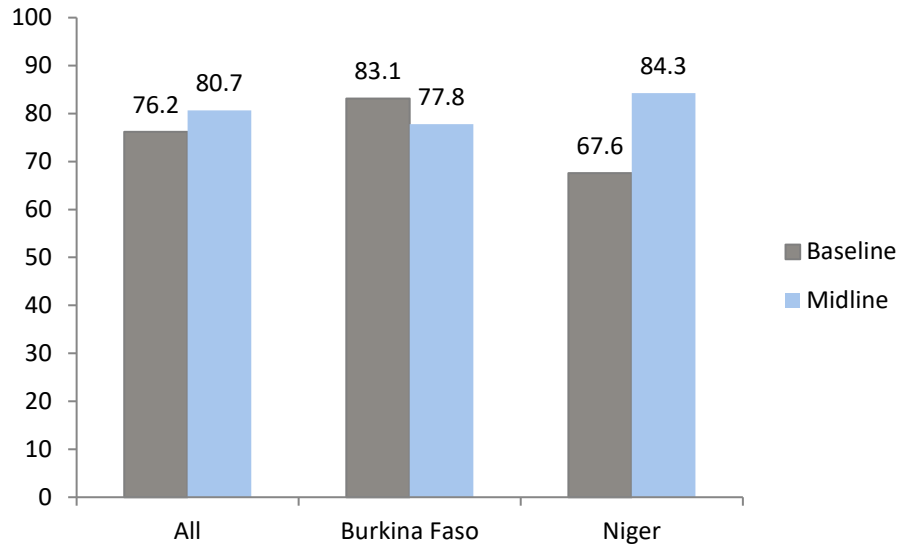
Survey respondents indicate whether or not they or another household member experienced the event or feeling in question and, if yes, how often in the last 30 days (rarely, sometimes or often). A score is then calculated based on these frequency responses.

<sup>19</sup> 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.

**Table 6: Baseline-midline comparison of food security indicators by program area and predominant livelihood group**

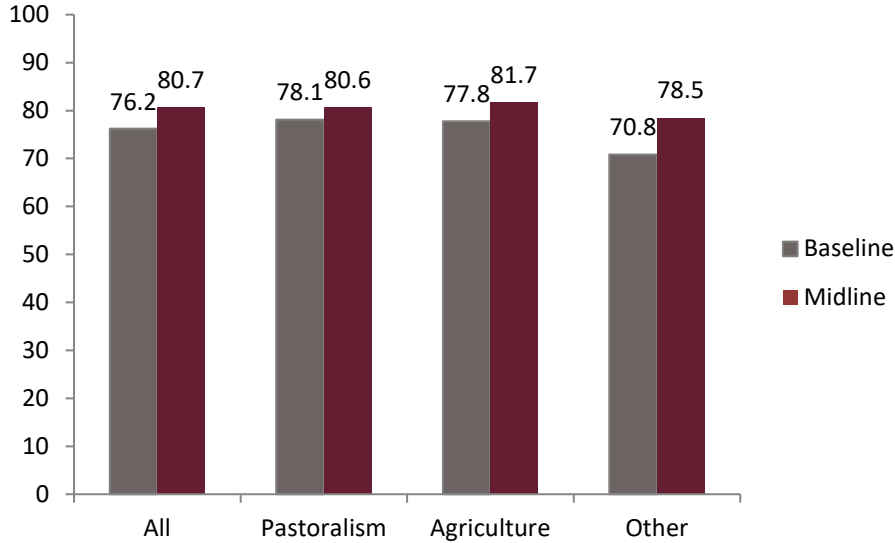
Indicator	All		Program area				Predominant livelihood						
	Baseline	Midline	Burkina Faso		Niger		Pastoralism		Agriculture		Other		
			Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	
<b>Access to food</b>													
Household food security scale	20.2 <sup>a</sup>	18.8 <sup>a</sup>	19.9	19.8	20.7 <sup>a</sup>	17.5 <sup>a</sup>	19.5	18.9	20.1 <sup>a</sup>	18.7 <sup>a</sup>	21.0 <sup>a</sup>	18.7 <sup>a</sup>	
Percent food insecure	76.2	80.7	83.1	77.8	67.6 <sup>a</sup>	84.3 <sup>a</sup>	78.1	80.6	77.8	81.7	70.8	78.5	
<b>Hunger</b>													
Household hunger scale	0.47	0.52	0.43	0.50	0.52	0.54	0.58	0.65	0.45	0.46	0.49	0.59	
Percent households in hunger	13.0	14.4	12.5	14.6	13.6	14.2	18.0	20.3	12.2	12.5	13.5	16.2	
<b>Dietary quality</b>													
Dietary diversity score	5.1	5.0	6.1 <sup>a</sup>	5.4 <sup>a</sup>	3.9 <sup>a</sup>	4.6 <sup>a</sup>	5.7	5.4	4.9	4.9	5.5 <sup>a</sup>	5.0 <sup>a</sup>	

**Figure 10: Percent of households that are food insecure, baseline versus midline for the program areas**



Source: RISE household survey data.

**Figure 11: Percent of households food insecure, baseline versus midline for the predominant livelihood groups**



Source: RISE household survey data



## 4.1.2 Qualitative Data

The qualitative data give insight from people living in the RISE program areas themselves about the state of their food security and the constraints they face to improving it, including climate shock exposure.

The dominant livelihood activities are farming and livestock rearing, both of which are vulnerable to drought and flooding. Given the semi-arid climate, the most commonly-grown crops and staple foods are millet and sorghum. FGD participants in both Burkina Faso and Niger stated that drought had severely affected even these relatively drought-tolerant crops. It also reduced pasture for livestock.

### Niger

FGD participants in Niger consistently identified variable rainfall as the main factor contributing to food insecurity and poverty. As expressed by a group of women in Zinder Region, drought “causes a food deficit” (Box 9). In order to buy food, FGD participants in Niger reported selling some livestock or even land to buy food (as described above in Section 3.3).

FGD participants also shared some successes and struggles with improving their food security through increased crop production. The RISE program has been providing seeds and training on

#### Box 9: Quote from women’s FGD on gender, Zinder Region

“Our main problems are not enough rain, which causes a food deficit; lack of resources to buy agricultural inputs; and crop pests – the ‘enemies’ that decimate our scarce production. As for the livestock, the problems are lack of pasture and animal disease.”

#### Box 10: Quote from user of improved seeds, Maradi Region

“If there was not this [special millet], it would be a catastrophe. You see my neighbor, he is a farmer, but he has nothing, his field did not give him anything, and I am compelled to share, which is fine but on the other hand it is not fine, as it is better when everyone can provide for themselves.”

improved agriculture techniques such as bio-reclamation of degraded lands, but not infrastructure for irrigation or fencing. In sampled villages in high-exposure areas, locals reported being aware of the RISE programs’ dissemination of improved seed varieties, mainly millet, sorghum, and cowpea. Those who received the seeds expressed unanimous appreciation for their performance, confirming that in all fields where they had been planted the short-cycle varieties ripen in about half the time of traditional varieties. In the account of one older, experienced farmer who adopted the improved short-cycle variety of millet (HPK variety) it was almost ready to harvest in late August – despite the terrible season. Meanwhile, his neighbors had produced nothing, which meant he would have to share his harvest of improved millet (see Box 10).

Although improved varieties often sell at higher prices than traditional varieties, at least for some crops (e.g., cowpea), there remains some reluctance on the part of farmers to adopt them due to limited availability of good quality seed and higher cost. Further, improved seeds need to be bought again after four or five growing cycles in which the seed is saved and used for planting the subsequent year. In the low-exposure village in Tillabery, an improved millet variety was distributed for free through a commune initiative in 2014. Farmers have been using that millet variety since then, and the seeds are credited with having ended the village's cereal deficit. Despite this success, the commune is not planning to cover the cost of buying new seeds for village farmers. This leaves farmers in somewhat of a bind; not only do they not have the income with which to purchase new seed but they are also likely to experience diminishing production as the genetic potential of their saved seeds erodes over time.

Some respondents in Niger reported that counter-season crops, also called *marâchage*, are a good source of food and income. However, *marâchage* activities are constrained in some areas. For example, in sampled villages in the Zinder region, counter-season cultivation is not practiced to its full potential because the only water point is over 3 km away. In the Maradi Region, where the valley received beneficial seasonal floods, one men's FGD reported that farmers produced over 80 large trucks of watermelon each season through *marâchage*. However, a recently-constructed dam just across the border in Nigeria has stopped the beneficial floods, and the dam and drought have dramatically reduced the flow of river water to the extent that counter-season cultivation is currently not possible. This change ended an important source of income and food.

A surprise food security-related finding is that women in one FGD in Niger reported that water, sanitation, and hygiene (WASH) interventions such as hygiene awareness-raising activities and cooking demonstrations helped people reduce illness-related expenditures, resulting in more money available to buy food.

### **Burkina Faso**

In Burkina Faso, FGD participants reported that the three-week interruption of the rainy season, from August 2-20, 2017, was already having huge negative and probably irreparable consequences for that year's harvest.<sup>20</sup> Even if rain returned, FGD participants stated that the sorghum, millet, cowpea, and corn crops were already affected in the higher lands. Almost all crops are heavily dependent the right quantity of rainfall at the right time, but flood control and water management systems are lacking, leaving crops vulnerable to variable precipitation.

Very few of the respondents in Burkina Faso considered themselves to be food secure, and respondents seem quite aware that being food secure one year does not mean that they would be the next: "Even with the increase in yields thanks to the new techniques [introduced by

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<sup>20</sup> Burkina Faso field work was conducted August 19-31, 2017.

RISE], only the harvests of a few [households] will...last until next season, while [others] need to sell part of it to ensure the schooling of the children. ... [The] picture is not all bright.”

When asked about activities that contribute to resilience, almost all interventions listed by FGD participants in Burkina Faso were associated with income generation related to food security. These include receiving cash to buy food (according to a women’s FGD) and developing rice production which enabled participants to buy sorghum or maize with the income earned from selling rice (according to a men’s FGD). A female FGD participant stated that the *habanayé* gave some people access to financial resources to start another income generating activity.

*Habanayé*, however, was not used in the Sahel region, where FGD participants say their livestock is too valuable to share; KIs there report that they prefer to share cash or food.

People in both program areas used money from the savings group to buy food and start petty trading, which can generate savings for later use.

FGDs in Burkina Faso reported that widows are especially vulnerable to food insecurity, as they usually lose access to land, their main sources of income and food, after the death of their husband.

## 4.2 Resilience to Shocks

Household resilience is the ability of a household to manage or recover from shocks and stresses. It is measured here using two indicators. The first, a subjective or “experiential” indicator, is based on households’ own reports of their ability to recover from the shocks they experienced. The second, more objective, indicator is based on measured changes in households’ food security.

### *Self-reported ability to recover*

For the experiential measure, survey respondents were asked to answer the question “To what extent were you and your household able to recover?” for each of the 26 shocks experienced.

The following are 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.

The responses are used to calculate an ability to recover (ATR) index that takes into account the degree of shock exposure of each household in order to single out their general ability to recover (see Smith et al. 2015). Complementary indicators are the percent of households recovering from all the shocks they experienced and from the two most prevalent shocks, drought and food price increases. A household is classified as having recovered from the shock if the chosen answer to the question was #3, #4, or #5 above.

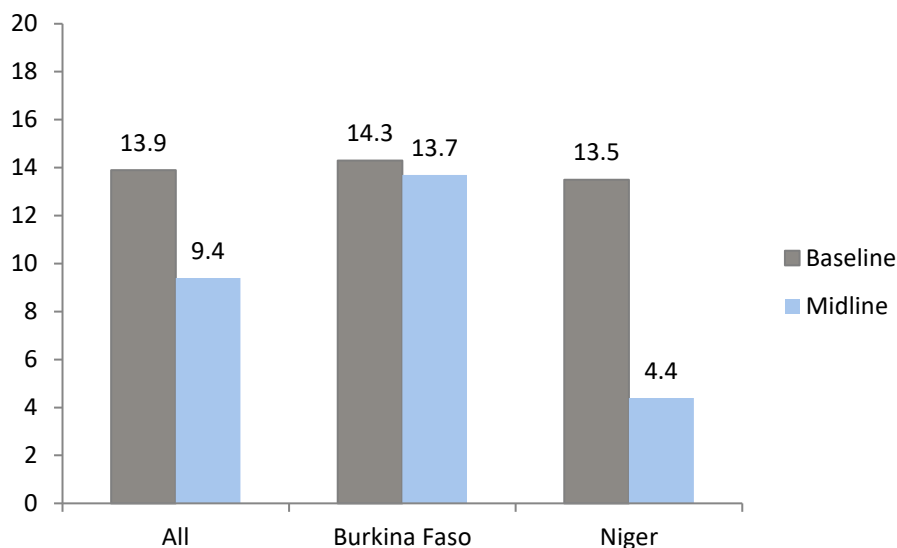
Table 7 reports on the changes in resilience from the baseline using these subjective indicators. Similar to the results for food security, the overall drop in resilience detected by the ATR index applies only to Niger households, who experienced a 17 percent index decline ( $p=0.003$ ). As illustrated in Figure 12, the percent of households able to recover from all shocks experienced declined substantially in Niger since the baseline, from an already very low 13.5 percent to 4.4 percent. Such large declines are registered specifically for both drought and food price increases (Table 7).

**Table 7: Baseline-midline comparison of households' resilience to shocks (experiential indicators), by program area and predominant livelihood group**

Indicator	All		Program area				Predominant Livelihood					
	Baseline	Midline	Burkina Faso		Niger		Pastoralism		Agriculture		Other	
			Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline
Ability to recover index (adjusted for shock exposure)	1.94 <sup>a</sup>	1.81 <sup>a</sup>	1.96	1.98	1.92 <sup>a</sup>	1.60 <sup>a</sup>	1.96 <sup>a</sup>	1.71 <sup>a</sup>	1.92	1.82	1.98 <sup>a</sup>	1.82
Percent households recovering from....												
All shocks experienced	13.9 <sup>a</sup>	9.4 <sup>a</sup>	14.3	13.7	13.5 <sup>a</sup>	4.4 <sup>a</sup>	11.9 <sup>a</sup>	5.0 <sup>a</sup>	12.7	10.4	18.7 <sup>a</sup>	9.1
Drought	20.0	18.4	18.7	25	21.7 <sup>a</sup>	8.5 <sup>a</sup>	21.7 <sup>a</sup>	10.1 <sup>a</sup>	19.1	21	22.4	15.8
Food price increases	22.2 <sup>a</sup>	8.4 <sup>a</sup>	16.2	10.2	26.4 <sup>a</sup>	7.2 <sup>a</sup>	13.1	5.3	22.3 <sup>a</sup>	9.4 <sup>a</sup>	27.5 <sup>a</sup>	7.9

<sup>a</sup> Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

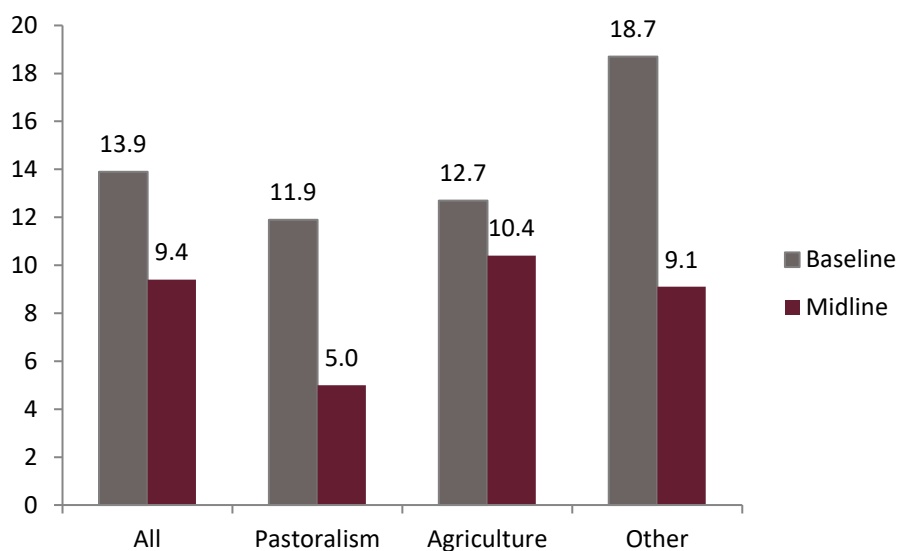
**Figure 12: Percent of households recovering from shocks experienced, baseline versus midline for the program areas**



Source: RISE household survey data.

Among the livelihood groups, the “other” group saw the greatest reduction in ability to recover from all shocks, followed by the pastoralism group (see Figure 13). Note, however, that the agriculture group saw a large reduction in ability to recover from food price increases (Table 7).

**Figure 13: Percent of households recovering from shocks experienced, baseline versus midline for livelihood groups**



Source: RISE household survey data.

### Change in food security from baseline to midline

The objective measure of resilience is the change in the food security index between the baseline and midline, as measured for the 360 panel households. Consistent with findings of a reduction in the index over time for the sample as a whole, the mean change is negative, at -1.05 (Table 8). In concurrence with the ATR results, Niger households were less resilient to shocks over the period than Burkina Faso households. Fifty-five percent of Burkina Faso area households were resilient over the period, that is, were able to maintain or increase their food security. By contrast, less than half (45 percent) of Niger-area households were resilient.

**Table 8: Resilience: Change in food security and percent of households resilient, by program area and livelihood group**

Indicator	All	Program area		Livelihood group		
		Burkina Faso	Niger	Pastoralism	Agriculture	Other
Change in food security from baseline to midline c/	-1.05	0.71	-2.10	-0.43	-1.29	-0.73
Percent of households resilient	48.9	54.6	45.4	57.6	46.2	51.7
a Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns						
Note: Values calculated using the panel data set (N=360).						

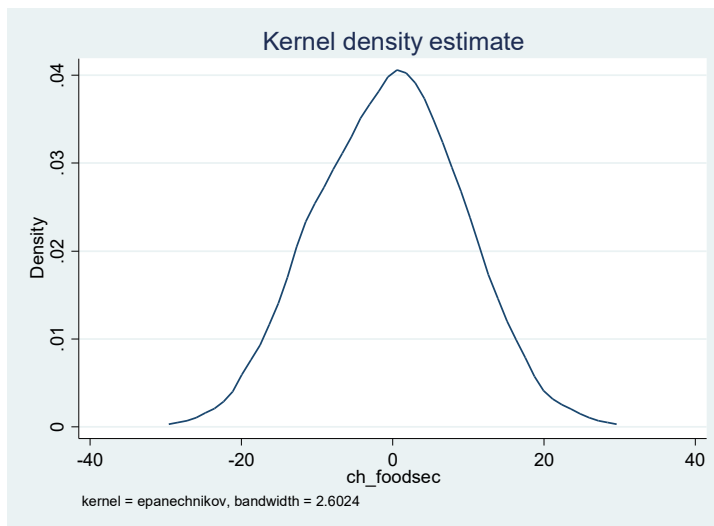
Among the livelihood groups, the percent of resilient households is highest for the pastoralism-focused group and lowest for the agriculture-focused group. These comparative results differ from those of the ATR measure, the latter which indicate that the pastoralist group is the *least* resilient. In fact the correlation between these two measures is quite low, at 0.141 ( $p=0.007$ ). Given their differences, both are used as measures of resilience in the regression analyses of Chapters 6 and 7.

Figure 14 shows the probability distribution of the changes in food security for the 360 panel households. It demonstrates great variability around the mean, with roughly half experiencing an increase in their food security and the other half experiencing a decrease. This variability is aptly voiced by a women's FGD participant in Niger (Box 11). The differences across households can be attributed to the degree of households' exposure to shocks as well as their underlying resilience capacities, the latter which will be explored in Chapter 5.

#### Box 11: Quote from women's FGD on resilience, Maradi Region

"Our community did not completely recover after the shocks as there are many households that do not have enough to eat. But there are also others who came back well.....as they carry on successful IGAs."

**Figure 14: Probability distribution of change in food security between the baseline and midline**



Note: Calculated using the panel data set (N=360).

The qualitative data from FGDs with women in Niger give some insight into the importance of income generating activities (IGS's) for the ability of their households to recover after a shock. According to participants, women's participation in IGAs is only possible thanks to the existence of savings and credit groups (see also Section 5.1.2). A woman's ability to engage in IGAs (e.g., selling street food, livestock fattening, petty trade) is considered critical for resilience at the household and community levels. Supported by LAHIA, a women's producer group (i.e., of cowpea) in the Maradi Region felt that their savings group (developed through their producer group) provided them with better resilience and a feeling of individual and collective empowerment.

### 4.3 Summary

Consistent with the increase in shock exposure found in Chapter 3, food security has declined in the RISE program area since the baseline. The percent of households that are food insecure has risen from an already high 76.2 to 80.7. The food insecurity prevalence remained steady in the Burkina Faso area; the overall increase is due to a substantial increase in the Niger area (from 67.6 to 84.3%). The qualitative data point to rainfall variability and especially drought as main factors driving food insecurity. Data collected measuring trends in households' perceived ability to recover from shocks point to the same pattern found for food security: the ability to recover has declined for Niger households as a group and remained constant for Burkina Faso households. Among Niger households the reduction in ability to recover is particularly marked for both drought and food price increases. Looking at the change in food security for individual households between baseline and midline, the panel data documents great variability, with

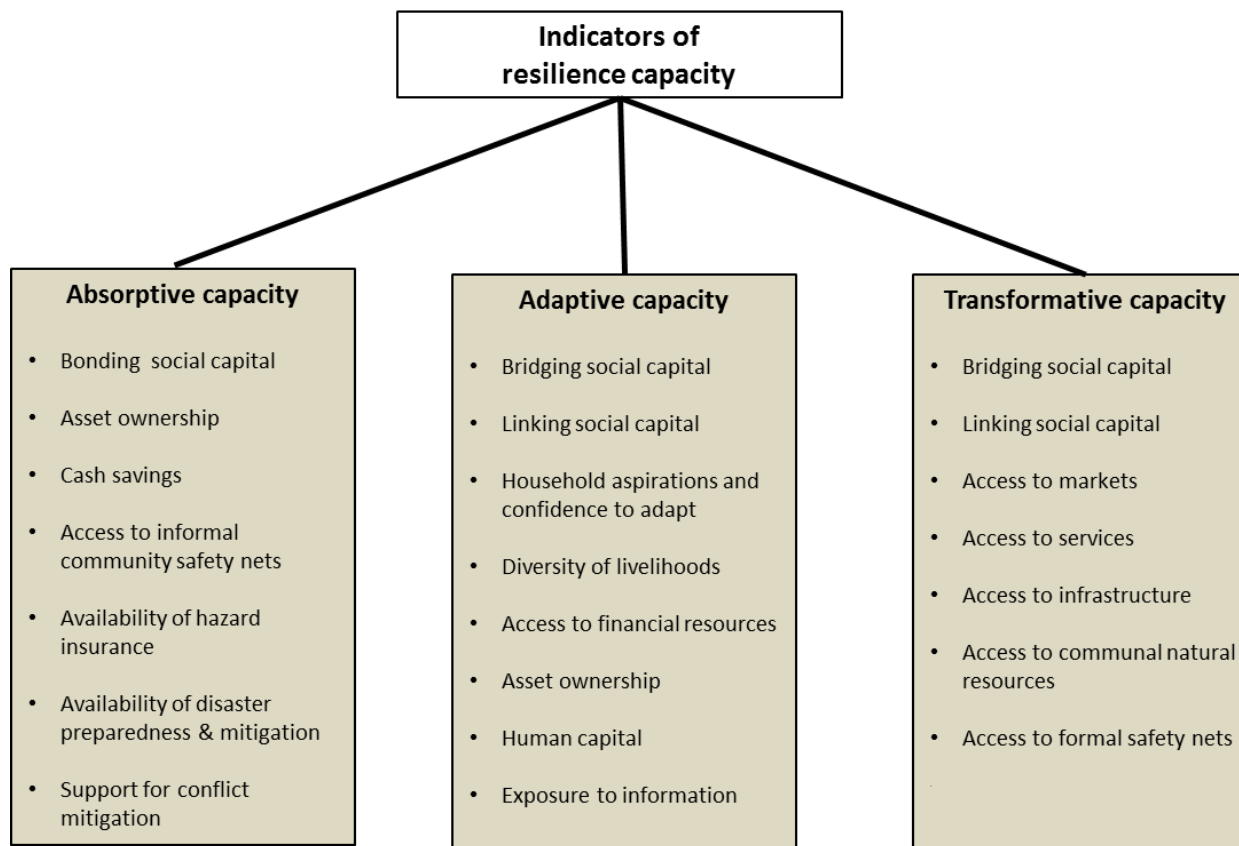


roughly half of the households experiencing increased food security and the other half experiencing a decrease. These differences across households can be attributed to the severity of their exposure to shocks as well as their underlying resilience capacities, the latter which are taken up in the next chapter.

## 5. TRENDS IN HOUSEHOLD 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 such resilience. As noted in Chapter 1, household resilience capacities can be classified into three categories: absorptive capacity, adaptive capacity, and transformative capacity. Given their complexity, measuring these concepts requires combining multiple indicators of the underlying concepts into an overall indicator. Figure 15 lays out the indicators of the three capacities that are used to measure them in this report. For this chapter's analysis these indicators, described in detail in the baseline report (Smith et al. 2015), are combined into indexes of the three capacities and an overall index of resilience capacity using factor analysis.

**Figure 15: Indicators employed to measure resilience capacity**



Data collected on all of the indicators at both baseline and midline give the opportunity to determine whether households' resilience capacities have been increasing over this initial two years of the RISE program. Section 5.1 first examines trends for the program area overall and for the Burkina Faso and Niger areas. Section 5.2 then summarizes trends for the predominant livelihood groups. Trends for the RISE intervention groups will be reported in Chapter 7.

Note that *community* resilience capacity, which centers on collective action at the village level, was examined for the baseline and found to vary little across the program areas; it was also not found to have any association with households' food security or resilience. While not included in this midline report, further analysis of this capacity will be undertaken using the endline data.

## 5.1 Trends for the Program Areas

Table 9 compares baseline and midline values of the indicators of household resilience capacity for the RISE area as a whole and individually for the Burkina Faso and Niger areas. Some of the indicators are multiple-indicator indexes themselves calculated using various methods (see Smith et al. 2015). In these cases, the values of many of the underlying indicators are reported in Appendix 2.

**Table 9: Indicators of resilience capacity at baseline and midline, by program area**

Indicator	All		Program area			
	Baseline	Midline	Burkina Faso		Niger	
			Baseline	Midline	Baseline	Midline
<b>Social capital</b>						
Bonding social capital	71.3	75.1	75.7	71.0	65.9 <sup>a</sup>	80.3 <sup>a</sup>
Bridging social capital	52.6	56.2	51.7	46.1	53.7 <sup>a</sup>	68.7 <sup>a</sup>
Linking social capital	47.1	44.5	54.1 <sup>a</sup>	48.6 <sup>a</sup>	38.6	39.7
<b>Aspirations and confidence to adapt</b>	39.1 <sup>a</sup>	42.0 <sup>a</sup>	43.4	44.6	33.6	38.9
<b>Livelihood diversity</b>	2.58	2.54	2.71 <sup>a</sup>	2.46 <sup>a</sup>	2.41 <sup>a</sup>	2.64 <sup>a</sup>
<b>Asset ownership</b>						
Consumer durables	7.78 <sup>a</sup>	8.18 <sup>a</sup>	9.27	9.15	5.95 <sup>a</sup>	6.98 <sup>a</sup>
Farming implements	4.35	4.14	4.77 <sup>a</sup>	4.18 <sup>a</sup>	3.85	4.09
Animals owned (Tropical Livestock Units)	3.71	3.61	5.54	5.24	1.47	1.60
Land owned (ha)	3.69	3.41	3.66 <sup>a</sup>	3.13 <sup>a</sup>	3.73	3.76
Index of asset ownership	23.6	23.4	27.2 <sup>a</sup>	25.1 <sup>a</sup>	19.1 <sup>a</sup>	21.2 <sup>a</sup>
<b>Access to financial resources</b>						
Access to credit (% of hholds)	68.7	61.0	74.3	67.6	61.7	52.8
Access to savings (%)	50.5	51.8	49.1	59.0	52.2	42.9
Index of access to financial resources	1.19	1.13	1.23	1.27	1.14	0.96
Currently holding savings	37.1	31.9	55.1 <sup>a</sup>	40.6 <sup>a</sup>	15.0	21.2
<b>Access to markets, infrastructure, services, and communal natural resources</b>						
Access to markets	1.58	1.82	1.80	1.69	1.31 <sup>a</sup>	1.97 <sup>a</sup>
Access to infrastructure	1.26	1.19	1.23	1.35	1.30	0.99
Access to basic services	4.03	4.23	4.22	4.41	3.81	4.01
Access to communal natural resources	1.94	1.75	1.81	1.65	2.10	1.88
<b>Human capital and access to information</b>						
Human capital	27.2	26.2	25.9	26.7	28.9	25.7
Exposure to information	3.46 <sup>a</sup>	2.56 <sup>a</sup>	3.43 <sup>a</sup>	2.58 <sup>a</sup>	3.51 <sup>a</sup>	2.54 <sup>a</sup>
<b>Safety nets</b>						
Formal safety nets	0.97	0.92	0.78	0.98	1.21	0.86
Informal safety nets	2.01	2.14	2.16	2.59	1.83	1.59
<b>Disaster preparedness and mitigation</b>	0.68	0.49	0.41	0.51	1.02	0.48
<b>Hazard insurance (% of hholds)</b>	46.2 <sup>a</sup>	26.5 <sup>a</sup>	40.6 <sup>a</sup>	18.8 <sup>a</sup>	53.2	35.9
<b>Institution providing conflict mitigation (%)</b>	55.4	46.8	62.5	58.6	46.6	32.3
<b>Indexes of resilience capacity</b>						
Absorptive capacity	46.2	43.0	48.7	46.3	43.0	38.9
Adaptive capacity	50.9	48.4	56.4 <sup>a</sup>	51.0 <sup>a</sup>	44.0	45.0
Transformative capacity	47.1	47.3	50.8	50.3	42.6	43.7
<b>Overall resilience capacity</b>	52.2	50.0	57.0 <sup>a</sup>	53.1 <sup>a</sup>	46.2	46.2

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

## 5.1.1 Social Capital and Aspirations

### *Social capital*

Bonding social capital (the bonds between people living in the same communities) and bridging social capital (the bonds across people living in different communities) have both risen substantially in the Niger program area. Qualitative data underscore this finding. As previously mentioned, FGD participants in Niger stated that community solidarity was critical (i.e., bonding and bridging capital) considering the insufficient amount of humanitarian aid distributed by organizations and the total absence of the State (i.e., linking capital). One female FGD participant said, “They [Government representatives] only come to take pictures.” In Burkina Faso, several respondents indicated that RISE activities involving groups (e.g., savings groups) had facilitated people getting to know each other better, strengthening inter-personal interactions and reinforcing positive social dynamics. The qualitative data from one FGD in Burkina Faso suggest, however, that sharing has waned: “Before, it was easy to make donations, but now the gifts have diminished a lot except for relatives ... ”(Male FGD, Kulfuo). Returning to the quantitative results, linking social capital (vertical links between households and entities with authority or power) shows a slight downturn in the Burkina Faso area.

### *Aspirations*

“Aspirations and confidence to adapt” is a psychosocial capacity measured by combining indicators of: (1) the absence of fatalism; (2) belief in individual power to enact change; and (3) exposure to alternatives to the status quo. An increase in the index of this capacity for the RISE area overall is linked to a moderate uptick for the Niger program area, itself stemming from a substantial increase in exposure to alternatives to the status quo (see Appendix 2). The latter is measured using information about households’ travel and communications with people outside of their community, and engagement in economic activities with members of other clans. Qualitative data presented further on in this chapter provide examples of RISE program activities that may increase exposure to alternatives to the status quo such as *Ecole de Maris* (EDM) or “Husbands’ School” in Burkina Faso and increased mobility of women due to rising participation in markets and trading.

## 5.1.2 Economic Sources of Resilience Capacity

Diversity of livelihood sources, asset ownership, and access to financial resources are important economic enablers of households’ resilience to shocks.

### *Livelihood diversity*

Livelihood diversity has risen in the Niger program area (an index rise of 10 percent). This increase is driven by increases in the percent of households engaging in the production/sales of seedlings, seeds and fodder, in handcrafts, and relying on gifts/inheritance as their primary

livelihood (Appendix 2). On the other hand, livelihood diversity declined in the Burkina Faso area (by 9 percent), associated with declines in crop production and sales, artisanal mining, and remittances. Many of these changes may be related to households' responses to the increased shock exposure they were experiencing over the period.

### **Asset ownership**

Asset ownership has seen a moderate increase in the Niger area. This increase is seen in ownership of consumer durables rather than in productive assets or livestock, which are the types of assets that are most likely to enhance households' resilience. By contrast, asset ownership in the Burkina Faso area declined due to drops in ownership of farming implements and land.

### **Access to financial resources**

There has been no detectable change in access to financial resources (savings and credit) since the baseline. However, the Burkina Faso area has seen a substantial decline in the percent of households currently holding savings (from 55.1 to 40.6). Qualitative data show that savings groups introduced as part of RISE and other programs have been an especially important absorptive capacity for recovering from shocks, especially for women.<sup>21</sup> In both program areas, women FGD participants reported using money from savings groups to buy food and/or start new income generating activities such as petty trading. The groups have also strengthened community solidarity and social cohesion, which can be helpful in times of stress.

Women's groups in a sampled village in Tillabery expressed strong self-satisfaction in their management of savings groups, learning over time from development actors regarding "vie associative" (community life). They manage two separate groups: one for credit and another for "solidarity" initiatives (e.g., social capital, informal safety nets). The money from the latter group is disbursed to women in need who are part of the network, such as for ceremonies for a baptism, marriage, or funeral.

In Niger, participants conveyed that credit groups are an essential resource for timely support and for recovery from shocks and are key to improving women's livelihoods, as income-generating activities (IGAs), such as street food businesses, are only possible thanks to these groups' existence.<sup>22</sup>

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<sup>21</sup> In Niger, FGDs reported that women have an easier time accessing credit, as they are considered at lower risk of defaulting on loans. Both men and women recognize the preference by NGOs and others for targeting women for microcredit activities because of women's better performance at repaying loans.

<sup>22</sup> The organization of credit and savings groups in high-exposure villages seems to be more advanced than in low-exposure villages. For example, many women's savings groups appear to be well-structured, with clear internal rules. Some schemes provide groups an initial injection of financial resources, and define the maximum number of women allowed per group. In some high-exposure villages, credit and savings groups involve not only individual women but also collectives, and focus on investing in IGAs, which for women often include street food businesses.

**Box 12: Quote from women’s FGD on resilience, Maradi Region**

“Savings groups have been a great help to us in the event of shocks. They allowed us to really flourish as women and mothers.”

RISE – and other – activities have increased the number of women obtaining credit for productive investments. However, not all activities are profitable and different approaches are used in order to limit failure. For example, credit offered by REGIS-ER is less flexible than other schemes in that it is only used for small-scale animal fattening activities. Thus, participants cannot choose to use

their loans for other types of IGAs. Different schemes for credit provision were adopted by non-RISE development actors, such as Ayarda in the Zinder Region and World Vision in the low-exposure sampled village in the Maradi Region, where money was received by women in a collective and utilized for a variety of IGAs.

### 5.1.3 Access to Markets, Infrastructure, Services, and Communal Natural Resources

Access to markets, infrastructure, services, and communal natural resources are all important aspects of transformative capacity.

#### *Access to markets*

Access to markets is measured using an indicator of access to three types of markets: livestock, agricultural products, and agricultural inputs. Market access has seen a definite rise in the Niger program area. This rise is due to a considerable increase in access to markets for livestock and agricultural inputs (Appendix 2). In the Burkina Faso area access to all three types of markets shows a slight, statistically insignificant, decline.

#### *Access to infrastructure*

Access to infrastructure is measured using an indicator of access to piped water, electricity, phone services, and paved roads. The only statistically significant change detected since the baseline is that access to paved roads has declined considerably in the Niger area (Appendix 2).

#### *Access to basic services*

Access to basic services is measured using access to schools, health centers, veterinary services, agricultural extension services, credit institutions, savings institutions, and security services. There has been no change in any of these services for either program area since the baseline (Appendix 2).

#### *Access to communal natural resources*

Access to communal natural resources is measured at the village level based on access to communal grazing areas, communal water sources for livestock, and firewood from communal

land. One noticeable change since the baseline is observed: In both program areas access to firewood from communal lands has declined considerably. The percent of households living in a village with such access fell from 78.5 to 62.8 in the Burkina Faso area, and from 62.4 to 33.0 in the Niger area (Appendix 2).

Qualitative data provide more detail about this trend. FGD participants in three villages in Burkina Faso stated that natural resource committees help maintain or strengthen the community's ability to mitigate the impact of shocks and protect communal resources such as water, forest, or pastureland. One FGD participant stated that the role of the forest management committee "...is to prevent the cutting of wood because there are no trees left in our bush, which leads to drought and lack of rain. And when there is no rain, the grass does not grow to feed the animals."

In Niger, FGD participants (especially in high-exposure villages) perceived that RISE activities have contributed to increased awareness of the importance of intentional and careful management of natural resources, including trees, grazing areas, and agricultural land. FGDs in Niger credited RISE awareness-raising activities with contributing to households' reduced use of tree cutting as a coping strategy. However, some households (e.g., in a low-exposure village), were cutting and selling trees due to reduced livelihood options following their exposure to frequent and cumulative shocks (see Section 3.3).

### **5.1.4 Human Capital and Exposure to Information**

Human capital, measured here using literacy, formal education levels, and trainings received, endows people with the ability to use information and other resources to cope with shocks and stressors. Exposure to information allows people to apply such human capital. The mean number of different types of trainings received by adult household members declined in the Burkina Faso area since the baseline (Appendix 2), with the particularly types of training in decline being job training and adult education (literacy, numeracy or financial). The other types of trainings asked about in the household survey were business development, natural resource management, and using cell phones to get market information.

Exposure to information saw a decline in both program areas, with the index falling by around 25 percent in each. Further analysis of the data reveals that the types of information for which exposure is declining include long-term changes in weather patterns, livestock disease threats or epidemics, and innovations in cultivation.

While the quantitative data indicate that participation in trainings has declined since the baseline in the RISE area, the qualitative data indicate that RISE implemented trainings on literacy, improved seeds, and agriculture techniques such as bio-reclamation of degraded lands (BDL) in both areas. FAO also provided trainings on *marâchage*. The RISE programs with a stronger focus on supporting adult literacy are Sawki, REGIS-AG, and LAHIA. FGDs in the Maradi

Region reported that men, women, and youth participate with interest in Sawki and LAHIA literacy activities, which they credit with improving participants' ability to read and write.

In one village in Niger where LAHIA and REGIS-AG are active, qualitative data indicates that interventions to teach 150-200 female cowpea farmers agricultural techniques and post-harvest processing have brought about positive changes. Participants state that they have learned how to organize themselves for production, post-harvest processing, sales, and an important savings and loan network. This has led to group cohesion and economic empowerment.

Data from FGDs suggests that learning agricultural techniques (and receiving improved seeds) from RISE activities for horticultural production are factors consistently present in better-off (i.e., more resilient) households.

With regard to education, education components specifically addressing the needs of young girls are also being implemented within Sawki and PASAM TAI projects in Niger. The Supporting Adolescent Girls' Future through Second Chance Education (SAFE) Schools activity, in its initial phase, has been in place for about one year (2016-2017). The SAFE Schools Initiative aims to enable girls who dropped out of school to complete a condensed educational program. Girls aged 9-14 were interviewed from two SAFE School initiatives, all of whom

**Box 13: Quote from a Femme Modèle, Zinder Region**

“Before we started receiving the advice of mother leaders, we suffered greatly; set one child down, pick the other up. We did not know where to go or what to do with all these children. But today we feel fulfilled and we raise our children well. Our life changed for the better and we are happy to experience these positive changes.”

could slowly write their name and some simple sentences in Hausa. They expressed eagerness to return to the program as soon as it started, and acknowledged their discomfort at attending classes in the public college (e.g., using their knees as tables and rocks as chairs). In contrast, SAFE School provides proper seats and tables. Girls also spoke about what they could learn at the SAFE School, and about their job aspirations. In particular, they aspire to a good job (e.g., nurse, teacher, military) in order to take care of their parents. They also shared that SAFE School provides space in which to safely discuss the importance of avoiding child marriage and to marry at a later age – messages that they all showed to have understood and endorsed. However, given the recent start of the initiative, it is too early to assess effectiveness or impact.

While not measured in the quantitative survey, trainings in maternal and child health appear to be having positive effects. Key messages around maternal and family health (including birth spacing) are delivered through mother-to-mother schemes as well as to men through the EDMs. Women who practice birth spacing report feeling satisfied with their children's nutritional status because the practice helps them have enough breastmilk and other food for all their children. Packaging the message that pregnancies should be spaced according to child



development benchmarks<sup>23</sup> seems to be effective in terms of clarity and message retention. Women practicing birth spacing advise others about how it can help prevent the heavy fatigue that can be involved in mothering.

Birth spacing sensitization is also addressed in the Smart Couple scheme that CRS is piloting in some villages. In this approach, couples are recruited and trained to disseminate specific messages to other couples. According to interviewed couples participating in Smart Couple, its emphasis on natural contraceptive approaches facilitates couples embracing family planning. Decisions about if and when to have children are still widely considered by both men and women as belonging to the husband as head of household. Women seeking contraceptives in some health centers are required to have the husband's consent, although many find a way around this constraint. While chemical contraceptives and condoms are generally regarded with suspicion, at least by men, natural methods seem to be offering more agreeable solutions for couples. Given the heavy emphasis by RISE and other initiatives, especially over last decade or more, it is perhaps not surprising that even in low-exposure villages there is high awareness of the importance of maternal health issues (e.g., visiting the health center for antenatal care). However, high-exposure villages exhibit a more open attitude toward birth spacing than low-exposure ones, at least in sampled villages.

Overall, while women seem to be more interested in birth spacing than men, knowledge is being disseminated – and used – in order to temporarily prevent pregnancy. In turn, more control over the spacing of her children allows women to engage more fully in IGAs, which contributes to the health and welfare of the entire family.

### **5.1.5 Safety Nets, Disaster Risk Reduction, and Conflict Mitigation**

Safety nets, both formal and informal, as well as specific support for households related to disaster risk reduction, are important capacities for coping in the aftermath of shocks. There has been no statistically significant change in the measures of access to safety nets between the baseline and midline.

While there has also been no change in the index of disaster preparedness and mitigation, there have been notable declines in the percent of households living in a village with a disaster planning group in the Niger area (see Appendix 2) and in the percent of households with hazard insurance in the Burkina Faso area.

No change was found in the percent of households living in a village with an institution providing conflict mitigation.

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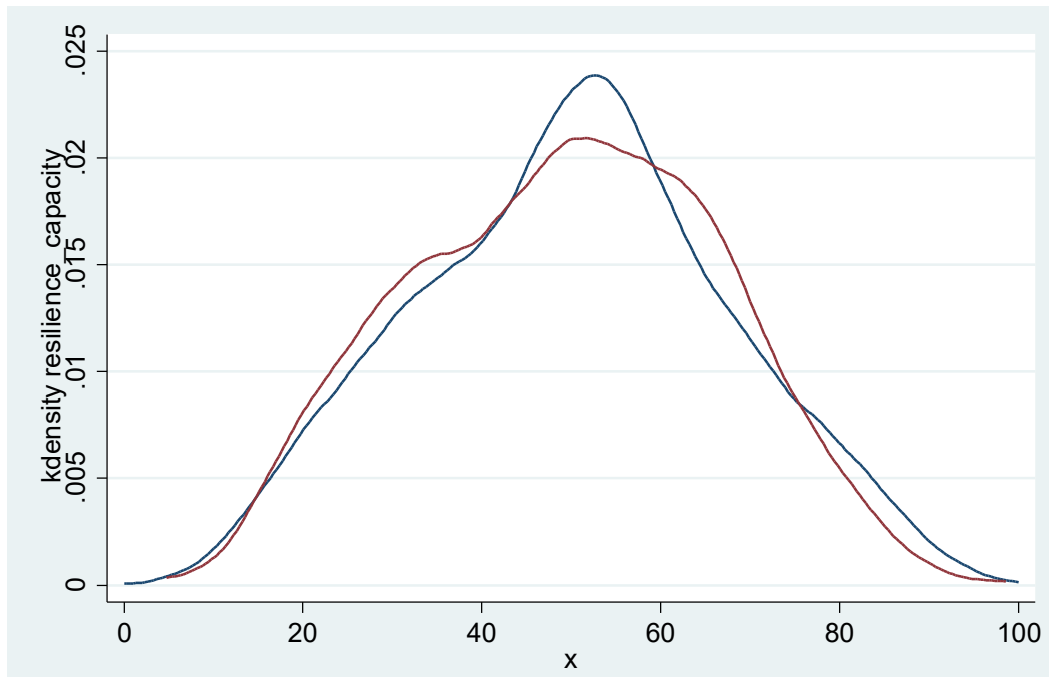
<sup>23</sup> The guidance is to wait until the next-oldest child is able to give his/her younger sibling water to drink when needed.

As described above in Section 5.1.3, FGDs in Burkina Faso noted that various types of community-level committees and management groups were important for helping the community and its members recover from shocks/stressors, thus serving a valuable safety net role. The qualitative data do not indicate any change in prevalence or importance since baseline. These groups include Village Development Councils (VDCs), natural resource management groups, and conflict management groups. VDCs were central to identifying vulnerable households in need of humanitarian aid, which FGD participants perceived as fair and helpful to the whole community. VDCs also manage conflict in three of the villages, whereas a separate conflict management committee fulfilled this role in one village.

Conflict in sampled villages in Burkina Faso varies, but often stems from farmer-pastoralist tensions during drought when livestock enter crop fields in search of browse. The role of livestock committees is to inform extension service authorities of outbreaks of livestock disease or serious degradation of pasture lands, to facilitate or advocate for animal vaccinations, and to help livestock owners get the transhumance papers required for moving their livestock during drought. For farmers, the low-land management committee would inform the relevant extension services about threats, such as armyworm attack or flooding, and organize farmers to rebuild dikes destroyed by floods or collectively deworm crops by hand. Those two types of committees are primarily benefitting their own members, but can contribute to reducing risk and preventing conflict at the community level. In two villages in the Est region, FGD participants noted that the self-defense militia group (*Kologweogo*) had been helpful for maintaining security.

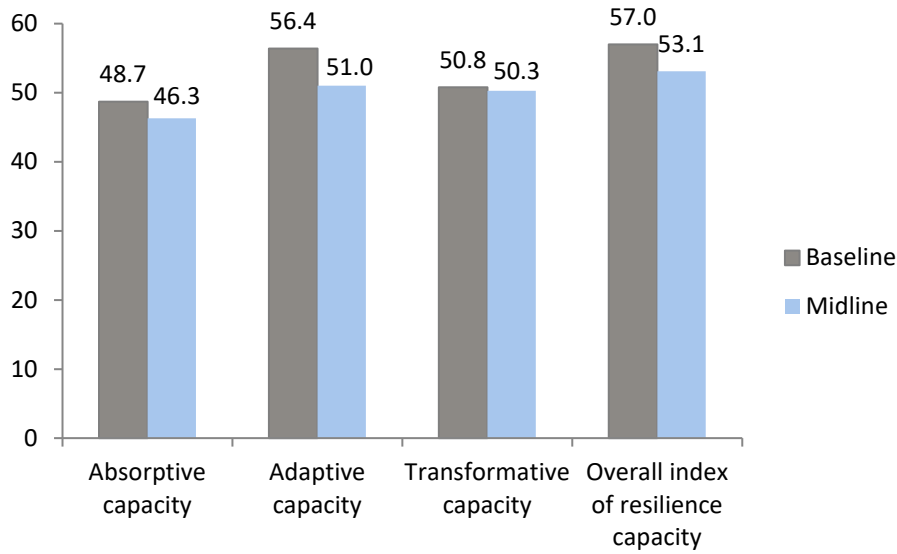
### **5.1.6 Indexes of Household Resilience Capacity**

The bottom panel of Table 9 compares baseline and midline values of the indexes of absorptive, adaptive, and transformative capacity. Figure 16, the distributions of the overall index of resilience capacity at baseline and endline, shows that for the RISE population as a whole there has been very little change in resilience capacity since baseline.

**Figure 16: Distribution of index of overall resilience capacity, baseline versus midline**

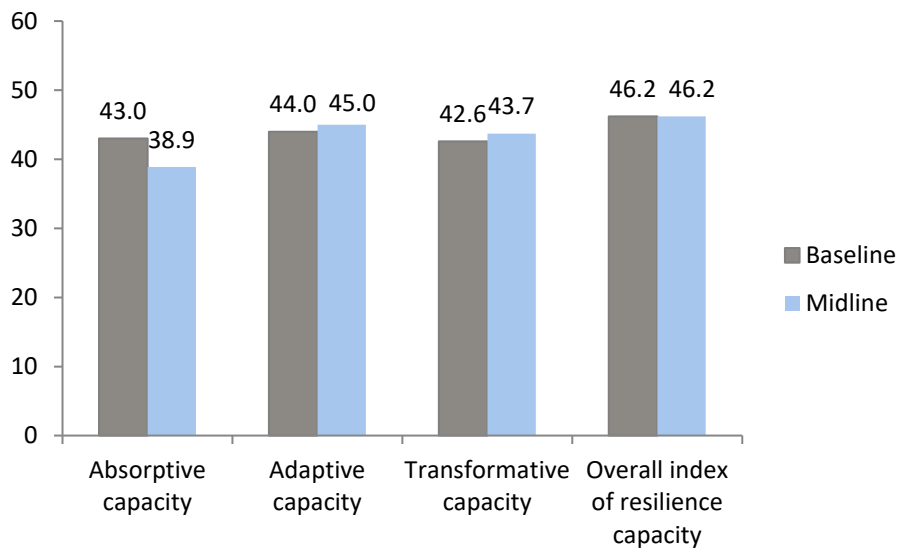
However, some differential changes by program area are apparent, illustrated in Figure 17 and Figure 18. There has been a 7.36 percent decline in the overall index of resilience capacity in Burkina Faso, driven by a decline in the index of adaptive capacity. The decline in adaptive capacity is itself rooted in drops in linking social capital, livelihood diversity, asset ownership, and exposure to information. The Niger area saw no statistically significant changes in the three forms of resilience capacity or overall capacity since the baseline.

**Figure 17: Indexes of resilience capacity, baseline versus midline, Burkina Faso program area**



Source: RISE household survey data.

**Figure 18: Indexes of resilience capacity, baseline versus midline, Niger program area**



Source: RISE household survey data.

## 5.2 Trends for the predominant livelihood groups

Trends for the predominant livelihood groups are examined in Table 10 and Figure 19 through Figure 21. The only group that saw a change in resilience capacity overall was the pastoralism group (which accounts for about 10 percent of all households), whose index declined by 10 percent. Underlying this decline was a drop in the index of adaptive capacity, with contributing index components including livelihood diversity, asset ownership (farming implements), holdings of savings and access to support for conflict mitigation. Two of these capacities declined steeply: holdings of savings, which dropped from 45 to 19 percent of households, and access to support for conflict mitigation, which declined from 70 to 46 percent.

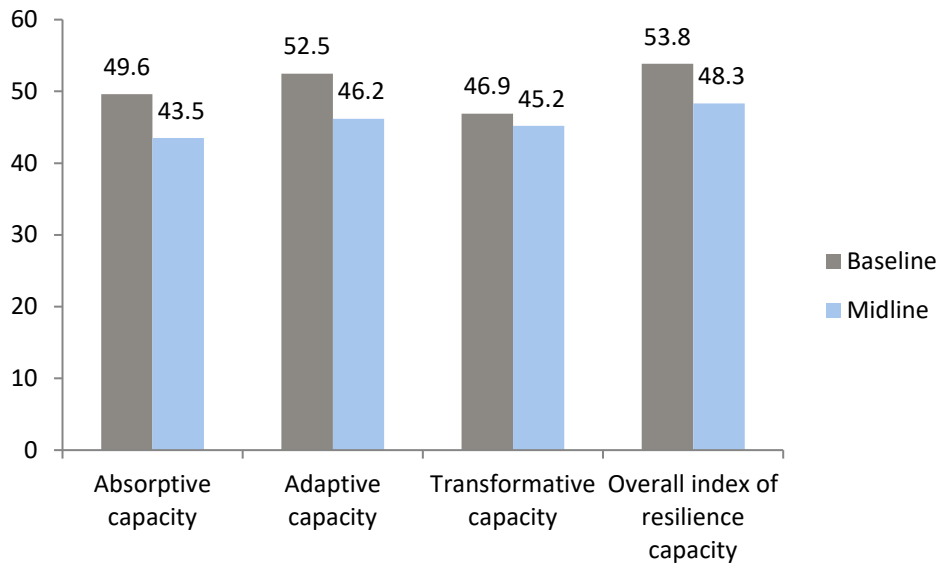
The agriculture-predominant group did not see a decline in its overall resilience capacity. However, it experienced a slight increase in aspirations and confidence to adapt and declines in exposure to information and access to hazard insurance, the latter from 47 to 25 percent. Finally, the “other” livelihood group saw a decline in exposure to information and a large decline in support for conflict mitigation--from 59 to 31 percent.

**Table 10: Indicators of resilience capacity at baseline and midline, by predominant livelihood group**

Indicator	Predominant livelihood group					
	Pastoralism		Agriculture		Other	
	Baseline	Midline	Baseline	Midline	Baseline	Midline
<b>Social capital</b>						
Bonding social capital (indexes)	80.4	75.2	70.5	74.8	70.4	75.8
Bridging social capital	64.0	55.9	50.9	55.0	53.4	59.0
Linking social capital	49.3	43.9	45.3	42.5	51.9	49.4
<b>Aspirations and confidence to adapt (index)</b>	40.9	41.9	37.8 <sup>a</sup>	42.9 <sup>a</sup>	42.0	40.3
<b>Livelihood diversity (index)</b>	2.4 <sup>a</sup>	2.2 <sup>a</sup>	2.6	2.6	2.7	2.6
<b>Asset ownership</b>						
Consumer durables (index)	8.10	8.20	7.37 <sup>a</sup>	7.97 <sup>a</sup>	8.88	8.62
Farming implements (index)	4.61 <sup>a</sup>	4.07 <sup>a</sup>	4.57	4.39	3.61	3.63
Land owned (ha)	12.67	8.34	3.13	3.58	2.13	1.78
Animals owned (Tropical Livestock Units)	3.58	3.65	4.00	3.73	2.81	2.59
Index of overall asset ownership	27.2	24.8	23.6	23.9	22.2	21.6
<b>Access to financial resources</b>						
Access to credit (% of households)	63.8	52.0	67.9	61.7	72.8	63.0
Access to savings	45.1	42.4	48.3	51.6	58.7	55.9
Index of access to financial resources	1.1	0.9	1.2	1.1	1.3	1.2
Currently holding savings	44.7 <sup>a</sup>	19.3 <sup>a</sup>	33.9	31.5	43.8	37.8
<b>Access to markets, infrastructure, services, and communal natural resources</b>						
Access to markets (indexes)	1.7	1.8	1.5	1.7	1.8	2.1
Access to infrastructure	1.0	1.1	1.2	1.1	1.7	1.4
Access to basic services	4.0	4.0	3.9	4.1	4.6	4.6
Access to communal natural resources	1.8	1.6	2.0	1.8	1.8	1.8
<b>Human capital and access to information</b>						
Human capital (indexes)	20.3	22.0	25.9	23.2	33.8	34.7
Exposure to information	3.4	2.8	3.6 <sup>a</sup>	2.6 <sup>a</sup>	3.2 <sup>a</sup>	2.5 <sup>a</sup>
<b>Safety nets</b>						
Formal safety nets (indexes)	0.9	1.0	1.0	0.8	1.0	1.1
Informal safety nets	2.1	2.1	2.0	2.0	2.1	2.5
<b>Disaster preparedness and mitigation (index)</b>	0.5	0.7	0.8	0.5	0.5	0.5
<b>Hazard insurance (% of households)</b>	40.2	27.6	47.4 <sup>a</sup>	25.4 <sup>a</sup>	45.2	28.4
<b>Institution providing conflict mitigation (% of households)</b>	70.0 <sup>a</sup>	45.5 <sup>a</sup>	52.4	54.2	58.7 <sup>a</sup>	31.1 <sup>a</sup>
<b>Indexes of resilience capacity</b>						
Absorptive capacity	49.6	43.5	45.9	42.4	45.5	44.1
Adaptive capacity	52.5 <sup>a</sup>	46.2 <sup>a</sup>	49.6	47.7	53.9	50.6
Transformative capacity	46.9	45.2	44.6	44.9	54.5	53.4
<b>Overall resilience capacity</b>	53.8 <sup>a</sup>	48.3 <sup>a</sup>	50.7	48.9	55.8	53.2

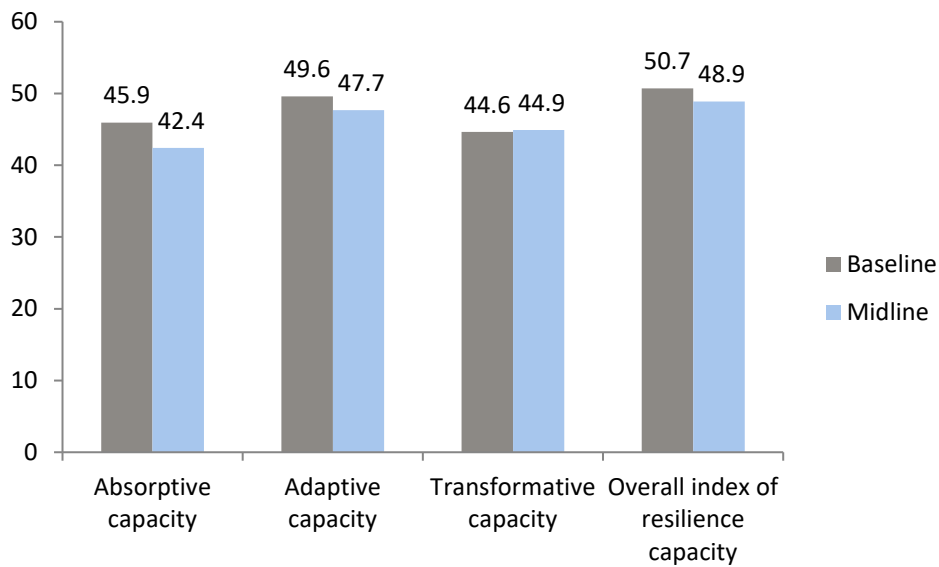
a/ Subgroups with the same superscript are significantly different at the 0.05 level. Comparisons are across columns.

**Figure 19: Indexes of resilience capacity, baseline versus midline, Pastoralism predominant livelihood**



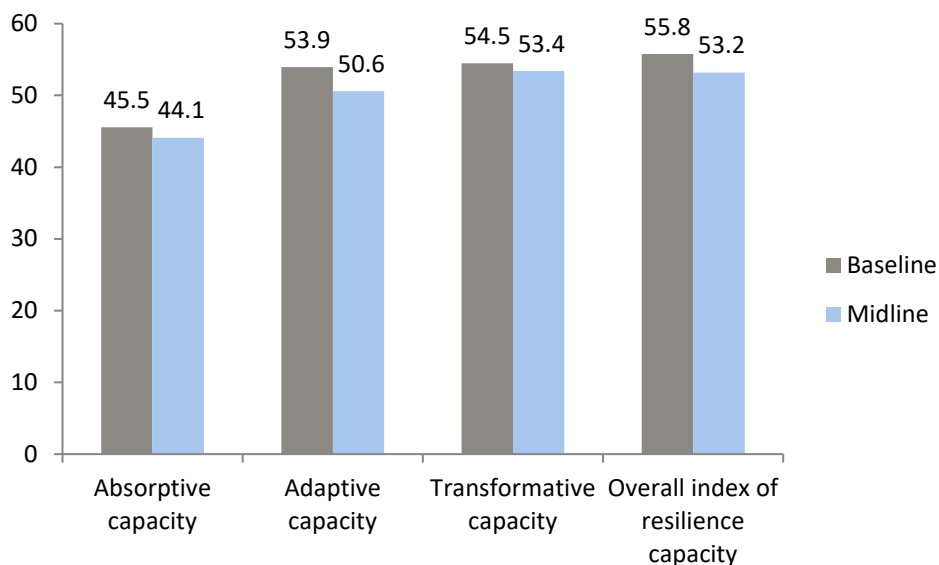
Source: RISE household survey data.

**Figure 20: Indexes of resilience capacity, baseline versus midline, Agriculture predominant livelihood**



Source: RISE household survey data.

**Figure 21: Indexes of resilience capacity, baseline versus midline: “Other” predominant livelihood**



Source: RISE household survey data.

### 5.3 What makes households resilient: Further insights on resilience capacities from the qualitative data

Qualitative data from Niger suggest that diversifying agricultural production and income sources (i.e., livelihood diversity) is considered an important mechanism for improving resilience and reducing exposure to recurrent and multiple shocks. In one village in the Zinder Region, home gardens and ownership of small ruminants (through credit and training for animal fattening) are identified as two specific contributions of the RISE program to building resilient livelihoods.

In all high-exposure villages sampled, RISE projects are seen as a positive force driving resilience. Learning about new agricultural techniques and practices (human capital formation), and receiving seeds for horticultural production, are consistently reported as characteristics of better-off households. Such advantages are also perceived as resulting from being a program beneficiary, so much so that households identified by respondents as resilient are often those that were beneficiaries of RISE or other projects. Additionally, being an active RISE program community liaison for activities related to agriculture and livestock development is also associated with resilient households.

For women, the key factor perceived as contributing to resilience is belonging to a savings and credit group (access to financial resources). Although some men did not necessarily note women’s contribution to providing for the household as a result of their participation in the groups as important, **women** themselves consider participation in the groups to be critical for their engagement in and development of IGAs, and thus contributing to household resilience.



Another resilience strategy reported by some FGDs in Niger is to ensure children get an education (human capital) so that they can get good jobs, often in urban settings away from the village, and can help their families through remittances and other support. Respondents in a village in Maradi Region indicated they had learned by observing households whose children had continued studying; they became inspired and convinced that sending their children to school and supporting them in pursuing a secondary education is an essential investment in their own future well-being.

**Box 14: Quote from resilient households, Maradi Region**

“In the past, people were not very invested in their children’s education, but now, after all these catastrophes, we see that the people of the village who succeeded in their studies are now the ones who come and help. This is why now everybody is sending their children to school and pushing them to study. Before, the children married very young, but now we wait until they are able to take care of and support themselves. We even allow the girls to study following the example of our female executives and ministers.”

Qualitative data from Burkina Faso reflect similar perspectives; those activities that allow households to generate additional income in relation to food security are considered as contributing to household resilience. This finding applies to interventions such as cash donations where the money was used to buy food (safety nets), but also for activities like developing rice production in lowlands where it provided income (from sales of rice) for purchasing sorghum or maize, which helped reduce food insecurity. Livestock interventions (i.e., habanayé) were perceived as helping people to access additional financial resources by

selling animals in case of difficulty or to initiate another activity (livelihood diversity). Other examples include SECCA (tontine) or animal donations (which allow households to sell donated animals in order to purchase food). More surprising was when people associate resilience capacity with the ability to “generate” money through WASH activities, for example, where hygiene awareness-raising activities (human capital formation)— including washbasins and culinary demonstrations—are said to have made it possible to reduce household health expenditures. This reduction in spending allows households to save or direct their money towards the purchase of food.

## 5.4 Summary

Resilience capacity has changed very little in the RISE area as a whole since the baseline. However, there have been some notable differences within the program areas.

The Burkina Faso area saw a small decline in its resilience capacity since baseline, as marked by a drop in the overall index of resilience capacity from 57.0 to 53.1. This decline was driven by a reduction in adaptive capacity, itself rooted in drops in linking social capital, livelihood diversity,

asset ownership (farming implements and land), and exposure to information. Other important capacities that have seen a decline in Burkina Faso are: holdings of savings, access to firewood on communal lands, and access to hazard insurance. None of the capacities measured here appear to have improved in this program area.

For the Niger area, the finding of no change in the overall index of resilience capacity masks some significant changes, both positive and negative. Five capacities have improved: bonding social capital, aspirations and confidence to adapt, livelihood diversity, asset ownership (consumer durables), and access to markets. Four have declined: access to infrastructure (specifically, paved roads), access to communal natural resources (firewood), exposure to information, and access to hazard insurance.

While the qualitative data collected at midline do not give insight into trends in resilience capacities, they point to four as being particularly important for households' ability to recover from shocks—livelihood diversity, human capital, access to financial resources, and safety nets. From both the baseline and midline (see Chapter 3) qualitative data, bonding social capital is also viewed as a critical capacity for household resilience.

## 6. WHICH RESILIENCE CAPACITIES HELPED HOUSEHOLDS RECOVER FROM SHOCKS?

Chapters 3, 4 and 5 examined trends in households' shock exposure, food security, resilience, and resilience capacities. This chapter pulls these measures together in a regression analysis examining the relationship between households' resilience capacities and their resilience to shocks. It asks which of the three capacities—absorptive, adaptive and/or transformative—and which individual capacities helped households recover from the shocks they faced. Doing so identifies which capacities have the potential to help households recover from future shocks and thus which should be considered in program planning. The regression analysis relies on both the full midline cross-sectional data set with 2,492 households and the panel data set with the 360 households included in both the baseline and midline samples (see Chapter 2).

As a precursor to identifying which *specific* capacities helped households recover, the chapter starts by using the resilience capacity indexes to ask two broader questions: (1) “Did households' resilience capacities reduce the negative impact of shocks on their food security?” (Section 6.1); and (2) “Did households' resilience capacities enhance their ability to recover from shocks?” (Section 6.2). The first question, which uses food security as a dependent variable, is indirect evidence that resilience capacities serve to enhance resilience as hypothesized. The latter gives more direct evidence, using actual measures of resilience as dependent variables. Section 6.3 then singles out each of the resilience capacities listed in Chapter 5, Figure 15 for analysis.

## 6.1 Did households' resilience capacities reduce the negative impact of shocks on their food security?

Table 11 contains Ordinary Least Squares-Fixed Effects regression results investigating whether households' resilience capacities reduced the negative impact of the shocks they faced in the year prior to the midline survey. The dependent variable for all regressions, which are based on the cross-sectional data set, is the food security index introduced in Chapter 4. The independent variables are the overall index of resilience capacity (see Chapter 5), household shock exposure (Chapter 3), and various demographic and economic characteristics of households, including their asset ownership. The main result of interest is the sign and statistical significance of the coefficient on an interaction term between shock exposure and the resilience capacity index; a positive coefficient is suggestive evidence of the resilience-enhancing effect of resilience capacity.<sup>24</sup>

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<sup>24</sup> Equation (1) in Chapter 2 is the empirical specification for this analysis.

**Table 11: Regression analysis of the relationship between household food security, shock exposure, and resilience capacity: Cross-sectional analysis (N=2,492)**

Shock exposure variable:	Overall shock exposure (perceptions-based)			Drought shock exposure		
	Shock exposure index (A)	Specific exogenous shocks (B)	Specific downstream shocks (C)	Drought severity (perceptions-based) (D)	Cumulative rainfall deficit (E)	Months of meteorological drought (F)
<b>Resilience capacity</b>	0.006	-0.012	0.002	0.004	-0.016	-0.017
Shock exposure	-0.091 **			-0.238	-0.698 ***	-0.867 **
Specific types of shocks						
Too little rain (drought)		-1.160 ***				
Too much rain (flooding)		0.334		0.472	1.474 **	1.554 **
Insect invasion		-0.040		0.088	-0.393	-0.243
Animal disease outbreak			-0.559	-0.527	-0.218	-0.256
Economic stressors b/			-0.347 *	-0.331	-0.016	-0.099
Conflict			-0.684 *	-0.677	-1.122 **	-1.167 **
Illness/death			-1.336 **	-1.400 **	-0.388	-0.421
Adult equivalents	-0.258 *	-0.284 *	-0.263 *	-0.267 *	-0.142	-0.113
AE-squared	0.010	0.011	0.012	0.011	0.005	0.005
Percent females 0-16 a/						
Females 16-30	0.048 ***	0.047 ***	0.047 ***	0.047 ***	0.047 ***	0.046 **
Females 30 plus	0.018	0.016	0.016	0.016	0.010	0.010
Males 0-16	-0.011	-0.011	-0.011	-0.011	-0.011	-0.012
Males 16-30	0.027 **	0.029 **	0.027 **	0.027 **	0.041 ***	0.042 **
Males 30 plus	0.014	0.013	0.016	0.014	0.029 *	0.031 **
Education: None a/						
Primary	0.406	0.378	0.440	0.387	0.420	0.357
Secondary	0.501	0.517	0.523	0.460	0.866 *	0.787
Female-adult-only hh	-0.300	-0.373	-0.288	-0.308	-0.756	-0.752
Livelihood: Other a/						
Agriculture	-0.280	-0.129	-0.331	-0.293	-0.365	-0.416
Pastoralism	-0.359	-0.306	-0.379	-0.349	-0.880 *	-0.729
Asset index	0.175 ***	0.187 ***	0.179 ***	0.177 ***	0.155 ***	0.151 **
Burkina Faso					0.567	0.982
Fixed-effects level	Village	Village	Village	Village	Country	Country
R-squared	0.271	0.271	0.271	0.274	0.112	0.109
Resilience capacity*Shock exposure	-0.003	--	--	-0.005	0.019 *	0.057 **

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels. *t*-statistics are robust to heteroskedasticity.

a/ Reference category.

The six regressions reported on in the table differ by which specific measure is used to control for shock exposure. The first three regressions (columns A-C) control for overall shock exposure at the household level—including environmental, economic and conflict shock—as measured using household perceptions-based data. The second three regressions (columns D-F) control for drought, the most commonly-experienced environmental shock. Drought exposure is measured using household perceptions data (with one-year recall) as well as two indicators measured at the village level from the African Flood and Drought Monitor, the cumulative rainfall deficit and number of months of meteorological drought (in the year prior to the midline). As we saw in Chapter 3, these indicators all capture different dimensions of drought exposure. The perceptions-based indicator captures the *spread* of drought throughout the RISE program area in addition to the perceived severity of its effects on households' food and income. The cumulative rainfall deficit summarizes the severity of drought. Months of meteorological drought measures how long households are exposed to drought, or drought duration.

It is important to keep in mind that while the cross-sectional regressions reported in Table I I have the advantage of a large sample size, they rely on *midline* resilience capacity data that was collected after shocks and coping have already occurred. The midline capacities could have been affected by our dependent variable, food security, itself or shocks, biasing the results. The fact that resilience capacity did not change very much since the baseline reduces the likelihood of such bias (see Chapter 5).

Regarding the regression results, we first note that regardless of how measured, they indicate that shock exposure had a decidedly *negative* effect on households' food security. The coefficient on the overall perceptions-based shock exposure index is negative and statistically significant at the 5% level. Looking more closely at specific shocks, the results in columns B and C of Table I I indicate that drought, economic stressors (such as food price increases), conflict shocks, and illness and death likely had negative impacts on households' food security.<sup>25</sup> Focusing in on drought (Columns D-F), the coefficient on the perceptions-based indicator is negative and marginally significant ( $p=0.134$ ). Those on the AFDM indicators are both negative and strongly statistically significant (at the 1% level), signifying as would be expected that as the severity and duration of rainfall deficit increases, household food security declines.

The bottom row of Table I I reports the coefficients on the interaction term between household resilience capacity and shock exposure, the main results of interest in this section.<sup>26</sup> While the coefficients are not significant when the perceptions-based measure of shock exposure is employed, they are positive and statistically significant (at the 10% and 1% levels, respectively) when the AFDM shock exposure measures are employed. These results provide

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<sup>25</sup> The shock indicators employed here are dummy variables indicating whether or not each shock was experienced.

<sup>26</sup> The full regressions run to produce these coefficient estimates include all of the independent variables listed in the left-hand column of the table.

suggestive evidence that **households' resilience capacities do reduce the negative impact of drought on their food security.**

The result for “months of meteorological drought” is illustrated in Figure 22. It shows the implied impact of drought duration on food security at three values of the resilience capacity index: the mean (red line), the mean minus 20 points (blue line), and the mean plus 20 points (green line). At the lowest resilience capacity, the slope of the line is steeply negative, such that as drought duration increases households' food security drops precipitously. On the other hand, at the highest level of resilience capacity households' food security is not negatively affected at all.

**Figure 22: Estimated recovery trajectory as drought duration increases at differing levels of resilience capacity**

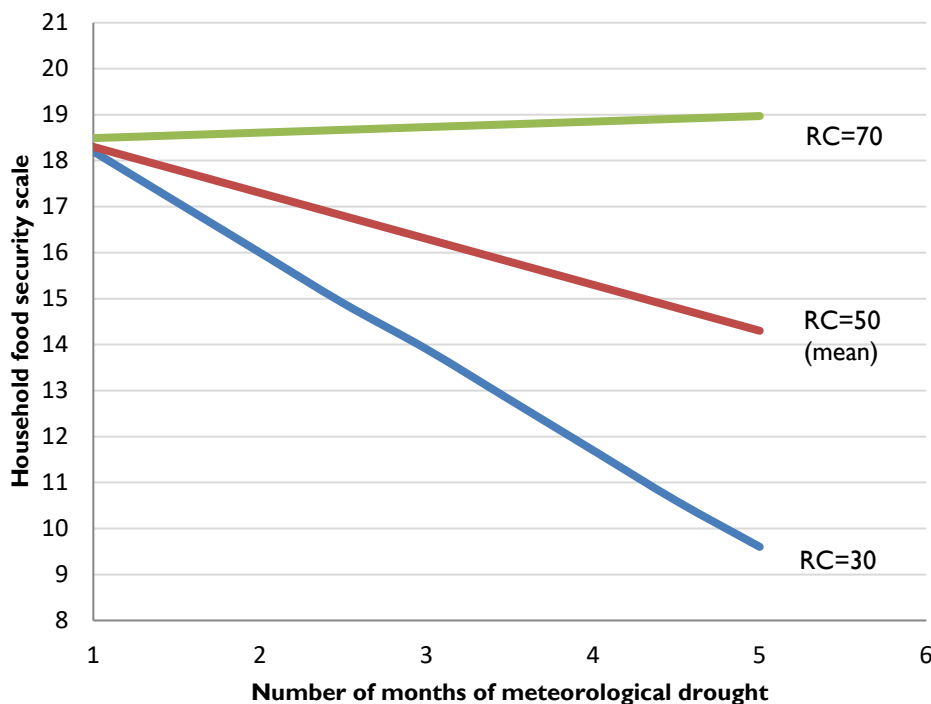


Table 12 shows the coefficients of the interaction term individually for the three dimensions of resilience capacity. When interacted with the shock duration measure, all—absorptive, adaptive, and transformative—have positive and strongly statistically significant coefficients. These results indicate that **all three dimensions of resilience capacity work to reduce the negative impact of drought and thus contribute to households' resilience.**

**Table 12: Regression analysis of the relationship between food security, shocks, and the three dimensions of resilience capacity: Cross-sectional analysis (N=2,492)**

Shock exposure variable:	Overall shock exposure (perceptions-based)	Drought shock exposure		
		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought
<b>Absorptive capacity</b>				
Absorptive capacity* Shock exposure	-0.0004	0.0005	0.0141	0.037 ***
<b>Adaptive capacity</b>				
Adaptive capacity* Shock exposure	-0.0013	-0.004	0.0153	0.041 ***
<b>Transformative capacity</b>				
Transformative capacity* Shock exposure	-0.0034	-0.009	0.0197 *	0.065 ***

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels. t-statistics are robust to heteroskedasticity.

## 6.2 Did households' resilience capacities enhance their ability to recover from shocks?

The results looking at the relationship between the indexes of resilience capacity and measures of households' ability to recover from shocks are reported in Table 13. The indicators of resilience serving as dependent variables are: (1) households' perceived ability to recover, measured for all 2,492 households in the midline sample (left hand panel of the table); and (2) the change in food security between the baseline and midline surveys, measured for the 360 panel households and analyzed using growth regression (right hand panel). The same measures of drought exposure and the other independent variables used for Section 6.1's analysis are employed here.<sup>27</sup>

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<sup>27</sup> The empirical specifications for these analyses are Equations (2), (3) and (4) in Chapter 2.



**Table 13: Regression analysis of the relationship between households' ability to recover from shocks and resilience capacity: Cross-sectional and panel results**

Shock exposure variable:	Cross-sectional analysis: Perceived ability to recover				Panel analysis: Change in food security			
	Overall shock exposure (perceptions-based)	Drought shock exposure			Overall shock exposure (perceptions-based)	Drought shock exposure		
		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought
Resilience capacity	0.015 **	0.012 **	-0.005 *	-0.005 *	-0.026	-0.031	0.026	0.041
Shock exposure	-0.016 ***	-0.054 ***	-0.046	-0.035	-0.111	-0.270	-1.337 ***	-1.840 ***
Baseline food security					-1.030 ***	-1.032 ***	-0.964 ***	-0.999 ***
Non-drought shocks								
Rainfall: Too much		0.237 ***	0.227 **	0.240 **		-0.303	-0.480	-0.838
Insect invasion		0.007	0.054	0.063		0.904	1.154	1.222
Animal disease outbreak		-0.144 ***	-0.069	-0.077		-1.731	-1.297	-1.204
Economic stressors b/		-0.044 *	-0.074 **	-0.079 ***		-0.025	0.013	-0.129
Conflict		0.051	0.144 ***	0.140 **		-1.975	-1.366	-1.510
Illness/death		0.075	0.148	0.148		-1.219	-1.339	-1.361
Adult equivalents	-0.019	-0.025	-0.009	-0.007	0.490	0.690	0.458	0.535
AE-squared	0.001	0.001	0.000	0.000	-0.024	-0.036	-0.022	-0.028
Percent females 0-16 a/								
Females 16-30	0.000	0.000	0.002	0.002	0.043	0.046	0.034	0.040
Females 30 plus	0.003	0.003	0.003 *	0.003 *	0.016	0.016	0.014	0.011
Males 0-16	0.000	0.000	0.000	0.000	-0.021	-0.027	-0.031	-0.032
Males 16-30	0.000	0.000	0.001	0.001	0.028	0.021	0.018	0.022
Males 30 plus	-0.004	-0.004	-0.001	-0.001	0.002	0.005	-0.004	-0.001
Education: None a/								
Primary	0.019	0.012	0.101 **	0.099 **	0.625	0.520	0.413	0.106
Secondary	-0.066	-0.063	0.118 **	0.111 *	1.158	1.051	1.157	0.555
Female-adult-only hh	-0.095	-0.120	-0.223 *	-0.216 *	1.487	1.887	2.158	2.039
Livelihood: Other a/								
Agriculture	-0.054	-0.032	-0.041	-0.045	-1.533 *	-1.633 *	-1.644 *	-1.493 *
Pastoralism	-0.080	-0.067	-0.306 ***	-0.297 ***	-1.329	-1.739	-2.294 *	-2.153
Asset index	-0.003	-0.002	0.006 **	0.006 **	0.185 ***	0.199 ***	0.139 ***	0.138 ***
Burkina Faso	-	-	0.396 ***	0.444 ***	1.344	2.255 **	0.180	0.392
Fixed-effects level	Village	Village	Country	Country	Country	Country	Country	Country
R-squared	0.376	0.388	0.152	0.148	0.5334	0.542	0.563	0.5599
Number of observations	2,388	2,386	2,386	2,388	360	360	360	360
Resilience capacity*Shock exposure					0.002	-0.007	0.018	0.020

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels. *t*-statistics are robust to heteroskedasticity.

a/ Reference category.

For perceived ability to recover, we find a positive, statistically significant (at the 5% level) association between households' resilience capacity and their ability to recover when the experiential measures of shock exposure are employed. However, a negative and marginally significant relationship is found when the AFDM shock exposure measures are employed.

The panel analysis using the change in food security as the measure of resilience yields no statistically significant results for overall resilience capacity. However, it does confirm that households' baseline food security is an important determinant of their resilience that needs to be taken into account. In particular, the coefficients on baseline food security (before the shocks took place) are negative, indicating that the higher is one's initial food security, the lower will be the change in food security in the future, regardless of shocks. This makes sense since households with higher food security are closer to the maximum of the food security scale and thus have a shorter remaining "window" for increases, whereas the opposite is true for households at the lower end of the scale.

Table 14 shows results for the three dimensions of resilience capacity. The cross-sectional analysis gives mixed results depending on the measure of shock exposure controlled for. The panel analysis—which provides more rigorous evidence—indicates that absorptive capacity played a role in bolstering recovery from shocks. In particular, the results indicate that **households' absorptive capacity reduced the negative impact of increasing drought duration on their ability to maintain their food security between the baseline and midline survey** ( $p=0.045$ ). This stronger evidence supports the conclusion that households' prior absorptive capacities did indeed bolster their resilience to this most commonly-experienced climate shock.

**Table 14: Regression analysis of the relationship between households' ability to recover from shocks and the three dimensions of resilience capacity: Cross-sectional and panel results**

Shock exposure variable:	Cross-sectional analysis: Perceived ability to recover				Panel analysis: Change in food security			
	Overall shock exposure (perceptions-based)	Drought shock exposure			Overall shock exposure (perceptions-based)	Drought shock exposure		
		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought
<b>Absorptive capacity</b>	0.020 ***	0.019 ***	-0.004 **	-0.005 ***	-0.013	-0.013	0.064 *	0.068 *
Absorptive capacity* Shock exposure					0.003	0.008	0.015	0.040 **
<b>Adaptive capacity</b>	0.009 **	0.007 *	-0.004	-0.004	-0.022	-0.027	0.022	0.032
Adaptive capacity* Shock exposure					0.002	-0.003	0.018	0.023
<b>Transformative capacity</b>	0.001	-0.003	-0.004 *	-0.004 **	-0.024	-0.028	0.000	0.011
Transformative capacity* Shock exposure					-0.001	-0.021	0.012	0.002

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels. t-statistics are robust to heteroskedasticity.

## 6.3 Which resilience capacities helped households recover from the shocks they faced?

The results reported in Table 15 give insight into which of the specific capacities listed in Figure 15 may have helped households recover from shocks. Only those from growth regressions with the change in food security between the baseline and midline as the dependent variable—which give the most rigorous evidence—are reported here. The blue-shaded boxes indicate that the regression coefficient of interest is positive and statistically significant while the red-shaded boxes indicate that it is negative and statistically significant.

From Table 15, we find that the following capacities likely helped households recover from the shocks they faced in the year prior to the midline survey:

- Holdings of savings;
- Disaster preparedness and mitigation;
- Asset ownership; and
- Bridging social capital.

Although weaker (significance at the 10% level), evidence is also found for:

- Bonding social capital;
- Availability of hazard insurance; and
- Access to financial resources.

Note that two of these capacities, bonding social capital and access to financial resources, were identified by qualitative survey respondents as being particularly important supports to households for recovering from shocks (see Chapter 5).

Given that asset ownership and holdings of savings are found here to help boost households' resilience in the face of shocks, it is concerning that they are on a declining trend in the Burkina Faso area. The availability of hazard insurance shows a steeply declining trend in the entire RISE area. On the positive side, bonding social capital shows a positive trend in the Niger area.

Four capacities have negative associations with the change in food security between the baseline and midline: Access to informal safety nets (e.g., women's groups and charitable groups), access to markets, access to infrastructure, and access to communal natural resources. These unintuitive results may be due to the fact that some households gained higher access to these resources precisely *because* of their lower ability to recover from shocks.

**Table 15: Regression analysis of the relationship between households' resilience to shocks and specific resilience capacities: Panel results (N=360)**

Shock exposure measure:	Overall shock exposure (perceptions-based)		Drought severity (perceptions-based)		Cumulative rainfall deficit		Months of meteorological drought	
	Basic model	With shock exposure interaction	Basic model	With shock exposure interaction	Basic model	With shock exposure interaction	Basic model	With shock exposure interaction
<b>Absorptive capacity</b>								
Bonding social capital								*
Holdings of savings				**	**		*	
Access to informal safety nets	***		***					
Availability of hazard insurance					*			*
Disaster prep/mitigation					*		**	
Asset index	***		***		***		***	
<b>Adaptive capacity</b>								
Bridging social capital						*		***
Linking social capital								
Aspirations/confidence to adapt								
Livelihood diversity								
Access to financial resources						*		
Human capital								
Exposure to information								
Asset index	***		***		***		***	
<b>Transformative capacity</b>								
Bridging social capital						*		***
Linking social capital								
Access to markets				**				
Access to infrastructure	**		**		*	*		
Access to services								
Communal nat. resources	**		**					
Formal safety nets								

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels. *t*-statistics are robust to heteroskedasticity.

The dependent variable is the change in food security between the baseline and midline surveys.

Blue-shaded cells indicate positive and statistically significant coefficients; red-shaded cells indicate negative and statistically significant coefficients.

## 6.4 Summary

This chapter's regression analyses using both the cross-sectional and panel data sets has provided suggestive evidence that households' resilience capacities do indeed serve to enhance their resilience to shocks. More specifically, evidence is provided that all three types of resilience capacity—absorptive, adaptive and transformative—reduce the negative impact on households' food security of the most widely-reported shock, drought. Further analysis using the panel data confirms that households' absorptive capacity (the ability to minimize exposure to shocks and recover quickly when exposed), likely enabled them to recover from drought conditions. Specific absorptive capacities that may have helped households recover from the shocks they experienced in the period between the baseline and midline surveys are:

- Bonding social capital;
- Holdings of savings;
- Availability of hazard insurance;
- Disaster preparedness and mitigation; and
- Asset ownership;

Evidence was also found for two adaptive capacities:

- Bridging social capital; and
- Access to financial resources.

Two of these capacities, bonding social capital and access to financial resources, were identified by qualitative survey respondents as being particularly important supports to households for recovering from shocks (see Chapter 5).

Given that asset ownership and holdings of savings were found in this chapter to help boost households' resilience in the face of shocks, it is concerning that they are on a declining trend in the Burkina Faso area. Also of concern is that the availability of hazard insurance shows a steeply declining trend in the entire RISE area. On the positive side, bonding social capital shows a positive trend in the Niger area.

## 7. EXPLORING HOW EXPOSURE TO RISE INTERVENTIONS HAS AFFECTED HOUSEHOLDS' RESILIENCE TO SHOCKS

Appropriate data for a formal impact evaluation of the RISE program will be collected as part of the endline survey. Meanwhile, in this chapter an exploratory analysis of the effect of the program to date on households' resilience to shocks, in addition to their underlying resilience capacity, is undertaken. The analysis draws on the differences across households residing in high exposure villages (the "treatment group") and low exposure villages (the "control group"). As detailed in Chapter 2, high exposure villages are benefiting from a set of FFP projects, REGIS-ER and/or REGIS-AG—the latter two of which provide comprehensive resilience programming—while low exposure villages do not.

The three methods employed are laid out in Chapter 2. They are: 1) Cross-sectional fixed-effects regression (N=2,492), where the dependent variables are perceived ability to recover and the indexes of households' resilience capacities; 2) Panel fixed-effects growth regression (N=360), where the dependent variables are the change in food security and change in indexes of resilience capacity between the baseline and midline; and 3) Difference-in-difference analysis. For the latter, the variables analyzed are food security, perceived ability to recover, indexes of resilience capacity, and individual indicators of resilience capacity.<sup>28</sup>

As seen in Chapters 4 and 5, all three of the key outcomes of analysis of this chapter—food security, perceived ability to recover, and resilience capacity<sup>29</sup>—have declined between the baseline and midline surveys, a period marked by a major drought and generally increasing shock exposure. Figures 23 through 25 show baseline-to-midline changes in the outcome variables for RISE low and high exposure households. Food security and perceived ability to recover have both declined *more* for high-exposure than low-exposure households. Resilience capacity also registers a greater decline for the high-exposure group, although the difference is not statistically significant. These descriptive findings may lead one to consider whether the program has had its intended positive impacts over the first two years of its operation. We will see in this chapter that when pre-existing differences across the groups at baseline are taken into account in the panel regression and DID analyses, it becomes apparent that the program

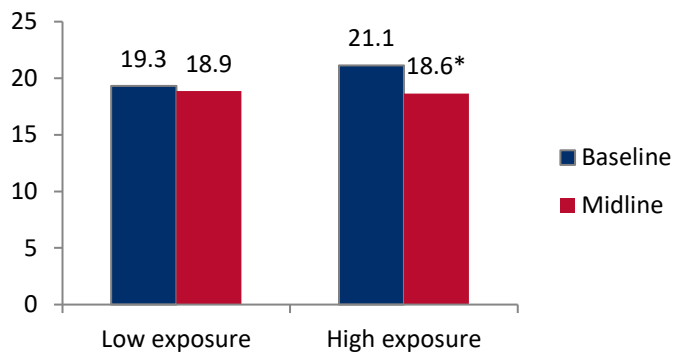
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<sup>28</sup> One type of analysis included in Chapter 6 is not here: that using the midline cross-sectional data set to examine whether the RISE project helped reduce the negative impact of shocks on households' food security (see Section 6.1). It is not included because at midline the shock exposure of high-exposure households was not only much greater than that of low-exposure households (for example, the number of months of meteorological drought was three times higher for the high-exposure group) but, more importantly, had far greater variation across the population (the standard deviation of the months of drought of the high-exposure group was more than double that of the low-exposure group: 1.03 vs. 0.48). Such a difference in variation renders this kind of analysis invalid.

<sup>29</sup> The overall resilience capacity index has declined slightly for the RISE population as a whole, but the decline has only been statistically significant in the Burkina Faso area.

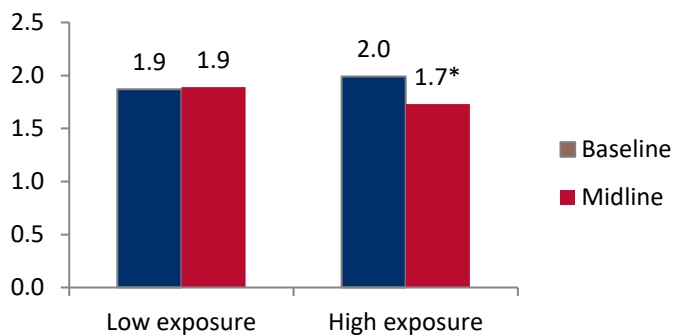
has likely enhanced households' resilience to shocks and boosted some important forms of resilience capacity.

**Figure 23: Baseline-midline changes in food security for RISE low- and high-exposure households**



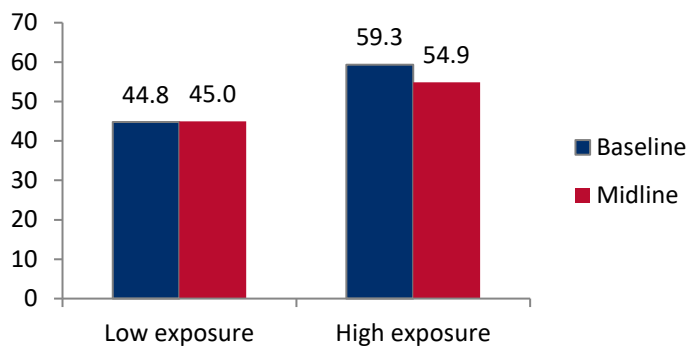
Note: Star (\*) indicates that the baseline-midline difference is statistically significant at least at the 5% level.

**Figure 24: Baseline-midline changes in perceived ability to recover from shocks for RISE low- and high-exposure households**



Note: Star (\*) indicates that the baseline-midline difference is statistically significant at least at the 5% level.

**Figure 25: Baseline-midline changes in the overall resilience capacity index for RISE low- and high-exposure households**



Note: Star (\*) indicates that the baseline-midline difference is statistically significant at least at the 5% level.



## 7.1 Comparison of baseline characteristics of low-exposure and high-exposure households

An important consideration in interpreting the results reported in this chapter is the existence of pre-existing differences between low-exposure and high-exposure households at baseline. Table 16 shows that food security was higher at baseline for the high-exposure households. Additionally, households' resilience capacities were substantially greater for the high-exposure households, with the overall index of resilience capacity being a full 33 percent higher. These differences in our key dependent variables must be taken into account in order to determine whether RISE has increased households' resilience.

Two factors may underlie the above differences across the treatment and control groups. First, most of the high-exposure villages had already benefited from some REGIS-ER interventions at the time of the baseline. Second, the selection of which specific villages to introduce interventions in by some RISE partners was based on explicit or implicit criteria (for example, accessibility, absence of serious conflicts, demonstration of local initiative or leadership) based on the judgment of local technical and administrative authorities. These criteria may account for some of the noted differences in the “starting points” of high and low-exposure villages.<sup>30</sup>

Other differences across the groups are that the low-exposure group owns more animals and land, and the high exposure group is more educated and less likely to rely on pastoralism as a primary livelihood. Importantly, there is no difference in shock exposure at baseline across the low- and high-exposure groups.

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<sup>30</sup> Steve Reid (Chief of Party, SAREL). Personal communication, March 2018.

**Table 16: Comparison of baseline characteristics of low-exposure and high-exposure households**

Measure	Low exposure	High exposure	Difference	
<b>Food security</b>				
Food security index	19.33	21.14	1.81	**
Dietary diversity score	5.10	5.09	-0.01	
<b>Resilience</b>				
Ability to recover index	1.89	1.99	0.11	
<b>Shock exposure</b> (year before baseline)				
Perceptions-based shock exposure index	8.13	7.59	-0.54	
Cumulative rainfall deficit	2.14	2.07	-0.07	
<b>Resilience capacity</b>				
Absorptive capacity	38.35	53.78	15.43	***
Adaptive capacity	45.74	55.85	10.11	***
Transformative capacity	37.02	56.87	19.85	***
Overall resilience capacity	44.78	59.34	14.56	***
<b>Economic status</b>				
Consumption assets (indexes)	7.83	7.74	-0.10	
Productive assets	4.37	4.34	-0.02	
Animals (Tropical livestock units)	4.60	2.87	-1.73	**
Land owned (ha)	4.33	3.08	-1.25	***
Overall asset index	24.29	22.87	-1.42	
<b>Demographic characteristics</b>				
Household adult equivalents	5.34	5.30	-0.04	
Percent of female adult only households	5.88	5.85	-0.04	
Education (percent)				
None	48.04	37.36	-10.69	
Primary	38.41	40.37	1.96	
Secondary	13.55	22.27	8.73	*
Predominant livelihood				
Pastoralist	11.29	5.83	-5.46	**
Agriculture	64.49	72.18	7.69	
Other	24.22	21.99	-2.23	

## 7.2 Regression analysis of the relationship between resilience outcomes and RISE intervention exposure

### 7.2.1 Cross-sectional OLS regressions

Cross-sectional OLS regression, the first method used to examine the RISE program's effect to date, does not account for initial differences across the treatment and control groups (see Chapter 2, Equation 5). While having the advantage of a large sample size, it can thus be expected to yield upward biased estimates of program effects. Table 17 contains the results. As for the analysis in Chapter 6, separate regressions are run for the four different measures of shock exposure. The independent variables controlled for are the same as those employed for Chapter 6's analysis (see Table 11).

A positive and statistically significant coefficient on the RISE intervention exposure dummy variable for ability to recover would be suggestive evidence of a resilience-enhancing influence of the RISE program; such a positive coefficient is not apparent from the data in this OLS specification. Coefficients are positive, however, for one dimension of resilience capacity, adaptive capacity, being statistically significant at least at the 10% level in all four specifications. According to this analysis, then, the RISE program has served to enhance households' adaptive capacity, the ability to make proactive and informed choices about alternative livelihood strategies based on changing conditions. This result holds despite the fact that adaptive capacity saw a small decline in the Burkina Faso program area (see Chapter 6).

**Table 17: Regression analysis of the relationship between resilience outcomes and RISE intervention exposure (Cross-sectional analysis, N=2,492)**

Shock exposure variable:	Overall shock exposure (perceptions-based)	Drought shock exposure		
		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought
<b>Dependent variable</b>				
<b>Ability to recover</b>	-0.064	-0.098	-0.106 *	-0.078
<b>Resilience capacity</b>				
Absorptive capacity	1.77	1.01	-0.35	4.21
Adaptive capacity	6.69 **	5.42 **	4.78 *	7.50 ***
Transformative capacity	4.59	3.97	3.46	7.38
<b>Overall resilience capacity</b>	4.97	4.48	3.67	7.31 **

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

t-statistics are robust to heteroskedasticity. The values in this table are coefficients on the RISE intervention dummy variable that is equal to "1" for high-exposure households.

## 7.2.2 Panel growth regressions

While the panel growth regressions have the disadvantage of a small sample size, they have the important advantage of controlling for baseline values of the dependent variable, whether that dependent variable is changes in food security or changes in resilience capacity (see Chapter 2, Equations 6 and 7). The results are reported in Table 18, with p-values in parentheses below each coefficient.

Here we find that the coefficient on the treatment variable is positive and statistically significant at the 5 percent level when cumulative rainfall deficit is the shock exposure variable. It is positive and significant at or near the 10 percent level for the other shock exposure measures. These results indicate that RISE had a positive effect on households' resilience to shocks. The panel data analysis also gives important insight into *how* the program has boosted households' ability to recover, indicating that it likely did so through improving households' absorptive and adaptive capacities. The evidence, corroborated by the OLS analysis, is particularly strong for adaptive capacity.

**Table 18: Regression analysis of the relationship between households' resilience to shocks and RISE intervention exposure (Panel data analysis, N=360)**

Shock exposure variable: Dependent variable	Overall shock exposure (perceptions-based)	Drought shock exposure		
		Drought severity (perceptions-based)	Cumulative rainfall deficit	Months of meteorological drought
<b>Change in food security</b>	2.07 *	2.13	3.16 **	1.33
	(1.67)	(1.63)	(2.20)	(1.05)
<b>Change in resilience capacity</b>				
Absorptive capacity	6.670 *	5.330	4.150	8.030 **
	(1.73)	(1.34)	(0.95)	(1.99)
Adaptive capacity	7.060 **	7.190 **	6.820 **	7.550 **
	(2.26)	(2.52)	(2.44)	(2.50)
Transformative capacity	-1.260	-1.190	-0.900	-2.32
	(0.25)	(0.23)	(0.17)	(0.44)
<b>Overall resilience capacity</b>	5.25	5.10	4.73	5.370
	(1.48)	(1.50)	(1.34)	(1.47)

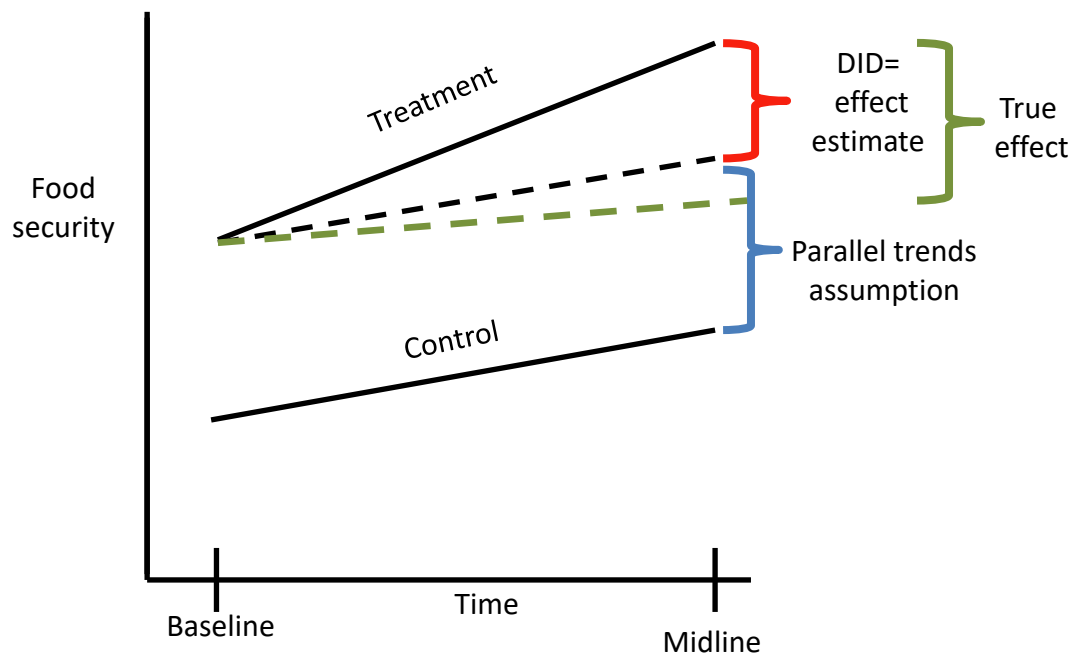
Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels (p-values are in parentheses).

t-statistics are robust to heteroskedasticity. The values in this table are coefficients on the RISE intervention dummy variable that is equal to "1" for high-exposure households.

## 7.3 Difference-in-difference analysis

Difference-in-difference analysis is a descriptive technique that evaluates program effects by comparing differences in the *changes over time* of treatment and control groups in outcomes the program is attempting to improve. It thereby removes any pre-existing difference in measured outcomes of interest between the groups, differences such as those seen in Table 16 above. The technique relies on the crucial “parallel trends” assumption: that the path over time of the outcome would be the same for the control and treatment groups if the program’s interventions had not occurred. As noted in Chapter 2, for our variables of interest—food security, ability to recover, and resilience capacity—this assumption is violated. Trends in the variables *are* expected to be different for the control and treatment groups even in the absence of the program. In the case of food security, this is clear from the growth regressions in the last chapter, which yield a coefficient on baseline food security that is negative and highly statistically significant (see Table 13): changes in food security between the baseline and midline can be expected to be intrinsically lower for groups of households with higher food security at baseline, in this case for the treatment group. This violation of the DID assumptions is illustrated in Figure 26.

**Figure 26: Difference-in-difference estimation with non-parallel trends**



Given this violation in the assumptions, the difference-in-difference between the treatment and control groups is likely to be biased downwards. As such, we can be confident in any results indicating a positive DID, that is, a positive effect of RISE, but those indicating a negative effect cannot be trusted.

Table 19 contains the DID results. The statistical significance of the differences between the control and treatment groups are reported in columns A and B; those in A do not take into account survey sampling weights while those in B do.<sup>31</sup> While no positive differences can be found for food security, ability to recover or any of the resilience capacity indexes, the following capacities show significantly higher values for the treatment group (with stars indicating those with a statistically significant DID at least at the 5 percent level both with and without sampling weights applied):

- Asset ownership\*;
- Livelihood diversity\*;
- Holdings of savings;
- Aspirations/confidence to adapt; and
- Access to markets.

These are the capacities through which the RISE program may have improved households' resilience to shocks in its initial two years of operation. Note that two of these capacities were also shown in Chapter 6 to have likely boosted households' resilience to shocks: asset ownership and holdings of savings.

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<sup>31</sup> Both are reported as there is no clear indication in the literature which is more appropriate in the case of DID analysis.

**Table 19: Regression analysis of the relationship between resilience outcomes and RISE intervention exposure: Difference-in-difference analysis**

Independent variable	Low exposure			High exposure			Difference in difference	
	Baseline	Midline	Difference	Baseline	Midline	Difference	A	B
<b>Food security</b>								
Food security index	19.31	18.87	-0.44	21.14	18.63	-2.51 ***	-2.08 ***	*
Dietary diversity score	5.10	5.10	0.00	5.09	4.93	-0.17	-0.17	
<b>Resilience</b>								
Ability to recover	1.87	1.89	0.02	1.99	1.73	-0.26 **	-0.28 ***	**
<b>Resilience capacity</b>								
Index of resilience capacity	44.77	44.98	0.21	59.34	54.91	-4.43	-4.64 ***	
<b>Absorptive capacity</b>								
Bonding social capital	68.26	72.59	4.33	74.25	77.60	3.35	-0.98	
Holdings of savings	0.32	0.22	-0.10 **	0.42	0.41	-0.01	0.09 ***	
Access to informal safety nets	1.52	1.61	0.09	2.49	2.66	0.17	0.07	
Availability of hazard insurance	0.33	0.27	-0.06	0.59	0.26	-0.33 **	-0.26 ***	*
Disaster preparedness/mitigation	0.25	0.51	0.26 **	1.10	0.48	-0.63 **	-0.89 ***	***
Asset index	24.27	22.67	-1.60 **	22.87	24.06	1.18 *	2.78 ***	***
Index of absorptive capacity	38.29	38.39	0.09	53.78	47.43	-6.35	-6.44 ***	
<b>Adaptive capacity</b>								
Bridging social capital	51.94	53.82	1.88	53.18	58.58	5.41	3.52	
Linking social capital	38.80	41.24	2.43	55.23	47.74	-7.48 *	-9.92 ***	**
Aspirations/confidence to adapt	39.48	41.08	1.60	38.64	42.99	4.35	2.75 ***	
Livelihood diversity	2.59	2.44	-0.15 **	2.57	2.64	0.07	0.21 ***	**
Access to financial resources	0.93	0.90	-0.03	1.44	1.34	-0.10	-0.07	
Human capital	22.52	18.96	-3.56 ***	31.99	27.02	-4.97 ***	-1.41	
Exposure to information	3.07	2.59	-0.48 **	3.76	2.54	-1.23 ***	-0.75 ***	**
Asset index	24.27	22.67	-1.60 **	22.87	24.06	1.18 *	2.78 ***	***
Index of adaptive capacity	45.72	44.08	-1.64	55.85	52.51	-3.34	-1.69	
<b>Transformative capacity</b>								
Bridging social capital	51.94	53.82	1.88	53.18	58.58	5.41	3.52	
Linking social capital	38.80	41.24	2.43	55.23	47.74	-7.48 *	-9.92 ***	**
Access to markets	1.41	1.47	0.06	1.71	2.12	0.41	0.35 ***	
Access to infrastructure	1.03	1.09	0.06	1.50	1.30	-0.20	-0.25 ***	
Access to services	3.39	3.79	0.40 *	4.69	4.63	-0.06	-0.46 **	
Communal natural resources	1.78	1.76	-0.02	2.07	1.74	-0.33	-0.31 ***	
Availability of formal safety nets	0.56	0.70	0.15	1.37	1.14	-0.24	-0.38 ***	
Index of transformative capacity	37.05	41.62	4.57 **	56.87	52.86	-4.01	-8.58 ***	**

Notes: Asterisks represent statistical significance at the 10 (\*), 5(\*\*) and 1(\*\*\*) percent levels.  
The significance levels reported in column "A" do not take into account sampling weights while those in "B" do.

## 7.4 Summary

Chapter 4 found that overall, households' resilience in the RISE program area has seen a moderate decline since the baseline. However, this chapter's analysis using three techniques—cross-sectional OLS regression, panel growth regression, and difference-in-difference analysis—finds that the RISE program's interventions to date *have* likely enhanced households' resilience to shocks by boosting their adaptive and absorptive capacities. Evidence is found that the interventions may have boosted resilience through:

- Protecting asset ownership;
- Diversifying livelihoods;
- Enhancing households' holdings of savings;
- Increasing aspirations and confidence to adapt;
- Increasing access to markets.

Note that two of these capacities were found in the last chapter to boost households' resilience: Asset ownership and holdings of savings.

From Chapter 5, we saw that some of the capacities listed above are on the decline in the Burkina Faso area: adaptive capacity overall and, specifically, asset ownership, livelihood diversity and holdings of savings. The RISE program may have helped to moderate these declines. Others show an increasing trend: aspirations in both areas, and asset ownership, livelihood diversity, and access to markets in Niger. The RISE program's activities may be partially responsible for these positive signs of resilience-building progress.

## 8. QUALITATIVE FINDINGS FROM NIGER ON GENDER DYNAMICS

Qualitative data from Niger suggest an interesting dynamic may be resulting, at least in part, from RISE activities. According to both male and female FGD participants, men are considered the primary household breadwinner, and as such feel a sole responsibility for feeding and caring for their families. Such a perspective reaffirms traditional gender roles – for both men and women. Men in particular feel increased frustration and stress during times of crisis. In light of recurrent shocks, RISE activities promoting resilience capacity may be affecting these traditional gender roles, with positive consequences for all.

For example, the continuous erosion of men's and household's assets due to recurrent shocks is contributing to acceptance by both men and the community in general of women's agency and economic self-empowerment. That is, women's income-generating capacity becomes a necessary resource for household survival and is no longer perceived as a threat to the gender order.



Men are becoming more flexible regarding their own gendered identities, engaging in IGAs traditionally not associated with the male sphere of influence. According to many respondents, the need to earn money is the main driver of these changes. Supported by project initiatives, men are initiating businesses that are traditionally a woman's realm (e.g., preparing and selling *beignets*, a type of fritter or doughnut) and women are cultivating crops typically grown by men (e.g., beans).

Decision-making is consistently considered by both male and female respondents to be the responsibility of the head of household.

Women assume this function only when their husbands are absent, and normally under the advice of their husband's family. Based on the interviews and FGDs conducted, decision making through collective discourse does not pertain to women in either low- or high-exposure villages.

Nevertheless, as a group of men in Zinder Region recognized, a complex set of factors is driving change: increasing population pressure, men struggling to provide enough food and resources to support the family, a high level of migration, changes in women's economic status (facilitated by RISE and other projects), and women's generation of resources highly needed for household survival. Taken together, these factors are encouraging cultural change and creating conditions for the acceptance of women's participation in decision making at the household level.

Women in one of the sampled low-exposure villages spoke openly about the positive changes observed in men's attitudes toward women as a result of development projects in the

**Box 16: Quote from men's FGD on gender, Zinder Region**

"If the head of household does not have anything, it is the woman who takes care of the household; this allows her to have an active role in the decision-making process."

community. According to the women, the projects have given women space and value, both by making aid conditional on women's involvement in project activities and in targeting women for microcredit activities.

At the very least, the range of opportunities for women has expanded, mainly as an effect of the economic empowerment facilitated by development projects, including RISE. As expressed by a group of men in a high-exposure village in the Maradi Region, men have started to view women differently as a result of women's increased economic capacity (i.e., from RISE and other

**Box 15: Quote from men's FGD on gender, Zinder Region**

"Seventy percent of assets belong to the head of household. But this can change with the situation, because the more the burden of one's family gets heavier [for men], the more women engage in supporting the household and control assets.... In the last five years women's income increased as they have been helped in animal husbandry, agriculture, and savings through the projects and their different activities."

project activities) and their ability to lend money or other assets (e.g., livestock) to their own husbands.

RISE activities also include implementation of Ecole de Maris (EDM) or “Husbands’ School,” which involve positive messaging and reinforcement of gender attitudes that support women. Overall, the EDM activity is well accepted by men, who seem to view it as an opportunity for men’s development and for achieving a well-managed household. EDM activities have focused on different themes in each of the three FFP projects (PASAM TAI, SAWKI and LAHIA). For example, REGIS-ER has encouraged men to consider practices and habits to improve the family’s hygiene and healthcare, and to support women’s nutrition and health during pregnancy, including accompanying women to the health center during pregnancy and for delivery, and practicing birth spacing to protect and foster the health of the newborn, mother, and whole family. In a village in the Maradi Region where EDM has been implemented for several years, interviewed men referred to their wives as peers and recall how – with the support of the project (mainly microcredit and guidance) – they could boost their initially small agricultural production, develop vegetable production, and engage in commercialization. Men reportedly felt that there was less intra-household conflict, and explained that women’s economic empowerment had helped change their attitudes about some of the cultural conventions that restrained women’s mobility.

In a high-exposure village in Zinder, both men and women credit changes in men’s willingness to share domestic tasks to the EDM, though this activity started only recently. Nevertheless, while some messages are welcomed by most Model Husbands, some men remained less enthusiastic, suggesting instead that men’s willingness to do some household tasks does not, in fact, weaken traditional gender roles. As one Model Husband put it, *“My second wife expressed the desire to have a break from pregnancies. I told her I have to think about it before answering. You do not say yes to a woman right away.”*

**Box 17: Quote from men’s FGD on resilience, Maradi Region**

“Frankly speaking, I have gone through many changes in my life, as before [I started taking part in EDM] I had no understanding of women’s issues, not even why women would go to the maternity ward in the health center for doctor visits or to give birth.”

Women’s economic independence has also been an important factor in reducing gender-based violence (GBV) and domestic abuse, although women noted more subtle forms of abuse still exist (e.g., husbands denying their wives permission to leave the house, shutting down internal communication between spouses). Overall, changes in men’s attitudes about women’s participation in market activities and household decision-making, along with better appreciation and support for their health, particularly their reproductive health, are clearly perceived by both men and women as critical to household resilience.

## 9. CONCLUSION: KEY FINDINGS AND PROGRAM IMPLICATIONS

### Key findings

The two-year period between the baseline and midline surveys was marked by an increase in shock exposure in the RISE program area, including increases in drought, flooding, insect invasions, animal disease outbreaks, food price inflation, and illness. A major drought hit both the Burkina Faso and Niger program areas immediately following the baseline survey, during the 2015 rainy season. In the wake of this increased shock exposure, both food security and the ability to recover from shocks held steady in the Burkina Faso area but declined in the Niger area.

All three types of resilience capacity—absorptive, adaptive and transformative—show very little change in the RISE area as a whole since the baseline. However, there was a small decline in resilience capacity in the Burkina Faso area (particularly in adaptive capacity), marked by drops in linking social capital, livelihood diversity, asset ownership, exposure to information, holdings of savings, access to firewood on communal lands, and access to hazard insurance. The Niger area saw improvements in some capacities (bonding social capital, aspirations and confidence to adapt, livelihood diversity, asset ownership, and access to markets), but declines in others (access to infrastructure, access to communal natural resources, exposure to information, and access to hazard insurance).

This report's empirical analysis provides evidence that all three types of resilience capacity do indeed serve to enhance households' resilience to shocks, especially absorptive capacity. The specific capacities that may have helped households recover from the shocks they experienced in the period between the baseline and midline surveys are: bonding and bridging social capital, asset ownership, access to financial resources, holdings of savings, availability of hazard insurance, and support for disaster preparedness and mitigation. It is particularly concerning, then, that three of these capacities are on the decline: the availability of hazard insurance in both program areas, and asset ownership and holdings of savings in the Burkina Faso area. It is important to keep in mind that these regression-based quantitative results are exploratory, not causal. However, it is encouraging that they are consistent with resilience theory.

Further empirical analysis provides suggestive evidence that the RISE program's interventions to date have likely enhanced households' ability to recover from shocks. They have done so by boosting households' absorptive and adaptive capacities, increasing resilience through:

- Protecting asset ownership
- Diversifying livelihoods
- Enhancing households' holdings of savings

- Increasing aspirations and confidence to adapt
- Increasing access to markets.

Thus the RISE program may have been instrumental in moderating the declines in adaptive capacity, asset ownership, livelihood diversity and holdings of savings seen in the Burkina Faso area. Further, it may be partially responsible for the increases seen in aspirations in both areas, and in asset ownership, livelihood diversity, and access to markets in Niger. The more rigorous impact evaluation techniques to be employed at endline will give further insight into these impacts.

Qualitative data collected in the Niger area point to some positive changes regarding gender roles and equality that may be linked to RISE activities, including greater economic independence and participation in household decision-making by women, greater support among men for women's health, and reduced gender-based violence and domestic abuse.

### Program implications

The results captured in this midline report point to a number of areas where attention should be given in programming decisions. These are summarized below.

- **Shifting differences between Burkina Faso and Niger program areas:** Adjustments to programs under RISE have to take into account that food insecurity got much worse in Niger since the baseline and remained steady in Burkina Faso. From the qualitative data, it appears that rainfall variability and drought are the main factors driving this change in food insecurity. The use of food security-related coping strategies (e.g., consuming seed stock, reducing the number of meals eaten in a day, and limiting portion sizes at meals) increased in Niger since the baseline. The ability to recover has declined for Niger households as well. These changes have prompted the program to set up a recurrent monitoring system to track household responses to shock exposure over time to enable more fine tuning in program adaptive management for each area. This information will also be critical for determining when and where to implement social protection activities such as a crisis modifier.
- **Many absorptive capacities are buffering households against shocks, but some are declining, especially in Burkina Faso.** Absorptive capacity is particularly key to helping households recover from drought shocks. The RISE program should continue to strengthen important absorptive capacities such as: **bonding social capital** (through group formation), **holding of savings** through savings groups (savings was in decline in Burkina Faso even though there was an increase in the number of savings groups), **access to hazard insurance** (which is on the decline in both Burkina Faso and Niger), and **disaster preparedness and mitigation**. All of these programming areas were identified as key to enabling households to absorb shocks.

- **Increasing and protecting household assets is also key to enhancing resilience.** Asset ownership, which is important to both absorptive and adaptive capacity, and should remain a key focus of RISE program interventions. Given the importance of assets and savings in helping to boost household resilience to shocks, it is a major concern that they are on a declining trend in the Burkina Faso area.
- **Diversifying livelihoods into different risk environments is felt by households to have a positive effect on their resilience.** Similar to the baseline, qualitative interviews in the midline indicated that livelihood diversity is an important way to deal with shocks in both Burkina Faso and Niger. Livelihood diversity declined in Burkina Faso but increased in Niger. More focus needs to be given to why it is declining in Burkina Faso. Based on the midline quantitative analysis, RISE programming has been influential in increasing livelihood diversity; programming to enhance alternative income generating activities, as well as intensifying agricultural production, should continue to be strengthened.
- **Access to financial services is important to boosting households' resilience in the face of shocks.** Based on the regression analysis, this is one of the key adaptive capacities that buffers households to shocks because it can be used to diversify livelihoods. Qualitative interviews in both countries also supported the notion that access to financial services enables households to manage shocks. There are differences between Burkina Faso and Niger with regards to access to microfinance institutions. It would be important to determine what systems level effects the shocks are having on these institutions. This should be explored as part of the Recurrent Monitoring System (RMS) work (see "Next steps" below).
- **From the baseline quantitative analysis, aspirations and confidence to adapt appear to have a positive influence on households' ability to recover.** There is evidence that these psycho-social dimensions have increased in the RISE program area since the baseline. Program efforts promoted through RISE seem to be having a positive effect on aspirations and confidence to adapt which is contributing to enhance household resilience. It would be important for the RISE program implementers to determine how it is supporting these psycho-social dimensions and expand on these efforts.
- **Although exposure to information is an important adaptive capacity it is declining in both Burkina Faso and Niger.** Important types of information that can enable households to adapt to shocks more effectively are access to market information, information on livestock/crop disease threats or epidemics, and climatic information. Given that cell phone use is extensive in both countries, more could be done on disseminating market and climate information through through this means. Note that there is some evidence that phone access went up since the baseline in Burkina Faso but down in Niger (see Appendix 2).

- **According to the midline quantitative analysis, the RISE program is improving household access to markets**, which may be why it is increasing in Niger. It is important to determine why access to markets is increasing in Niger but not to the same extent in Burkina Faso.
- **Qualitative data indicate that RISE programming is increasing women's income-generating capacity and economic self-empowerment in Niger.** These changes in women's economic status facilitated by the RISE program are creating conditions for the acceptance of women's participation in decision making, men's support for women's health, and reduced gender-based violence and domestic abuse. It is important to understand these changes at a deeper level, using both quantitative and qualitative data collection techniques, and determine if similar successes can be found in Burkina Faso.
- Beyond market access, the RISE program should continue to **strengthen transformative capacities** in both program areas. Although there is some sign of a positive trend in access to piped water in both Burkina Faso and Niger, there have been no changes in access to basic services. Access to veterinary services, lack of which was identified in the baseline qualitative data to be main concern, remains particularly low. With respect to infrastructure, access to paved roads has declined considerably in Niger. Further, access to communal natural resources has declined overall in the RISE program area due to the drop in access to firewood (see Appendix 2).

**Next Steps.** The next step in the evaluation of the RISE program is to set up a recurrent monitoring system to capture real-time household and community responses to shocks and stresses as they occur over the next year. Information related to shocks and stresses will be collected such as climate variables (rainfall), price levels, animal disease levels, and conflict. Follow-up survey activities are being carried out with panel households. Quantitative and qualitative data collection activities using short survey instruments and topical outlines have commenced and will be carried out every 2 months over a 12-month period. The main focus of these recurrent monitoring activities is to assess household and community capacity to manage covariate and idiosyncratic shocks and stresses.

In addition to these surveys, further analyses will be carried out using the existing midline data to explore the livelihood strategies and characteristics of the households that did recover from shocks and unpack the consequences of engaging in negative coping strategies on future resilience.

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# APPENDIX I. TANGO METHOD FOR CALCULATING AND UPDATING RESILIENCE CAPACITY INDEXES

(April 2018)

This document lays out TANGO’s method for calculating resilience capacity indexes that are comparable over time, in this example across a baseline and endline survey. The most important property of such an index is that it represents the concept being measured as closely as possible. To achieve this, the analyst should always start by identifying a comprehensive set of valid indicators. The indicators, referred to here as “index components,” should be correlated with each other and the final index in the expected direction (based on theoretical priors).

In overview, the TANGO method employs factor analysis applied to *baseline* household data to calculate index weights. These weights are then used to calculate both baseline and endline resilience capacity indexes, as detailed in the following five steps.

## Step I. Calculate index weights and baseline index values

The weights used for calculating both baseline and endline index values, denoted “ $w_i$ ”, one for each index component, are computed using factor analysis (the default “principal factors” option) and baseline data.<sup>32</sup>

The factor analysis may yield multiple “factors.” Which should be used for the index calculation? The reported loadings for each factor correspond to the signs (positive or negative) of the weights used for constructing the final index. The final factor for constructing the baseline and endline indexes is chosen based on consistency with the *meaning* of the concept being measured. For example, if the underlying index components should all be positively correlated with the concept, then the weights should all be positive.<sup>33</sup> If the components have been chosen well from the start, the selected factor is typically the first factor, the one contributing the most to the components’ overall variance.

The baseline index itself is calculated directly in STATA using the “predict” command (assuming the default “regression” option). STATA automatically standardizes the values of the index components to have mean=1 and standard deviation=0 as part of the calculation.

Given five index components  $Z_{1\_bl}$ ,  $Z_{2\_bl}$ ,  $Z_{3\_bl}$ ,  $Z_{4\_bl}$  and  $Z_{5\_bl}$ , the STATA code for conducting the factor analysis to calculate the baseline index (denoted  $Y_{bl}$ ) is:

---

<sup>32</sup> Other options are to use the endline data or a combination of both baseline and endline data. These would only be considered if the index weights differ substantially when baseline versus endline data are employed.

<sup>33</sup> For examples of this approach to interpreting factor analysis output see <https://www.stata.com/manuals13/mvfactor.pdf> and <https://www.stata.com/manuals13/mvfactorpostestimation.pdf>.

```
factor Z_1_bl - Z_5_bl
predict Y_bl
```

The code for saving the index weights for later use (to calculate the endline index) is

```
matrix(W)=r(scoef)
forvalues x=1/5 {scalar w`x'_=W[`x',1]
  gen w`x'=w`x'_}
collapse w*
```

## Step 2. Conduct KMO test

Next, the Kaiser–Meyer–Olkin (KMO) test of whether the index components have enough in common to warrant a factor analysis is conducted using the following command:<sup>34</sup>

```
estat kmo
```

## Step 3. Calculate means and standard deviations of baseline index components

The index components for the endline must be standardized manually using *baseline* means and standard deviations before calculating the updated endline index value. The following are the STATA commands for doing so:

```
forvalues x = 1/5 { egen m_Z_`x'_bl=mean(Z_`x'_bl) }
forvalues x = 1/5 { egen sd_Z_`x'_bl=sd(Z_`x'_bl) }
```

## Step 4. Calculate standardized values of endline index components<sup>35</sup>

Standardized endline values of the index components are calculated in STATA using the means and SD's calculated in Step 3 as follows.

```
forvalues x = 1/5 { gen Z_`x'_el_std = (Z_`x'_el-m_Z_`x'_bl)/sd_Z_`x'_bl }
```

## Step 5. Calculate endline index value

Finally, the endline index values are calculated using (1) the index weights calculated in Step 1; and (2) the standardized endline index components calculated in Step 4, as follows:

```
gen Y_el = Z_1_el_std* w_1 +
  Z_2_el_std* w_2 +
  Z_3_el_std* w_3 +
```

<sup>34</sup> KMO values less than 0.5 are considered to be “unacceptable.” (see <https://www.stata.com/manuals13/mvfactorpostestimation.pdf>).

<sup>35</sup> The procedures for updating indexes follows that in “Measuring equity with nationally representative wealth quintiles”, PSI 2014 (<http://www.psi.org/wp-content/uploads/2014/10/Wealth-Quintile-Guide.pdf>)

$$Z_{4\_el\_std} * w_4 + \\ Z_{5\_el\_std} * w_5.$$

## Note on index re-scaling

Indexes are often re-scaled for ease of interpretation and presentation. For example, an index may be re-scaled to run from 0 to 100 using the following commands:

```
egen max = max(index_old)  
egen min = min(index_old)  
gen index_new = (index_old - min) * 100 / (max - min) .
```

After rescaling the baseline index, in order to ensure comparability, it is very important to also rescale the endline index using the *same maximum and minimum values used for the baseline re-scaling*.

## APPENDIX 2. TRENDS IN HOUSEHOLD RESILIENCE CAPACITY: SUPPLEMENTARY TABLES

**Table A2.1 Changes in social capital and aspirations, by program area**

Indicator	All		Program area				
	Baseline	Midline	Burkina Faso		Niger		
			Baseline	Midline	Baseline	Midline	
<b>Social capital</b>							
Bonding social capital	71.3	75.1	75.7	71.0	65.9 <sup>a</sup>	80.3 <sup>a</sup>	
Bridging social capital	52.6	56.2	51.7	46.1	53.7 <sup>a</sup>	68.7 <sup>a</sup>	
Linking social capital	47.1	44.5	54.1 <sup>a</sup>	48.6 <sup>a</sup>	38.6	39.7	
<b>Aspirations and confidence to adapt</b>							
Index	39.1 <sup>a</sup>	42.0 <sup>a</sup>	43.4	44.6	33.6	38.9	
Index components							
Absence of fatalism	25.4	25.9	28.8	29.4	21.1	21.5	
Belief in individual power to enact change	50.9	51.9	54.4	57.1	46.5	45.4	
Exposure to alternatives to the status quo	25.5 <sup>a</sup>	29.4 <sup>a</sup>	27.5	26.9	22.9 <sup>a</sup>	32.5 <sup>a</sup>	

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

**Table A2.2 Changes in livelihood diversity and asset ownership, by program area**

Indicator	All		Program area			
	Baseline	Midline	Burkina Faso		Niger	
			Baseline	Midline	Baseline	Midline
<b>Livelihood diversity</b>	2.58	2.54	2.71 <sup>a</sup>	2.46 <sup>a</sup>	2.41 <sup>a</sup>	2.64 <sup>a</sup>
<b>Livelihood sources (percent of households)</b>						
Agricultural sources						
Crop production and sales	93.1 <sup>a</sup>	86.0 <sup>a</sup>	90.8 <sup>a</sup>	81.2 <sup>a</sup>	96.0 <sup>a</sup>	91.9 <sup>a</sup>
Livestock production and sales	64.3	64.6	84.7	84.4	39.1	40.2
Agricultural laborer	3.5	4.1	1.6 <sup>a</sup>	0.1 <sup>a</sup>	5.9	9.1
Production/sales of seedlings, seeds, and fodder	0.7 <sup>a</sup>	2.7 <sup>a</sup>	0.2	0.0	1.2 <sup>a</sup>	6.1 <sup>a</sup>
Production/sales of firewood, coal, and lumber	1.6	2.6	0.8	0.1	2.6	5.6
Sales of wild products	1.1	0.7	1.2 <sup>a</sup>	0.2 <sup>a</sup>	1.1	1.2
Employed in a commercial agricultural enterprise	0.4	0.2	0.6	0.2	0.1	0.1
Private agricultural service provider	0.0	0.3	0.1	0.2	0.0	0.4
Non-Agricultural sources						
Petty commerce	24.8	26.6	25.4	24.5	24.1	29.1
Non-agricultural service provider	3.3	1.3	4.0 <sup>a</sup>	0.6 <sup>a</sup>	2.3	2.3
Technical/professional	6.8	6.9	7.9	8.0	5.5	5.5
Artisanal mining	13.3 <sup>a</sup>	10.1 <sup>a</sup>	21.6 <sup>a</sup>	16.1 <sup>a</sup>	3.1	2.8
Non-agricultural worker	1.0	1.0	1.1	0.5	0.9	1.6
Household help	0.3	0.2	0.5	0.1	0.1	0.3
Artisan	2.6	4.1	3.9 <sup>a</sup>	1.9 <sup>a</sup>	1.0 <sup>a</sup>	6.8 <sup>a</sup>
Transportation/docker	1.2	1.4	1.1	0.3	1.3 <sup>a</sup>	2.8 <sup>a</sup>
External, non-agricultural sources						
Migration (remittances)	25.8 <sup>a</sup>	21.8 <sup>a</sup>	9.7	10.8	45.7 <sup>a</sup>	35.2 <sup>a</sup>
Gifts/inheritance	5.7	6.5	8.9	7.5	1.6 <sup>a</sup>	5.2 <sup>a</sup>
<b>Asset ownership</b>						
Overall index	23.6	23.4	27.2 <sup>a</sup>	25.1 <sup>a</sup>	19.1 <sup>a</sup>	21.2 <sup>a</sup>
Index of consumer durables owned	7.8 <sup>a</sup>	8.18 <sup>a</sup>	9.27	9.15	5.95 <sup>a</sup>	6.98 <sup>a</sup>
Index of farming implements owned	4.35	4.14	4.77 <sup>a</sup>	4.18 <sup>a</sup>	3.85	4.09
Animals owned (Tropical Livestock Units)	3.71	3.61	5.54	5.24	1.47	1.60
Land owned (ha)	3.69	3.41	3.66 <sup>a</sup>	3.13 <sup>a</sup>	3.73	3.76

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

**Table A2.3 Changes in access to markets, infrastructure, services, and communal natural resources, by program area**

Indicator	All		Program area				
	Baseline	Midline	Burkina Faso		Niger		
			Baseline	Midline	Baseline	Midline	
<b>Markets</b>							
Livestock	51.6	65.3	59.6	56.6	42.0 <sup>a</sup>	76.1 <sup>a</sup>	
Agricultural products	61.7 <sup>a</sup>	59.0 <sup>a</sup>	65.1	63.2	57.5	53.9	
Agricultural inputs	44.9	57.2	55.6	48.9	31.9 <sup>a</sup>	67.3 <sup>a</sup>	
Index of access to markets	1.58	1.82	1.80	1.69	1.31 <sup>a</sup>	1.97 <sup>a</sup>	
<b>Infrastructure</b>							
Piped water is a main source of drinking water	17.6	25.6	16.7	24.2	18.8	27.3	
Electricity used by >50% of hhs	7.0	5.3	8.5	4.6	5.2	6.2	
Phone access	78.0	71.3	78.4	85.1	77.4	54.2	
Paved road	23.1	16.9	18.8	21.2	28.3 <sup>a</sup>	11.6 <sup>a</sup>	
Index of access to infrastructure	1.26	1.19	1.23	1.35	1.30	0.99	
<b>Basic services</b>							
Primary school within 5 km	98.7	99.3	100.0	98.7	97.1	100.0	
Health center within 5 km	70.0	77.4	63.9	66.9	77.4	90.3	
Veterinary services within 5 km	24.1	23.0	21.7	28.1	27.0	16.6	
Agricultural extension available	53.8	53.7	68.3	58.1	36.4	48.2	
Credit institutions	53.1	54.9	63.6	64.5	40.5	43.2	
Savings institutions	46.6	51.1	46.3	59.9	47.0	40.3	
Security services are available	55.6	63.5	56.3	64.6	54.8	62.2	
Index of access to basic services	4.03	4.23	4.22	4.41	3.81	4.01	
<b>Communal natural resources</b>							
Village has communal grazing areas	64.4	60.0	41.9	41.5	91.5	82.8	
Village has communal water sources for livestock	58.8	65.6	60.7	60.4	56.5	71.9	
Firewood can be obtained from communal land	71.2 <sup>a</sup>	49.4 <sup>a</sup>	78.5 <sup>a</sup>	62.8 <sup>a</sup>	62.4 <sup>a</sup>	33.0 <sup>a</sup>	
Index of access to communal natural resources	1.94	1.75	1.81	1.65	2.10	1.88	

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

**Table A2.4 Changes in human capital and exposure to information, by program area**

Indicator	All		Program area			
	Baseline	Midline	Burkina Faso		Niger	
			Baseline	Midline	Baseline	Midline
Percent of households with a literate adult	33.3	31.3	33.0	34.6	33.7 <sup>a</sup>	27.2 <sup>a</sup>
Percent of households with an adult having primary or higher education	29.3	30.1	25.5	28.2	34.4	32.6
Number of different types of trainings received by adult household members	0.24 <sup>a</sup>	0.15 <sup>a</sup>	0.26 <sup>a</sup>	0.15 <sup>a</sup>	0.21	0.16
Index of human capital	27.2	26.2	25.9	26.7	28.9	25.7
Index of exposure to information	3.46 <sup>a</sup>	2.56 <sup>a</sup>	3.43 <sup>a</sup>	2.58 <sup>a</sup>	3.51 <sup>a</sup>	2.54 <sup>a</sup>

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

**Table A2.5 Changes in access to formal and informal safety nets, by program area**

Indicator	All		Program area				
	Baseline	Midline	Burkina Faso		Niger		
			Baseline	Midline	Baseline	Midline	
<b>Formal safety nets (percent of households)</b>							
Food assistance	51.4	45.9	48.2	50.0	55.3	40.8	
Housing and other non-food assistance	17.9	23.7	16.8	31.3	19.3	14.3	
Assistance in the case of livestock losses	13.1	12.0	6.6	8.9	21.1	15.8	
Assistance in the case of a disaster (from government or an NGO)	14.8	10.9	6.5	7.4	25.0	15.4	
Index of availability of formal safety nets	0.97	0.92	0.78	0.98	1.21	0.86	
<b>Informal safety nets (community organisations)</b>							
Credit or microfinance group	28.7	26.8	29.0	27.5	28.4	26.0	
Savings group	29.7	28.2	19.6	24.9	42.2	32.2	
Mutual help group	25.1	18.9	33.2	28.6	15.1	7.0	
Civic (improving community) group	9.0	14.3	7.6	19.4	10.8	8.1	
Charitable group	5.7	4.8	5.7	6.0	5.8	3.4	
Religious group	29.8 <sup>a</sup>	43.3 <sup>a</sup>	43.4 <sup>a</sup>	68.7 <sup>a</sup>	13.0	11.9	
Women's group	73.3	78.0	78.0	84.2	67.5	70.4	
Index of availability of informal safety nets	2.01	2.14	2.16	2.59	1.83	1.59	

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

**Table A2.6 Changes in disaster preparedness and mitigation, availability of hazard insurance, and conflict mitigation support, by program area**

Indicator	All		Program area				
	Baseline	Midline	Burkina Faso		Niger		
			Baseline	Midline	Baseline	Midline	
<b>Disaster preparedness and mitigation (percent of households)</b>							
Availability of a government disaster planning or response program	15.1	6.3	10.0	7.2	21.3	5.3	
Availability of an NGO disaster planning or response program	16.6	11.8	9.4	9.3	25.6	15.0	
Availability of a disaster planning group	14.9	8.2	0.5	5.6	32.6 <sup>a</sup>	11.4 <sup>a</sup>	
Emergency plan for livestock offtake if a drought hits	21.9	23.1	21.4	28.7	22.6	16.1	
Index of disaster preparedness and mitigation	0.68	0.49	0.41	0.51	1.02	0.48	
Availability of hazard insurance (%)	46.2 <sup>a</sup>	26.5 <sup>a</sup>	40.6 <sup>a</sup>	18.8 <sup>a</sup>	53.2	35.9	
Availability of an institution providing conflict mitigation (%)	55.4	46.8	62.5	58.6	46.6	32.3	

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



# APPENDIX 3. STANDARD PRECIPITATION INDEX VALUES SINCE JANUARY 2000

**Table A3.I: One month Standard Precipitation Index for the Burkina Faso and Niger program areas (January 2000 to December 2015)**

Year	Month	Burkina Faso	Niger	Year	Month	Burkina Faso	Niger	Year	Month	Burkina Faso	Niger	Year	Month	Burkina Faso	Niger
2000	Jan	-0.031	0.013	2005	Jan	-0.039	0.007	2010	Jan	0.1643	0.2597	2015	Jan	0.3169	0.0650
	Feb	-0.031	0.013		Feb	-0.050	0.015		Feb	-0.0211	-0.0410		Feb	0.0079	-0.0218
	March	-0.006	-0.152		March	0.101	0.679		March	-0.0285	0.2137		March	0.0353	-0.1688
	April	-0.606	0.172		April	0.897	0.382		April	-0.5132	-0.0716		April	-0.3565	0.3233
	May	0.181	-0.597		May	0.599	0.317		May	-0.1198	-0.0022		May	-0.8216	-0.0362
	June	-0.580	-0.525		June	1.349	0.221		June	0.7363	0.5234		June	-1.1142	-1.8585
	July	-0.263	0.110		July	2.138	1.601		July	-0.0294	0.3280		July	-0.2970	-0.4395
	Aug	-0.383	0.201		Aug	0.926	0.955		Aug	-0.9128	0.0130		Aug	-0.1172	0.1288
	Sept	-0.799	-0.204		Sept	-0.209	-0.431		Sept	0.8593	-0.2941		Sept	1.2126	0.8995
	Oct	-1.052	-0.511		Oct	-0.226	-0.094		Oct	0.8717	0.3868		Oct	0.8391	0.5733
	Nov	-0.860	0.179		Nov	0.163	0.309		Nov	1.3986	0.7555		Nov	2.2082	0.6262
	Dec	-0.177	0.048		Dec	0.142	0.215		Dec	1.3610	1.4933		Dec	1.0574	0.2902
2001	Jan	-0.149	0.025	2006	Jan	-0.186	0.044	2011	Jan	0.3009	0.3149	2016	Jan	0.1926	0.0614
	Feb	-0.069	-0.012		Feb	0.027	0.075		Feb	-0.0683	0.0136		Feb	-0.0363	-0.0185
	March	0.003	0.152		March	-0.014	-0.017		March	0.0072	0.1981		March	-0.0102	0.4138
	April	-0.581	0.066		April	-0.323	0.347		April	-0.4772	0.2225		April	-0.0123	0.1499
	May	-1.372	0.331		May	-0.628	-0.145		May	0.6170	0.0051		May	0.7744	0.2941
	June	0.301	0.385		June	-0.262	-0.063		June	-0.1299	-0.6566		June	0.8978	-0.5452
	July	-0.273	-0.160		July	-0.037	0.246		July	0.2538	0.3908		July	0.9780	0.7129
	Aug	-0.058	0.117		Aug	-0.161	-0.225		Aug	-0.3513	0.0166		Aug	0.2518	1.3081
	Sept	-0.190	0.027		Sept	-0.445	-0.132		Sept	-0.1079	-0.5868		Sept	0.5203	-0.0694
	Oct	0.047	0.018		Oct	-0.255	-0.279		Oct	0.1383	-0.4305		Oct	0.3044	-0.2215
	Nov	-0.222	-0.379		Nov	0.540	-0.009		Nov	-0.1624	-0.5976		Nov	-0.3713	-0.2854
	Dec	0.512	-0.355		Dec	-0.586	0.275		Dec	-0.6825	-0.2134		Dec	-0.3806	-0.2261
2002	Jan	-0.181	0.000	2007	Jan	0.506	0.044	2012	Jan	0.0206	0.2002	2017	Jan	-0.0731	-0.0110
	Feb	-0.092	0.013		Feb	0.027	-0.041		Feb	-0.0062	-0.0291		Feb	-0.0121	0.0354
	March	0.042	0.127		March	0.060	0.067		March	-0.0424	0.2254		March	0.0389	0.1525
	April	-0.600	0.453		April	-0.649	-0.063		April	-0.5281	0.2619		April	-0.5839	0.0198
	May	0.335	-0.339		May	0.146	-0.236		May	0.7387	0.1564		May	0.3205	0.4082
	June	-0.107	-0.865		June	0.873	-0.154		June	0.3223	0.4420		June	1.5685	-0.0226
	July	0.255	-0.514		July	-1.089	-0.755		July	0.7528	1.0057		July	1.7680	0.8661
	Aug	-0.401	-0.727		Aug	-0.336	-0.066		Aug	0.3452	0.7336		Aug	-0.0714	1.0170
	Sept	-0.937	-0.189		Sept	0.746	0.442		Sept	0.7402	-0.0748		Sept	-0.4528	0.2070
	Oct	-1.157	-0.352		Oct	0.332	-0.487		Oct	0.5416	-0.0338		Oct	0.2372	-0.0103
	Nov	1.076	0.748		Nov	-0.286	-0.382		Nov	0.4617	-0.1368		Nov	-0.3067	-0.7794
	Dec	0.447	1.251		Dec	-0.480	-0.293		Dec	1.1173	0.6188		Dec	-0.2888	-0.3878
2003	Jan	0.106	-0.036	2008	Jan	1.625	0.360	2013	Jan	0.3562	0.0593				
	Feb	-0.080	-0.018		Feb	-0.020	-0.017		Feb	-0.0159	-0.0183				
	March	0.001	-0.030		March	0.064	-0.034		March	-0.0017	0.5916				
	April	0.698	0.278		April	-0.305	-0.273		April	-0.4059	0.1719				
	May	0.497	0.494		May	-1.239	-0.423		May	0.2106	-0.0425				
	June	0.354	0.384		June	-0.285	-0.210		June	0.5051	-0.1552				
	July	0.651	0.848		July	-0.160	-0.280		July	0.3595	-0.0530				
	Aug	1.510	0.474		Aug	0.537	0.400		Aug	0.5224	0.1274				
	Sept	0.293	0.720		Sept	0.644	-0.189		Sept	0.4118	0.1662				
	Oct	0.692	0.521		Oct	-0.208	-0.072		Oct	-0.0211	0.0383				
	Nov	1.119	0.217		Nov	0.055	-0.831		Nov	0.6477	-0.6082				
	Dec	0.906	0.716		Dec	0.279	-0.275		Dec	-0.8872	-0.3638				
2004	Jan	-0.179	-0.024	2009	Jan	0.222	0.317	2014	Jan	0.1032	0.1335				
	Feb	-0.051	0.017		Feb	-0.054	0.014		Feb	-0.0503	-0.0323				
	March	-0.012	0.279		March	0.038	0.236		March	0.0469	0.1713				
	April	-0.281	0.103		April	-0.287	0.188		April	-0.3937	0.2061				
	May	0.795	0.385		May	-0.159	-0.026		May	-0.3829	-0.1863				
	June	0.112	0.478		June	0.270	0.262		June	0.6706	0.6524				
	July	-0.531	-0.085		July	-0.335	0.311		July	0.7298	0.1823				
	Aug	-1.184	-0.347		Aug	-0.025	0.450		Aug	0.0307	0.0597				
	Sept	0.234	0.060		Sept	0.300	-0.302		Sept	-0.1850	0.2346				
	Oct	-1.023	-0.347		Oct	0.788	-0.228		Oct	0.2843	-0.3405				
	Nov	-0.540	-0.746		Nov	0.745	0.409		Nov	0.9784	0.2986				
	Dec	-0.674	-0.449		Dec	1.955	2.833		Dec	-0.0533	-0.1738				

